Oxford City Housing Limited

LAND EAST OF WARREN CRESCENT

Land Quality Assessment

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July 2018 Confidential

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Land Quality Assessment

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APPENDICES

EXECUTIVE SUMMARY

WSP UK Limited (WSP) undertook a ground investigation at the Site at Land to the East of Warren Crescent, Oxford in order to facilitate discharge of Condition 26 of Planning Application 13/01555/CT3, in relation to the proposed residential development of the land.

The majority of the Site currently comprises amenity grassland, with a tarmac and concrete hardstanding car park in northwest corner. The Site is situated adjacent to the fenland Lye Valley which, to the south of the Site, forms a Site of Special Scientific Interest. Natural springs are located on the valley slopes to the east and downgradient of the Site near/at the base of the steep eastern boundary embankment and the Lye Brook runs through the base of the valley.

This report follows a Phase 1 Assessment which was previously completed for the Site by Peter Brett Associates LLP (dated December 2012), where the potential for contamination to be present at the Site was identified. The potential for contamination was associated with the Made Ground across the Site, due to the significant ground re-working/infilling to steepen the eastern boundary embankment.

Ground conditions were recorded to comprise a mantle of Made Ground (increasing significantly to the east of the Site) over the Beckley Sand Member. Potential Wheatley Limestone may be inferred to be present recorded at shallow depths in the west of the Site as the Site is located at the interface between the two strata. Groundwater flow is indicated to be southerly across the Site.

A generic quantitative risk assessment was undertaken for both human health and controlled waters. The principal receptors were considered to comprise residential site users and the surface waters of the Lye Valley (springs and Lye Brook).

Elevated polycyclic hydrocarbons (PAHs) were recorded in the Made Ground in the east of the Site (WS103), as well as leachable concentrations of selected PAHs, which exceed the applied criteria for human health and surface waters. It is considered that PAHs are associated with the localised presence of bitumen recorded in the Made Ground.

The Site is classified as NHBC Green for risks from ground gas, therefore no special protection measures are required for the proposed development.

Risks to controlled waters from the Site are considered to be low. Although there is potential for PAHs in the Made Ground to impact groundwater and surface waters, the localised and inconsistent distribution of PAH concentrations within the groundwater and surface waters, both on-site and upgradient/upstream of the receptors, indicates that the groundwater quality is also reflective of background water quality which is also influenced by highways run-off/ discharges and poor quality sewerage. PAH concentrations recorded in the springs may also be elevated due to organic interference. It is considered that the development will create a betterment of the Site conditions (i.e. through improved drainage, clean soil cover and use of interceptors) which will likely improve local groundwater quality.

It is recommended that the following is implemented into the development:

- Removal fo Made Ground or a clean cover layer should be incorporated into proposed garden areas. A suitable depth of clean cover soil is to be agreed with the Local Authority.
- Selection of appropriate water supply pipes should be undertaken with the Local Water Authority.

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1. INTRODUCTION

1.1. TERMS OF REFERENCE

WSP UK Limited (WSP) was instructed by Oxford City Housing Limited (the Client) to undertake a Land Quality Assessment to facilitate the discharge of Condition 26 of Planning Application 13/01555/CT3 in relation to the proposed residential development of land located to the east of Warren Crescent, Oxford, OX3 7NQ. The work was undertaken in accordance with our proposal dated 10/11/17.

WSP was also instructed to complete a Hydrogeological Assessment to facilitate the discharge of Condition 11 of the same planning application in relation to the incorporation of sustainable drainage systems (SuDs) in the development.

This report forms the Land Quality Assessment and includes the first two monitoring rounds of the Hydrogeological Assessment to inform a controlled waters generic risk assessment with respect to contamination.

The Hydrogeological Assessment will comprise a minimum of 12 months monitoring of the groundwater quality in order to assess the baseline water quality under the Site and from the adjacent springs, feeding into Lye Valley SSSI. The hydrogeological assessment will be reported separately following the completion of the baseline monitoring.

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The site location and current layout are presented in **Appendix A**, Figures 1 and 2; the proposed development plan is presented in Figure 3.

1.2. OBJECTIVES

The objectives of this assessment were to:

- Characterise the land quality beneath the Site to identify potential contaminated land related development constraints to the proposed development;
- Identify potential mitigation works should contaminated land constraints been identified.
- Facilitate the discharge of planning Condition 26 of the aforementioned planning permission.

Condition 26 states that the Phase 2 assessment should include:

- A comprehensive intrusive investigation in order to characterise the type, nature and extent of contamination present, the risk to receptors and to inform the remediation strategy proposals.

1.3. PROJECT SCOPE

To assist in meeting the requirements of Condition 26, the scope of the project comprised:

- A desk-based review of publicly available information for the Site;
- Completion of an intrusive site investigation carried out between 8 – 12 January 2018;
- Laboratory analysis of recovered soil and groundwater samples;
- Completion of three ground gas and groundwater elevation monitoring rounds;
- Refinement of the preliminary conceptual site model (CSM) that was developed in the desk study assessment;
- Generic quantitative risk assessment (GQRA) of potentially sensitive receptors with respect to ground and groundwater contamination; and
- Provision of recommendations with respect to the management and mitigation of any potential ground contamination constraints or liabilities which were identified.

1.4. LEGISLATIVE CONTEXT AND GUIDANCE

The assessment was undertaken in the legislative context of:

- Part 2A of The Environmental Protection Act (1990);
- The National Planning Policy Framework (2012).

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

- Environment Agency 'Model Procedures for the Management of Land Contamination', CLR11 (2004);
- 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);
- British Standard 'Investigation of Potentially Contaminated Sites – Code of Practice', BS EN 10175:2011
- 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;

1.5. SOURCES OF INFORMATION

The following relevant sources of information were used in the production of this report. Information from these sources relating to the underlying ground conditions has also been included in Sections 2 to 5 of this report, where appropriate:

Table 1.1 - Sources of Information

Source	Report
Third Party Reports	*Phase 1 Ground Condition Assessment for Warren Crescent*, Doc Ref: GEO R4/Rev 01, Peter Brett Associates LLP, dated December 2012. A summary of this report is provided in Section 2.3.
Public Information	Groundsure 'Environmental Insight' ref. EMS-087921_275019, dated 4 December 2012. Defra 'Magic Map' website accessed 11 April 2018. British Geological Society (BGS) 1:50,000 Series Geological Map Sheet 236 'Whitney' (Solid & Drift ed). BGS 'Geology of Britain' online viewer accessed 11 April 2018.
Notes:	The report contains British Geological Survey materials ©NERC 2018 and Environment Agency information ©Environment Agency and database right.

1.6. LIMITATIONS

This report is addressed to and may be relied upon by Oxford City Council.

This assessment has been prepared for the sole use and reliance of the above named parties. This report has been prepared in line with the WSP proposal and associated notes. It shall not be relied upon or transferred to any other parties without the express written authorisation 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.

Third party information used in the production of this report has been taken in good faith as being accurate. WSP cannot and will not accept any liability for errors and/or omissions in data provided by others and WSP cannot warrant the work of others.

General limitations of the assessment are included in **Appendix B**.

2. SITE SETTING

2.1. SITE DESCRIPTION AND CURRENT USE

Site location and current layout plans are presented in **Appendix A**, Figures 1 and 2.

A detailed description of the current land use is provided in the recent Peter Brett Associates Phase 1 Preliminary Risk Assessment report. Table 2.1 summarises the site details.

Table 2.1 – Summary of Site Details

Detail	Comment
Name and Address of Site	Land east of Warren Crescent, Oxford, OX3 7NQ
National Grid reference	X: 454808 Y: 205983
Site Description and Current Use	The majority of the Site comprises amenity grassland, with a tarmac and concrete hardstanding car park in northwest corner of the Site.
Area	Approximately 0.29 ha.
Site Setting and Surrounding Area	The Site is located in a residential setting. Residential land use lies to the north and west of the Site. The Lye Valley and Lye Brook are located to the east of the Site (at the bottom of an embankment slope adjacent to the eastern Site boundary), which is designated as a Local Nature Reserve. To the southeast of the Site, the land is designated as the Lye Valley Site of Special Scientific Interest (SSSI) owing to the calcareous valley fen. Churchill Hospital is located approximately 260m to the east.
Topography and Ground Cover	The Site is generally level at around 95m AOD, sloping gently to the south to approximately 93m AOD. On the Site's eastern boundary is a steep embankment slope, which drops from the crest of the Site at circa 93-95mAOD approximately 4-6m to base of the embankment (circa 89m AOD) leading onto a shallower slope(fenland) dropping to the Lye Brook at the base of the valley at circa 86m AOD. the Lye Valley. The Lye Brook runs through the base of the valley north to south.
Boundaries	The western half of the Site's northern boundary (adjacent to the car park) comprises hedging, and the eastern half comprises a footpath which leads east into the adjacent Lye Valley. To the north of the footpath are allotments. The Site's eastern and southern boundaries comprise chain link fencing with occasional trees and shrubs. The Site's western boundary is open to Warren Crescent at the northern end and comprises wooden fencing at the southern end. Residential flats with associated gardens are adjacent to the southwest of the Site.
Drainage & Flooding	The Site does not comprise any formal drainage. Rainwater will infiltrate into the grass. No evidence of surface water pooling or flooding was observed on-site. Thames Water foul and surface waters pipes run beneath the Site in an approx. southwest to northern direction. Foul water sewers are also noted to run north to south in the fenland along both sides of the Lye Valley adjacent to the Lye Brook.
Embankments & Slopes	The eastern Site boundary is formed of an embankment and the land falls steeply to the Lye Valley and Lye Brook below. The top of the embankment is at Site level (approximately 95m AOD) and falls to around 89m AOD within the valley with a shallower slope to the valley base at circa 86m AOD.
Trees & Vegetation (including invasive species)	The majority of the Site comprises amenity grassland, with some shrubs and semi-mature trees. Mature trees line the eastern Site boundary. No invasive species were observed on-site, although a specific assessment was not undertaken.

Detail	Comment
Foundations, Retaining Walls & Basements Evident on-site	The Site has not contained any buildings. No evidence of foundations or basements have been identified during the investigation. Raised manholes associated with the underling sewerage system are present in the grass near the southeast corner of the car park.
Visual Observations of Contamination or Ground Subsidence	The surfacing of the Site, including the car park, appeared free from visual evidence of spillages or leakages of fuel and/or chemicals. Considerable ground re-working/infilling has been undertaken at the Site to steepen the eastern embankment. The source of the Made Ground is unknown though anecdotally it has been suggested that the material in part may have originated from construction of the Oxford ring road.

2.2. SITE HISTORY

The majority of the Site has remained undeveloped. Historic OS mapping shows the car park in the northwest corner of the Site to have be developed by 1969, along with a residential garage block on the car park site. The garages are shown to have been demolished by 2012. The garages are likely associated with the houses on Warren Crescent, shown on historic mapping to be constructed by 1959.

A steep cutting along the northern end of the Site's eastern boundary is shown on historic mapping by 1970. 1988 historic mapping shows the remaining southern part of the eastern boundary to comprise 'slopes'.

2.3. PREVIOUS REPORTS

Phase 1 Ground Condition Assessment for Warren Crescent, Doc Ref: GEO R4/Rev 01, Peter Brett Associates LLP, dated December 2012

This report comprises a desk-based assessment of the Site and preliminary intrusive investigation to inform on ground conditions and preliminary geotechnical and geo-environmental assessment. A total of three boreholes (BH1001 -1003) were excavated to 8-12m below ground level (bgl) at the Site by Geotechnical Engineering from 8 - 10 May 2012.

Ground conditions comprised variable Made Ground over the Wheatley Limestone Member (present in BH1001 only), underlain by the Beckley Sand Member. Monitoring wells were installed with response zones in the Beckley Sand Member. Rest groundwater levels were recorded between 4.9m and 5.5m bgl.

Six soil samples and three groundwater samples, plus three spring samples (taken from the adjacent Lye Valley) were taken for analysis.

Soils were analysed for a range of metals, polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH). Locally elevated PAH and TPH was noted in the soils but contaminant concentrations in the soils tested were below the applied assessment values for a residential land use with plant uptake.

In the groundwater samples, the measured concentrations of potential heavy metal contaminants were below the selected assessment criteria for assessing potential groundwater impacts on surface waters. However, an elevated concentration of aliphatic hydrocarbon (C_{12} to C_{16}) was recorded in Borehole 1003 only (located in east of site at crest of embankment).

Concentrations of potential heavy metal and hydrocarbon contaminants measured in the spring water(s) were below the applied assessment criteria for assessing potential groundwater impacts on surface waters.

A number of potential limitations have been identified with the preliminary intrusive investigation. This includes the limited number of holes which were advanced on the Site and consequently the lack of representative coverage across the area of development, including the swale at the southern end of the Site, the location of the spring samples within the valley which differ to those used by the EA in previous assessment and the absence of any stream samples. The screening criteria used within the report (CL:AIRE/CIEH 2008) are no longer current and, in some cases, the current threshold limits for analytes (for example, benzo(a)pyrene) have since been reduced and are now below the concentrations encountered in the 2012 investigation.

2.4. POTENTIAL SOURCES OF CONTAMINATION

2.4.1. ON-SITE CONTAMINATION SOURCES

The Phase 1 report (Peter Brett Associates LLP, December 2012) identified the following potential on-site sources of contamination:

- Made Ground of unknown origin present across the Site. Made Ground may contain metals, inorganics and organics.

Further sources may include:

- Surface water run-off from the car park in the northwest corner, which may contain traces of hydrocarbons from fuel associated with vehicles.
- The underground sewer pipes running beneath the Site may be of a poor quality, with potential for leaks.

2.4.2. OFF-SITE CONTAMINATION SOURCES

- Churchill Hospital lies approximately 260m upstream of the Site at the nearest point (car park). Potential contamination may be associated with pharmaceuticals and waste.
- Surface water run-off from surrounding roads.

3. RATIONALE FOR INVESTIGATION

3.1. PRELIMINARY CONCEPTUAL SITE MODEL (CSM)

The rationale for the site investigation was scoped to refine the preliminary CSM and tier 1 risk assessment that were derived in the Phase 1 report (Peter Brett Associates LLP, December 2012).

The preliminary CSM identified potential contaminant sources (as described in Section 2.4). The preliminary CSM also identified a number of plausible contaminant linkages (PCLs) that, without necessary protection and/or remediation, could put identified receptors at risk of significant exposure. Identified PCLs from the Phase 1 report (Peter Brett Associates LLP, December 2012) are presented in Table 3.1:

Table 3.1 – Identified plausible contaminant linkages

Potential Contamination Source	Potential Receptors	Potential Pathways
On-Site: Made Ground of unknown origin forming much of the eastern embankment. Off-Site: Hospital (approximately 260m to the west at its closest). Highways	Human Health receptor (current and future site users)	Direct dermal contact with soil or dust Ingestion of home grown produce Inhalation of dust or vapour (including asbestos) Gas ingress and accumulation in confined spaces (asphyxiation)
	Building receptor (proposed buildings)	Direct contact with aggressive ground conditions Gas ingress and accumulation in confined spaces (explosion)
	Ecological receptor (Lye Valley LNR)	Direct contact wind-blown dusts Indirect contact via uptake/irrigation of contaminated groundwater
	Surface water receptor (Lye Valley Springs and Lye Brook	Direct contact wind-blown dusts Surface water run-off Recharge from groundwater/spring water
	Groundwater receptor (Secondary A Aquifer)	Leaching though unsaturated zone Vertical and lateral migration within groundwater

3.2. RATIONALE

The intrusive investigation was designed to establish the current levels of potential contamination within the soils and groundwater at the Site.

Based on a review of the limited data previously available, it was suggested by the Environment Agency (EA) through initial discussions with the project team that there may be two separate aquifers across the Site separately feeding the springs and Brook, potentially associated with both the limestone and sand beds. The intrusive investigation was designed to understand the hydrogeological model of the Site and target these two potential aquifers hypothesised to be at circa 86m AOD and 89m AOD, in general continuity with the elevation of the springs and Lye Brook respectively.

To characterise the site-wide ground conditions, establish the potential presence of contamination (including an assessment of ground gas) and confirm groundwater levels, a total of six rotary percussive boreholes and five window samples were advanced at locations spread across the Site in order to provide representative coverage. The rationale is provided in Table 3.2 below.

Table 3.2 - Borehole Rationale

Borehole ID	Rationale
BH101	Long term monitoring well outside the footprint of proposed buildings in the northern half the Site. Upgradient well. Installation of monitoring well to target groundwater in strata at circa 86mAOD.
BH102	Long term monitoring well outside the footprint of proposed buildings in the northern half the Site. Eastern embankment well. Installation of monitoring well to target groundwater in strata at circa 89mAOD.
BH103	Long term monitoring well outside the footprint of proposed buildings in the northern half the Site. Western boundary well. Installation of monitoring well to target groundwater in strata at circa 86mAOD.
BH104	Long term monitoring well in swale area in south of Site, upgradient of Spring A.
BH105	Long term monitoring well in swale area in south of Site, upgradient of Spring A. Deep monitoring well targeting strata at circa 86mAOD at southern end of the Site.
BH106	Additional borehole adjacent to BH102 to install monitoring well to target strata at 86mAOD on eastern boundary of Site to enable triangulation of deeper groundwater body.
WS101- WS105	Shallow monitoring wells beneath and in vicinity of building footprint to enable assessment of shallow ground gas conditions (and groundwater if present). Monitoring wells installed within shallow strata.

The exploratory hole locations of the investigation are presented in **Appendix A**, Figure 4.

3.3. SCOPE OF WORKS

The main drilling phase of the ground investigation works was carried out between 8 and 12 January 2018. The scope of the intrusive assessment work was as follows:

- Clearance of all proposed exploratory hole locations by a specialist utility survey sub-contractor, including OS surveying (x,y,z co-ordinates) of each exploratory location;
- Full time site supervision by appropriately experienced WSP engineer and logging of ground conditions to BS5930:2015;
- Advancement of hand-excavated service avoidance pits to 1.5m bgl (where ground conditions permitted);
- Advancement of six dynamic sampling/rotary boreholes to depths between 9 and 12m bgl
- Advancement of five window samples using a terrier rig to approximately 5m bgl (where ground conditions permitted);
- Use of a hand-held Photo-Ionisation Detector (PID) to take readings of volatile organic compounds within the soils, generally collected at 0.5m to 1.0m intervals at all intrusive locations.
- Groundwater well development by purging up to three well volumes;
- Ground gas and groundwater elevation monitoring on three occasions;
- Collection of groundwater and surface water /spring samples using low flow sampling techniques;
- Laboratory analysis of soil and groundwater; and
- Disposal of all waste arisings generated during the works.

The ground investigation was undertaken in accordance with techniques outlined in BS5930:2015 and BS1377:2016, as appropriate. The exploratory hole logs, which also contain the PID readings, are presented in **Appendix C**.

The findings are discussed in Sections 4 and 5 and support the refined conceptual site model which is presented in Section 6.

3.4. GROUNDWATER INSTALLATIONS

Following completion of the drilling all boreholes and window samples were installed with groundwater monitoring wells. All were constructed using 50mm perforated HDPE piping, with pea gravel and bentonite surround; and were fitted with appropriate valves and top covers. Installations targeted the two groundwater elevations inferred by the EA. Specific details of each installation are summarised in Table 3.3 and shown on the exploratory hole logs in **Appendix C**.

Table 3.3 – Summary of monitoring installations

Exploratory Hole	Ground level	Screen Top and Base Depth (m bgl)	Screen Top and Base Elevation (m AOD)	Strata at Response Zone
BH101	95.213	8.00 to 11.70	87.21 to 83.51	Beckley Sand Member
BH102	95.017	4.00 to 6.70	91.02 to 88.32	Beckley Sand Member
BH103	95.186	8.80 to 11.80	86.39 to 83.39	Beckley Sand Member
BH104	93.111	3.00 to 7.00	90.11 to 86.11	Beckley Sand Member
BH105	93.083	6.40 to 10.90	86.68 to 82.18	Beckley Sand Member
BH106	95.033	8.00 to 12.00	87.03 to 83.03	Beckley Sand Member
WS101	95.252	0.60 to 1.60	94.65 to 93.65	Beckley Sand Member
WS102	95.191	0.50 to 3.20	94.69 to 91.99	Beckley Sand Member
WS103	95.107	4.00 to 5.50	91.11 to 89.61	Beckley Sand Member
WS104	94.93	0.70 to 2.20	94.23 to 92.73	Beckley Sand Member
WS105	93.878	3.50 to 4.50	90.38 to 89.38	Beckley Sand Member

3.5. GROUNDWATER SAMPLING AND MONITORING

Following the ground investigation, each borehole was developed through the removal of at least three well volumes of water in order to remove fines accumulated during the drilling process and to settle the filter pack. Purged water was pumped into an IBC (intermediate bulk container) to await appropriate off-site disposal. Window sample holes were noted to be dry (base of well above groundwater level) at the time of development and therefore, no purging or groundwater monitoring was undertaken of WS holes.

Groundwater elevation monitoring from the boreholes was undertaken at the Site on 23 January 2018, 21 February 2018 and 21 March 2018. Monitoring and sampling will continue on a bi-monthly basis for the remainder of 2018.

Prior to sampling, in-situ measurements of groundwater quality indicators (dissolved oxygen, electrical conductivity, redox potential and temperature) were taken using a multi-parameter probe. Once the in-situ parameters had stabilised to within acceptable limits, the groundwater samples were then taken from each monitoring well using low flow sampling techniques and filtered on site as required. Any groundwater obtained prior to stabilisation of in-situ parameters was disposed of to the IBC.

The groundwater samples were collected in appropriate containers and transported to the testing laboratory (under an appropriate chain of custody) within a cooler box in accordance with best practice.

3.6. SURFACE WATER SAMPLING

Surface water samples were taken from two locations in the Lye Brook (Upstream and Downstream) and from three springs located along the embankment on the Site's eastern boundary. The locations of the surface water samples are provided in **Appendix A**, Figure 4. The location of the spring samples were advised by a member of the local volunteer group, Friends of the Lye Valley (FoLV) and a representative of the EA. The spring naming convention follows that previously used by the EA. The springs samples were obtained from the spring seepages on the side of the valley, due to the very low seepage/flow and nature of collection, the samples could not be filtered on Site.

Spring samples have been taken on 31 January 2018 and 21 March 2018. Samples will continue to be taken on a bi-monthly basis for the remainder of 2018. Surface water samples were collected into appropriate containers and transported to the testing laboratory (under an appropriate chain of custody) within a cool box in accordance with best practice.

3.7. LABORATORY ANALYSIS

All samples were collected in accordance with 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 Laboratories 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 pH, total organic carbon, speciated polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons criteria working group (TPHCWG), CLEA metals, volatile and semi volatile organic compounds (VOC and SVOCs), inorganics, PCB congeners and asbestos.

The first round of groundwater and surface water samples were analysed for pH, metals, PAH, TPHCWG and inorganics, with some selected for SVOCs and volatile organic compounds (VOCs).

3.8. GROUND GAS MONITORING

Three rounds of ground gas monitoring were undertaken on the following dates: 31 January 2018, 21 February 2018 and 21 March 2018. Ground gas monitoring was undertaken in all rotary boreholes (apart from BH103) for the first two visits. Monitoring in the rotary boreholes could not be undertaken on the latest visit as data loggers had been fitted to the wells which requires them to remain vented. All window sample holes were monitored on all three monitoring visits.

Initial and steady 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.

This level of monitoring is consistent with the typical/idealised period and frequency specified in C665 for a residential development (classified as High sensitivity of development) on a site with very low/low ground gas generation potential.

Atmospheric pressure during monitoring varied between 989mb and 1016mb. According to the Wundermap website[1], historical pressure graphs for a nearby weather station located on Stanway Road (northeast of the Site), indicate that atmospheric pressure was falling during all three monitoring rounds. It is considered that monitoring included worst case conditions (atmospheric pressure <1000mb and falling).

[1] https://www.wunderground.com/

4. GROUND CONDITIONS

4.1. PUBLISHED GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

The regional BGS 1:50,000 map, No. 237 Thame, information available on the BGS on-line Geology of Britain Viewer indicate that the Site lies along the boundary of two bedrocks: Wheatley Limestone Member (limestone) and Beckley Sand Member (sandstone).

Wheatley Limestone Member and Beckley Sandstone Member are both classified as Secondary A Aquifers – described as permeable layers capable of supporting water supplies at a local rather than strategic scale.

The Site does not lie in a groundwater Source Protection Zone.

4.2. GROUND CONDITIONS ENCOUNTERED IN PREVIOUS INVESTIGATION

Details of the ground conditions encountered from the intrusive investigation carried out in May 2012 are given in the Phase 1 report (Peter Brett Associates LLP, December 2012).

A summary of the ground conditions based on exploratory logs from the three rotary boreholes comprises Made Ground from 0.45 to 3.5m bgl with the deepest Made Ground encountered in the east of the Site. Made Ground was underlain by the Wheatley Limestone Member (considered to be present in BH1001 only in the northwest of the Site) from 0.45 to 2.0m bgl and the Beckley Sand Member from 2.0 to 3.8m bgl.

4.3. GROUND CONDITIONS ENCOUNTERED ON-SITE

4.3.1. SUMMARY

The intrusive locations of the current ground investigation are presented in **Appendix A**, Figure 4 and the exploratory logs are provided in **Appendix C**. A summary of the strata encountered across the Site is provided in Table 4.1.

Table 4.1 – Summary of strata encountered during investigation

Stratum	Depth to Base of Stratum (m bgl)	Elevation of Base of Stratum (m AOD)	Thickness (m)	Comments
Grass/topsoil	0.15-0.30	92.91–95.10	0.15-0.30	Grass over topsoil with roots.
Concrete	0.13	95.08	0.13	Present at BH101 only; located in the car park.
Made Ground	0.58-3.80	90.68–94.61	0.43-3.50	Made ground typically comprised brown gravelly sand with brick, concrete and bitumen. Occasional nails and wire present.
Beckley Sand Member	Not Proven (11.80)	Not Proven (82.18)	Not Proven	Comprised brown/yellow fine and coarse sands, with abundant shells. Interbedded bands of grey limestone present.

* Brackets indicate maximum drilled depth and the minimum elevation

4.3.2. SURFACE COVER

Topsoil was encountered in all exploratory holes apart from BH101 (which comprised concrete cover to 0.13m bgl).

4.3.3. MADE GROUND

Made Ground was encountered in all exploratory holes and generally comprised gravelly sand with brick, concrete and bitumen, plus wire and nails in BH105. A limited thickness of Made Ground was encountered in BH103, located near the Site's western boundary. The maximum depth of Made Ground was 3.50m bgl, encountered in BH102 in the east of the Site, on the crest of the embankment. The greatest thicknesses of Made Ground were encountered in exploratory holes located near the eastern Site boundary relating to the steepening of the embankment.

4.3.4. BECKLEY SAND MEMBER

Beckley Sand Member was present across the entirety of the Site, beneath the Made Ground or (potential) Wheatley Limestone Member. The geology was observed to comprise a combination of fine and coarse sands, generally becoming darker in colour with depth. The sands were often calcareous and contained shells. The Beckley Sand Member comprised bands/doggers of grey limestone (varying in thickness) generally throughout.

A band of light grey limestone encountered at shallow depth (from 0.8-0.9m bgl) on the western Site boundary (within BH101, BH103 and WS104) could potentially comprise the Wheatley Limestone Member. A maximum thickness of limestone 1.0m was encountered in BH101, located in the northwest corner of the Site with this band inferred to thin towards the south and east. The limitations of the drilling methodology and the position of the Site on the interface between the Beckley Sand Member and Wheatley Limestone makes it difficult to definitively classify the strata.

4.4. HYDROGEOLOGY

4.4.1. GROUNDWATER ENCOUNTERED DURING PREVIOUS INVESTIGATION

During the previous intrusive investigation in May 2013, groundwater levels were measured between 4.9 to 5.5m bgl.

4.4.2. MONITORED GROUNDWATER ELEVATIONS

Groundwater elevation monitoring was undertaken on four occasions following the site works. The details are summarised in Table 4.2.

Table 4.2 – Measured groundwater elevations

Borehole	Response Zone Target Depth	Depth to Groundwater (m bgl)				Groundwater Level (m AOD)			
		22/01/18	31/01/18	21/02/18	21/03/18	22/01/18	31/01/18	21/02/18	21/03/18
BH101	86m AOD	5.45	5.38	5.41	5.31	89.763	89.833	89.803	89.903
BH102	89m AOD	5.65	5.67	5.68	5.56	89.367	89.363	89.353	89.473
BH103	86m AOD	5.63	5.62	5.64	5.5	89.556	89.566	89.546	89.686
BH104	89m AOD*	4.23	4.22	4.24	4.14	88.881	88.891	88.871	88.971
BH105	86m AOD	4.3	4.29	4.31	4.21	88.783	88.739	88.773	88.873
BH106	86mAOD	5.59	5.67	5.64	5.61	89.443	89.347	89.377	89.407

Notes:

* Whilst the response zone in BH104 is targeted at a shallow depth, the final monitoring well installation indicates that the response zone extends to close to 86m AOD and therefore may not be fully representative of the shallow strata in isolation.

Groundwater flow is indicated to be southerly across the Site. For the purposes of this land quality assessment, given the absence of any aquitard strata encountered and recorded groundwater levels, it will be considered that groundwater in the boreholes across the Site is in continuity.

A full discussion on the hydrogeology for the Site will be presented in the Hydrogeological Assessment.

4.4.3. IN-SITU GEOCHEMISTRY MEASUREMENTS

Geochemical parameters were recorded during low flow purging prior to groundwater sampling (two rounds completed thus far). The following stabilised in-situ conditions were observed in the groundwater:

- pH conditions observed were generally neutral ranging between 7.02 to 7.95;
- Reported dissolved oxygen (DO) concentrations were typically between 1.74 to 7.31 Mg/l;
- Conductivity was observed to vary between 737 µS / cm (BH105) to 937.8 µS / cm (BH103);
- Redox conditions ranged between 165 mV (BH101) and 357 mV (BH104); and
- Temperatures were recorded ranging between 11.13˚C and 12.92˚C.

4.4.4. SURFACE WATER

Lye Brook to the east of the Site is fed by a number of different sources. This includes the springs of the Lye Valley (from both sides of the valley), surface water run-off from surrounding land (allotments to the north, residential to the east and west), and highway drainage from the B4495/The Slade which discharges into the stream at the northern extent of the Lye Valley. There are therefore numerous sources which may influence the water quality of the stream.

Fenland springs are present along the slopes of the valley, on both sides. The springs appear to be more developed at the north of the fen. Three springs on the western slope of the valley were sampled as part of this investigation, described below:

- Tufa Spring: Located in the valley adjacent to the northeast of the Site, spring is sited more than 2m away from the stream on valley slope.
- Spring A: Spring located nearest to the southern site boundary, near to the top of the valley slope/base of embankment.
- Spring B: Located south of the Site, some 5m south of Spring A, near to the top of the valley slope/base of embankment.

The springs are located at circa 89m AOD on the valley slope/base of embankment and present as slow flowing seepages on to the fenlands of the Lye Valley, the exact egress from the slope is difficult to identify. The springs on the western slope of the valley are considered to be typically located to the north and south of the main area of Made Ground, on the natural slope/original embankment profile

5. HUMAN HEALTH RISK ASSESSMENT

5.1. INTRODUCTION

Following the tiered approach which is described in CLR11, this Section provides a Generic Quantitative Risk Assessment (GQRA) of those contaminant linkages that were determined to be plausible in the refined CSM.

5.2. RATIONALE

Defra and the EA have published a limited number of Soil Guideline Values (SGVs) for a series of generic land use scenarios which follow the Contaminated Land Exposure Assessment (CLEA) methodology. Where SGVs are not available, WSP has derived a set of Generic Assessment Criteria (GAC) for the CLEA generic land use scenarios using the CLEA Workbook v1.071 Excel modelling tool.

Soil results have been compared against a residential land use with home grown produce, as the proposed development includes private gardens. Laboratory data indicates an average soil organic matter (SOM) of 1.6% SOM. On the basis of the site investigation data, soil chemical data has been compared against an end use GAC for a conservative 1% SOM content.

The CLEA workbook does not currently have the capacity to derive criteria to assess risks from the inhalation of vapours derived from contaminants dissolved in groundwater. Therefore, a set of groundwater GACs for the vapour pathway has also been derived using the Johnson & Ettinger (J&E) approach. Further details on the assumptions and methodologies adopted by WSP are provided in **Appendix D**.

Appendix D presents the laboratory certificates, chemical data and screening of the data.

Potential risks to human health from ground gases are assessed in Section 5.5.

5.3. SOIL TESTING RESULTS

The generic risk assessment showed that, with the exception of WS103, none of the soil samples analysed presented contaminant concentrations which exceed the GAC derived for a residential with home grown produce scenario.

A single sample from WS103 (15.3mg/kg at 1.0 m bgl) recorded an exceedance of the GAC guideline threshold for benzo(a)pyrene (1.60mg/kg). This soil sample was taken from Made Ground and it is considered that the presence of benzo(a)pyrene may be associated with the presence of bitumen encountered within the Made Ground at this location. Concentrations of other polycyclic aromatic hydrocarbons (PAH) were recorded in this sample however, all were within the GAC thresholds.

The Total Petroleum Hydrocarbon (TPH) Hazard Index exceeded 1.0 within WS103 (1m bgl) which indicates that whilst indicated hydrocarbon fractions were not identified to exceed the applied screening criteria, there is a risk from elevated TPH based on the sum of the total TPH concentration. It is considered that this elevated TPH is associated with bitumen material encountered in this borehole.

Asbestos was not detected in any of the soil samples (10 No.) analysed, however whilst not encountered given the Made Ground material on Site, due to the nature of asbestos, its presence cannot be wholly discounted.

A wide range of metals were recorded at concentrations above the laboratory limit of detection (LOD) in the soil samples however, none were in exceedance of the GAC.

Concentrations of volatile and semi-volatile organic compounds were below the laboratory LOD in all soil samples.

5.4. GROUNDWATER VAPOUR DATA ASSESSMENT

Groundwater vapour was screened against a sandy loam scenario, as a conservative approach. There were no exceedances of groundwater vapour concentrations; the majority of volatile analytes were below the laboratory LOD.

5.5. GROUND GAS ASSESSMENT

5.5.1. GROUND GAS RESULTS

The results of the gas monitoring are presented in **Appendix E**. Table 5.1 presents Gas Screening Values (GSV) which have been calculated in accordance with C665 for each gas monitoring well by utilising the maximum flow rate multiplied by the maximum methane or carbon dioxide concentration, whichever is the higher. No flow rates were detected during any of the monitoring rounds, therefore 0.1 l/hr has been used as a characteristic limit of detection in order to allow the calculation of GSVs.

Table 5.1 – Summary of ground gas monitoring results

Exploratory Hole	Max Flow Rate (lhr-1)	Max Methane (% v/v)	Max Carbon Dioxide (% v/v)	Methane GSV	Carbon Dioxide GSV	Flooding Status
BH101	0.1	0	0.07	0	0.00007	Flooded
BH102	0.1	0	0.3	0	0.0003	Not flooded
BH104	0.1	0	4.2	0	0.0042	Not flooded
BH105	0.1	0	1.0	0	0.001	Flooded
BH106	0.1	0	0	0	0	Flooded
WS101	0.1	0	3.3	0	0.0033	Dry
WS102	0.1	0	1.3	0	0.0013	Dry
WS103	0.1	0	1.7	0	0.0017	Dry
WS104	0.1	0	2.7	0	0.0027	Dry
WS105	0.1	0	4.0	0	0.004	Dry

Based on the results of the monitoring visits undertaken the Gas Screening Value ranged between 0 and 0.0042 v/v. In a worst case scenario, in accordance with the CIRIA guidance, taking the worst case flow rate across the Site (0.1l/hr) and highest ground gas concentration across the Site (4.2%v/v), a maximum GSV for the Site would be 0.0042l/hr.

5.5.2. GROUND GAS DISCUSSION

Gas monitoring is considered to be representative of worst case conditions. No methane was measured at the Site in any of the monitoring rounds. Slightly elevated concentrations of carbon dioxide were recorded however, all were below 5% v/v. The highest concentrations of carbon dioxide were recorded in BH104 and WS105, both located in the south of the Site. Neither of these wells were flooding during the monitoring rounds.

As such, the Site would be classified as CIRIA Characteristic Situation 1 for a commercial or high-rise residential (flats) setting.

With respect to low level housing, as per the proposed developed, the Site would be classified as Green in accordance with the NHBC guidance.

Based on the monitoring data, it is considered that there is very low risk from ground gases and as such, no special ground protection measures are considered to be required. It should be noted, however, the Council may require additional monitoring.

The Site is not located within a radon protection area (as less than 1% of properties are above the Action Level for radon) and as such, no special measures are required for radon protection.

5.6. SUMMARY OF HUMAN HEALTH QRA

Soil samples were analysed against GAC for a residential with home grown produce scenario. With the exception of WS103, no other soil samples analysed presented concentrations of any contaminants in exceedance of the GAC thresholds. As such, risks to human health receptors are generally considered to be low.

Elevated benzo(a)pyrene above the screening criteria was recorded in WS103 at 1.0m bgl, considered to represent localised concentrations associated with the presence of bitumen identified in the Made Ground. Elevated TPH with a hazard index greater than 1.0 was also recorded in this locality, also likely associated with the components of the Made Ground.

In order to mitigate potential risks to future residents from PAHs / hydrocarbons, the implementation of mitigation measures (installation of clean cover or removal of Made Ground) within garden / landscaped areas should be considered where areas of Made Ground are encountered during development.

Three rounds of gas monitoring have been undertaken at the Site. No significant ground gas risks have been identified to date and the Site can be classified as Green for low rise residential housing. No special protection measures would be required.

6. CONTROLLED WATERS RISK ASSESSMENT

6.1. RATIONALE

The controlled waters risk assessment was conducted in accordance with the principles of Environment Agency 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination' 2006 (EA 2006) and on the 'prevent and limit' approach of the Water Framework Directive (2000/60/EC). Generic controlled waters risk assessments compare directly measured concentrations with standard assessment criteria. In this case the following assessments were undertaken:

- Level 1 - evaluates the concentrations of chemicals within the porewater in the unsaturated zone of source area soil, in this case soil leachate analysis/using theoretical calculations.
- Level 2 - evaluates the concentrations of chemicals within the saturated zone immediately underlying a source area i.e. taking dilution and attenuation into account, in this case groundwater analysis.

The principal surface water receptor identified in the CSM was nearby Lye Brook and springs within the Lye Valley. Therefore, the following assessment criteria are considered to be appropriate:

- Environmental Quality Standards (EQS) from The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Hardness, pH and dissolved organic carbon within surface waters can affect the bioavailability of copper, manganese, nickel and zinc. For copper, nickel, zinc, manganese and lead, site-specific bioavailable Environmental Quality Standards (EQS) have been calculated using the Metal Bioavailability Assessment (M-BAT) Tool.

This is based on parameters (pH, dissolved organic carbon and dissolved calcium) measured within the receiving watercourse, in this case from the adjacent stream and three springs (Tufa, Spring A and Spring B). It should be noted that the M-BAT Tool uses a maximum value for calcium and DOC, however, DOC and calcium measurements taken from the springs and stream were higher than this (due to their natural calcium content). The calculated thresholds are therefore considered to be more conservative.

Different exceedance values have been calculated for the stream, Tufa Spring, Spring A and Spring B. A precautionary approach has been taken and the lowest value has therefore been used for the purposes of screening the surface water samples.

A copy of the laboratory results, screening and the M-BAT Tool spreadsheet is given in **Appendix F**.

Whilst the underlying Secondary A Aquifer (Beckley Sand Member) is not currently a potable or critical water source, they have been identified as a controlled water receptor considered to be of moderate sensitivity. As such, the results of the groundwater analysis have also been compared to the following assessment criteria:

- UK Drinking Water Quality Standards (DWS) from The Water Supply (Water Quality) Regulations 2000 (amended 2004);
- World Health Organisation Guidelines for Drinking Water Quality (2017);
- WHO Petroleum Products in Drinking Water (2008).

6.2. LEVEL 1 CONTROLLED WATERS ASSESSMENT

A number of soils samples were found to have leachable concentrations of contaminants that exceeded the applied Generic Assessment Criteria (GAC) for controlled waters.

A single exceedance of the UK Drinking Water Standard thresholds for the protection of groundwater was recorded within WS103 (0.33 µg/l) for benzo(a)pyrene (0.010ug/l).

A summary of the leachate concentrations which exceeded the EQS thresholds are presented in Table 6.1 overleaf.

Table 6.1 – EQS exceedances from leachates (surface water receptor)

Contaminant	Threshold (ug/l)	Criteria Source	Concentration recorded (µg/l)	Location
Anthracene	0.10	EQS 2015	1.11	WS103 1m (Made Ground)
Benzo(a)pyrene	0.00017	EQS 2015	0.33	WS103 1m (Made Ground)
Benzo(b)fluoranthene	0.017	EQS 2015 MAC	0.459	WS103 1m (Made Ground)
Benzo(g,h,i)perylene	0.008	EQS 2015 MAC	0.389	WS103 1m (Made Ground)
Benzo(k)fluoranthene	0.017	EQS 2015 MAC	0.206	WS103 1m (Made Ground)
Fluoranthene	0.0063	EQS 2015	2.11	WS103 1m (Made Ground)
			0.054	BH105 0.6m (Made Ground)

Leachable concentrations of some PAHs were recorded in exceedance of the EQS threshold in WS103 within the Made Ground. The likely source of petroleum hydrocarbons is considered to be localised and related to the presence of bitumen in the Made Ground.

6.3. LEVEL 2 CONTROLLED WATERS ASSESSMENT

6.3.1. GROUNDWATER

Protection of Groundwater

Two rounds of groundwater sampling have been undertaken to date at the Site. With the exception of manganese, none of the groundwater samples analysed reported contaminant concentrations which exceed the GAC thresholds for the protection for groundwater. A summary of the groundwater samples which exceeded the GAC for a groundwater resource are presented in Table 6.2.

Table 6.2 – GAC exceedances in groundwater samples (groundwater receptor)

Contaminant	Threshold (µg/l)	Criteria Source	Concentration recorded (µg/l)	Location
Manganese	50	UK Drinking Water Standards	144	BH101 (Round 1)
			100	BH102 (Round 1)
			170	BH103 (Round 1)
			116	BH106 (Round 1)

Manganese was recorded in groundwater samples from all six boreholes however, concentrations did not exceed the GAC in BH104 or BH105, located in close proximity to each other at the southern end of the Site. Concentrations also did not exceed the criteria in the sampled boreholes in Round 2, where all concentrations were of a lower magnitude. Manganese occurs naturally in soils and groundwater as well in anthropogenic sources. In this case, the elevated concentrations recorded on the Site during Round 1 are at relatively similar concentrations and due to its presence in BH101, considered to be in an upgradient location from the Made Ground, it is considered that the concentrations are reflective of the background concentrations in the groundwater associated with the surrounding land. As such, it is not considered that there is a significant source of manganese on Site.

Protection of Surface Water

Groundwater samples taken from the Site were compared against EQS in order to assess the risks posed to identified surface waters, namely the adjacent springs in the Lye Valley and the Lye Brook.

Table 6.3 – EQS exceedances in groundwater samples (surface water receptor)

Contaminant	Threshold (µg/l)	Criteria Source	Concentration recorded (µg/l)	Location
Chromium (Total)	4.70	EQS 2015	17.7	BH102 (Round 1)
Mercury	0.070	EQS 2015	0.0907	BH102 (Round 2)
			0.207	BH103 (Round 2)
			0.21	BH104 (Round 2)
			0.192	BH105 (Round 2)
Benzo(a)pyrene	0.00017	EQS 2015	0.00892	BH102 (Round 1)
			0.00558	BH103 (Round 1)
Benzo(b)fluoranthene	0.017	EQS 2015	0.0195	BH102 (Round 1)
Benzo(ghi)perylene	0.008	EQS 2015	0.0208	BH102 (Round 1)
Fluoranthene	0.0063	EQS 2015	0.00719 - 0.0606	BH102 (Round 2 and Round 1 respectively)
			0.0975	BH103 (Round 1)
			0.00715	BH105 (Round 2)

PAHs found in concentrations exceeding the EQS were recorded in BH102, BH103 and BH105 but not consistently present across the Site. The concentration exceedences are relatively low and generally within an order of magnitude of the screening criteria, and as such it is considered that the presence of the PAH and TPH in the groundwater is likely to be associated in part with the localised presence of Made Ground. BH103 is also upgradient of the Made Ground so the low recorded concentrations are likely to be reflective of the groundwater quality in the wider area. The marginally elevated concentrations exceeding the EQS were also generally not repeated in both rounds of analysis.

Chromium was recorded in exceedance of the EQS by an order of magnitude in BH102 during Round 1, this was not repeated in Round 2. As all other recorded chromium concentrations were low or below the LOD and no soil source was identified in BH102, it is considered that the risk from chromium is low.

6.3.2. SURFACE WATER

A summary of the surface water samples where contaminants were identified to exceed the EQS are presented in Table 6.4.

Table 6.4 - EQS exceedances in surface water samples

Contaminant	Threshold (μg/l)	Criteria Source	Concentration recorded (μg/l)	Location
Lead	4.74	Bioavailable EQS	27.6	Downstream (Round 2)
Zinc	69.63	Bioavailable EQS	96.9	Downstream (Round 2)
Chromium	4.70	EQS 2015	4.74	Spring A (Round 1)
Manganese	266.45	Bioavailable EQS	456	Tufa Spring (Round 2)
			1,060	Spring A (Round 2)
			13,800	Spring B (Round 2)
Benzo(a)pyrene	0.00017	EQS 2015	0.00538	Upstream (Round 1)
			0.00793	Downstream (Round 1)
			0.0132	Spring A (Round 1)
			0.0449	Spring B (Round 1)
Benzo(g,h,i)perylene	0.008	EQS 2015	0.0132	Upstream (Round 1)
			0.020	Downstream Round 1
			0.429 - 0.648	Tufa Spring (Round 2 and Round 1 respectively)
			0.069	Spring B (Round 1)
Fluoranthene	0.006	EQS 2015	0.064	Upstream (Round 1)
			0.048	Downstream (Round 1)
			1.05 - 1.52	Tufa Spring (Round 2 and Round 1 respectively)
			0.028	Spring A (Round 1)
			0.12	Spring B (Round 1)
Benzo(b)fluoranthene	0.017	EQS 2015	0.022	Downstream (Round 1)
			0.777 - 1.27	Tufa Spring (Round 2 and Round 1 respectively)
			0.033	Spring A (Round 1)
			0.083	Spring B (Round 1)

Contaminant	Threshold (µg/l)	Criteria Source	Concentration recorded (µg/l)	Location
Benzo(k)fluoranthene	0.017	EQS 2015	0.402 - 0.55	Tufa Spring (Round 2 and Round 1 respectively)
			0.043	Spring B Round 1
Aromatic C12-C16	2	CL:AIRE 2017	63	Tufa Spring Round 1
Aromatic C16-C21	0.1	CL:AIRE 2017	73	Tufa Spring Round 1
Aromatic C21-C35	0.00017	CL:AIRE 2017	176	Tufa Spring Round 1

* Screening criteria for hexavalent chromium

Elevated PAHs were recorded above the applied EQS in selected boreholes, springs and stream samples. In general, concentrations were within 1 -2 orders of magnitude above the screening criteria threshold values (which are typically very low). PAHs were recorded in both the upstream and upgradient boreholes of the Site. Longer chain petroleum hydrocarbons were also identified in the Tufa Spring during Round 1. However, these TPH analytes were below the LOD in all other surface water samples and below the EQS in groundwater samples.

Metals were also recorded within selected boreholes and surface water samples above the applied EQS. Exceedences were up to two of magnitude above the applied screening criteria within the surface waters, though in general lower than this within groundwater on Site. Concentrations were not found to be consistent between locations or between monitoring rounds and no significant soils source for metal contaminants has been identified on site.

It is considered that background sources other than the Made Ground on-site are also attributing to the concentrations of contaminants observed in the surface waters. Potential sources include the highway drains which discharge into the stream, the foul water sewer on Site and within valley, and background groundwater quality. There is also the potential for entrainment of organic matter / sediment to interfere with the analysis of these samples as they could not be filtered on Site due to the method of collection. As such, it is not considered that there is a significant risk of contamination of the surface waters from the groundwater on Site.

6.4. SUMMARY OF CONTROLLED WATERS QRA

In general, risks to the groundwater as a groundwater resource (i.e. potable water source) are considered to be low. Concentrations of metals (manganese) encountered that locally exceeded the applied screening criteria, including within upgradient wells, are considered to be reflective of background groundwater quality. No other contaminants were recorded to exceed the screening criteria for protection of groundwater.

Hydrocarbon and metal contaminants have been identified in selected groundwater samples and surface water samples to exceed the applied EQS screening criteria. Where leachable concentrations of PAHs have been identified, it is considered that this is reflective of bitumen, locally present within the Made Ground. There have been no leachable concentrations of metals identified.

Elevated concentrations of metals and PAHs were recorded to be highest within the spring samples where entrainment with and interference from organic material / sediment is likely to be high due to the method of collection from the spring seepages.

Localised concentrations of metals have been recorded within the groundwater and springs to exceed the applied EQS criteria for surface waters. There is little correlation between the concentrations identified within the soils, groundwater, springs and stream samples (i.e. different metal determinands exceed in different locations) and therefore, a plausible contaminant pathway is unlikely in the absence of a significant soil source. It is considered therefore, that a significant risk from metals does not exist.

As such, whilst there is a plausible risk to surface waters from PAHs within the Made Ground on-site, it is considered that the groundwater quality is not significantly different to that of the surrounding land with elevated PAHs also present upgradient of the Made Ground, likely associated with surface water run-off and poor drainage in the area. The Lye Brook will continue to be influenced by upstream discharges of highways surface water run-off from both sides of the valley.

The proposed development is likely to create a betterment of the site condition through the use of clean ground cover and use of improved drainage (new sewers etc.) and interceptors.

7. REFINED CONCEPTUAL SITE MODEL

7.1. INTRODUCTION

This Section provides a refinement of the preliminary CSM, which was originally derived in the Phase 1 report, taking into account information obtained from the ground investigation. Plausible source-pathway-receptor contaminant linkages have been refined in line with industry good practice (principally CLR11 and R&D66).

7.2. POTENTIAL SOURCES OF CONTAMINATION

Revised potential sources of on-site contamination comprise:

- Benzo(a)pyrene and TPH within Made Ground on-site;
- Surface water run-off from car parking;
- Presence of poor quality foul and surface water sewers beneath the Site.

Revised potential sources of off-site contamination comprise:

- Surface water run-off from highways.

In the absence of any significant ground gas, risks posed to human health or buildings from ground gases have been discounted further from assessment.

7.3. POTENTIAL RECEPTORS

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

Human Health

- Future site users and neighbours;
- Future below ground maintenance workers.

Controlled Waters

- Groundwater within the Beckley Sand (Secondary A Aquifer);
- Springs and stream within adjacent Lye Valley.

Other

- Lye Valley LNR (east) and SSSI (southeast);
- Below ground building structures and services.

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.

7.4. PLAUSIBLE CONTAMINANT LINKAGES

Table 7.1 provides a revised evaluation of the potential contaminant linkages that are considered to be plausible for the future residential use of the Site. It uses the current site investigation findings to refine the Phase 1 assessment.

Table 7.1 – Summary of Plausible Contaminant Linkages

Potential Contaminants	Potential Receptors	Potential Pathways	Risk	Risk Evaluation	Comments
PAHs, TPH, Metals	Current and future site users, future maintenance workers	Dermal contact, direct ingestion and inhalation of impacted Made Ground particulates.	Low to Moderate	Elevated PAHs in the soils which exceeded applied criteria were recorded in WS103 (1m bgl) only. A TPH hazard index greater than 1 is also recorded in this locality. These are both considered to be associated with the presence of bitumen in Made Ground which has been placed on the eastern part of the site forming a large part of the embankment. Given the nature of Made Ground, the presence of asbestos cannot be wholly discounted.	Made Ground is not considered to be a suitable medium for residential garden areas. A thickness of clean cover (depth to be agreed by the Council) will need to be incorporated and provide suitable medium for planting. This may require the removal and replacement of Made Ground to meet levels. A geotextile membrane or hard to dig layer should be used as a break layer to prevent Made Ground mixing with the clean topsoil. Excavated Made ground may be placed under areas of hardstanding (i.e. building footprint) as an alternative to off-site disposal.
	Groundwater (Secondary A Aquifer)	Vertical leaching from impacted soil. Migration from off-site sources.	Very Low to Low	Risks to groundwater as a resource from PAHs have not been identified on-site. Elevated manganese was also recorded to be at concentrations that exceeded the applied criteria for groundwater, however an equivalent soil source was not identified. Elevated concentrations were localised and fluctuated between roads in both upgradient and downgradient wells. As such concentrations are considered to be generally reflective of background water quality.	The development is likely to better the site conditions through improved drainage, use of clean cover across areas of Made Ground and presence of interceptors.
	Surface water (downgradient springs A & B and stream)	Vertical leaching from impacted soil and lateral migration of impacted groundwater.	Low	PAHs were recorded within surface water samples and selected groundwater boreholes, including in upgradient/upstream locations. A plausible link between PAHs within the Made Ground on-site and the surface water samples is considered to exist. However, in the context	The development is likely to better the site conditions through improved drainage, use of clean cover across areas of Made Ground and presence of interceptors. An ongoing risk to surface waters is considered unlikely to exist.

Potential Contaminants	Potential Receptors	Potential Pathways	Risk	Risk Evaluation	Comments
				of the wider background and upgradient/upstream water quality, the potential for organic matter / sediment interference with surface water samples and the localised and fluctuating nature of the exceedences, the risks associated to surface waters from the Site are considered to be low. Localised concentrations of metals have also been recorded within selected groundwater and springs that exceed the applied EQS criteria for surface waters. However, a plausible contaminant pathway is unlikely in the absence of a significant soil source.	
	Underground water supply pipes	Hydrocarbons may have potentially aggressive effects on standard polyethylene pipes.	Low	Locally elevated hydrocarbons were identified within the Made Ground. However, concentrations are considered to be reflective of the presence of bitumen within the Made ground and not of free phase product/Mineral Oil.	The use of alternative material for water supply pipes may be required in areas where Made Ground is present. This would be subject to requirements of the local water authority.

8. CONCLUSIONS

8.1. SUMMARY

WSP undertook a ground investigation at land to the east of Warren Crescent, Oxford in order to facilitate the discharge of Condition 26 of Planning Application 13/01555/CT3 in relation to the proposed residential development of the land. The majority of the Site comprises amenity grassland, with a tarmac and concrete hardstanding car park located in the northwest corner of the Site.

The ground investigations completed the Site have confirmed that the ground conditions comprise Made Ground, overlying the Beckley Sand Member. Potential Wheatley Limestone deposits may be inferred in the western part of the Site at the boundary of the two stratum. The Made Ground predominantly comprises gravelly sand with brick, concrete and bitumen and deepens significantly towards the east associated with the embankment. The Beckley Sand Member predominately comprises coarse sands, often calcareous, with gravel, and interbedded thin limestone bands.

Groundwater is considered to flow in a southerly direction. Further assessment of the hydrogeological regime will be undertaken as part of a Hydrogeological Assessment to be completed separately following a year-long monitoring programme. It is considered that the groundwater contributes to the springs within the Lye Valley to the east of the site (which appear as seepages from the embankment) and the stream (Lye Brook) at the base of the valley.

8.2. CONTAMINATION RISK

Based on the proposed residential land use, the following contamination issues have been established:

- Polycyclic Aromatic Hydrocarbons (PAH) within the Made Ground. Benzo(a)pyrene was encountered in the Made Ground at WS103 and leachable concentrations of selected PAHs have been recorded. These are considered to be associated with the presence of bitumen in the Made Ground across the Site.

Risks to the key receptors are summarised below:

- Risks to Future Site Users: Given the nature of the proposed development, the risks to future site users are low to moderate. In the absence of mitigation, in areas of soft landscaping (residential gardens), localised elevated PAHs within the Made Ground may present a risk to human health through direct contact and ingestion (of soils or of home-grown produce). The presence of asbestos within the Made Ground cannot be wholly discounted. The Site is classified as green with respect to risks from ground gas, therefore no special protection measures are required.

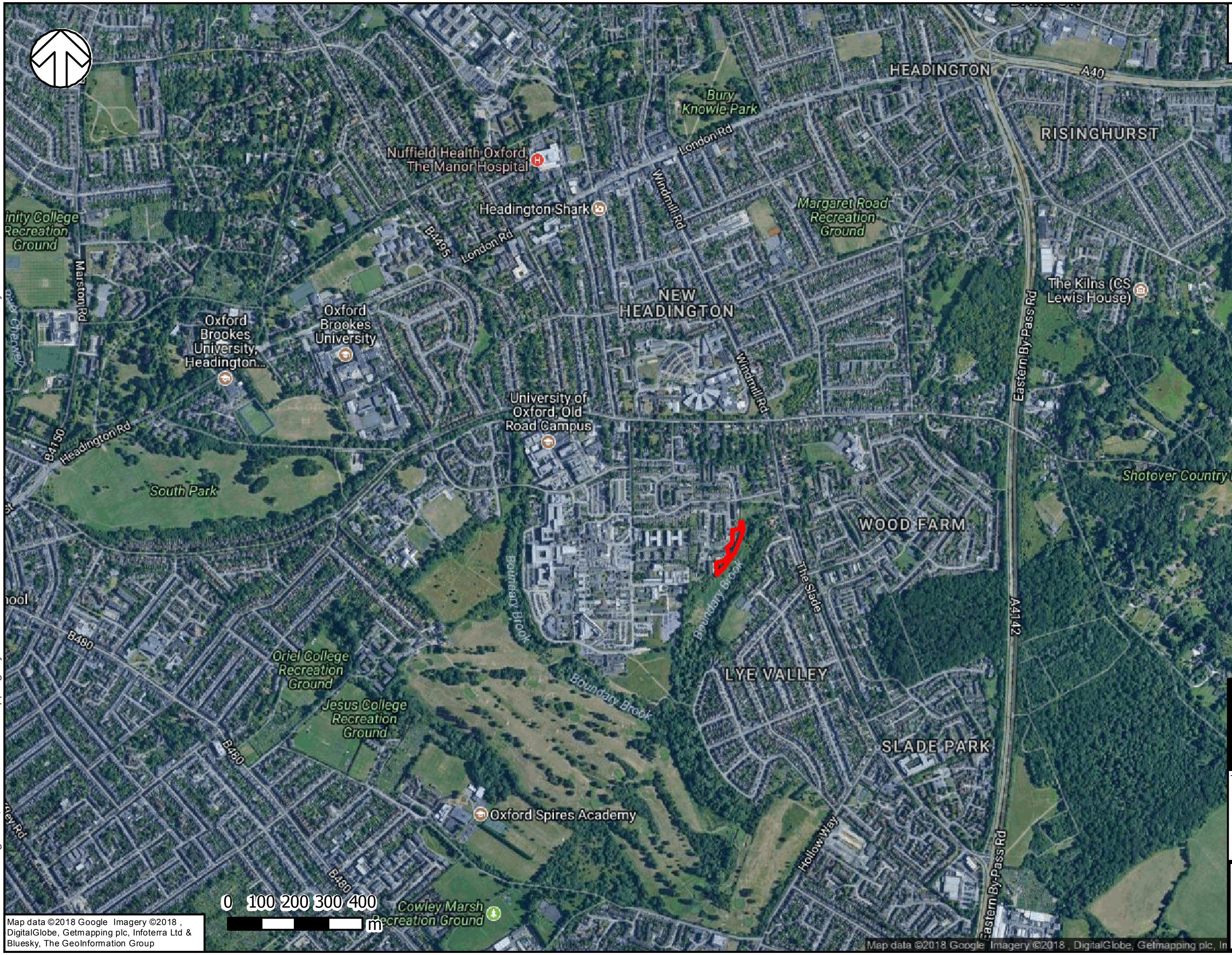
- Risks to Controlled Waters: At this stage, risks to controlled waters from the Site are considered to be low. Although there is potential for PAHs in the Made Ground to impact groundwater and surface waters, the localised and inconsistent distribution of PAH concentrations within the groundwater and surface waters, both on-site and upgradient/upstream, is likely reflective of background water quality, potentially associated with highways run-off/discharges. PAH concentrations recorded in the spring samples may also be elevated due to organic interference associated with the collection of the spring seepages.

9. RECOMMENDATIONS

- Mitigation measures to protect human health receptors include incorporation of a suitable thickness of clean cover in areas of Made Ground within residential gardens, to break the exposure pathway. This may necessitate the removal of Made Ground to achieve site levels, though this can be re-used under hardstanding as an alternative to off-site disposal. The thickness of clean cover would need to be agreed with the Local Authority in advance of the works but should be of sufficient depth to prove a suitable planting medium for home grown produce. A geotextile membrane should be placed at the base of the clean cover to prevent Made Ground from mixing with the clean soil above.
- No specific remediation is considered necessary for controlled waters, however it is considered that the development will create a betterment of the Site conditions (i.e. through improved drainage, clean soil cover and use of interceptors) which will likely improve local groundwater quality.
- Based on the Guidance on the Selection of Water Supply Pipes (UKWIR, 2010) which uses soil threshold parameters to determine pipe specification material for a site, barrier pipes (polyethylene-aluminium-polyethylene) may be required in areas of Made Ground for the development in order to protect against the potentially aggressive effects of any residual hydrocarbons within the Made Ground. It should be noted that elevated hydrocarbons were only recorded in the WS103 and likely associated with the presence of bitumen in this location and not mineral oil. As the Site has not been previously used for chemical storage, the requirements for water pipe material should be confirmed with Local Water Authority. Underground utilities/services should be buried within clean backfill in the event of any future maintenance being required.

Appendix A

FIGURES



Key

Site

wsp

TITLE:

70037512; Land at Warren Crescent

FIGURE No:

Figure 1: Site Location

File: Created using iGIS, WSP's Online Mapping System

Drawn By: UKHCB003

Date Modified: 08/05/2018 11:57

File: Created using iGIS, WSP's Online Mapping System
Drawn By: UKHCB003
Date Modified: 08/05/2018 11:55

Key

Site

wsp

TITLE:

70037512; Land at Warren Crescent

FIGURE No:

Figure 2: Site Layout

NOTES:
DIMENSIONS NOT TO BE SCALED FROM THIS DRAWING. CONTRACTORS TO NOTIFY ARCHITECTS OF SITE VARIATIONS AFFECTING INFORMATION ON THIS DRAWING. THIS DRAWING IS COPYRIGHT OF GLENN HOWELLS ARCHITECTS.

KEY

3b 5p (2 Storey) = 10 No. Units

Proposed tree

Tree to be removed

Shrub planting to be removed

New position of public footpath

Date	Rev	By	Details
15.02.13	00	JS	Drawing issued
07.03.13	01	JS	Issued for Information
08.03.13	02	JS	Issued for Information
27.03.13	03	SS	Street trees omitted and swales indicated
04.04.13	04	LB	Issued for Information
14.05.13	05	JS	Planning issue
07.08.13	06	JS	Kerbline amended
22.08.13	07	JS	Allotment parking added

LOCATION KEY

PLANNING ISSUE

GLENN HOWELLS ARCHITECTS
321 Bradford St, Birmingham, B5 6ET
Tel. 0121 666 7640 F. 0121 666 7641
mail@glennhowells.co.uk

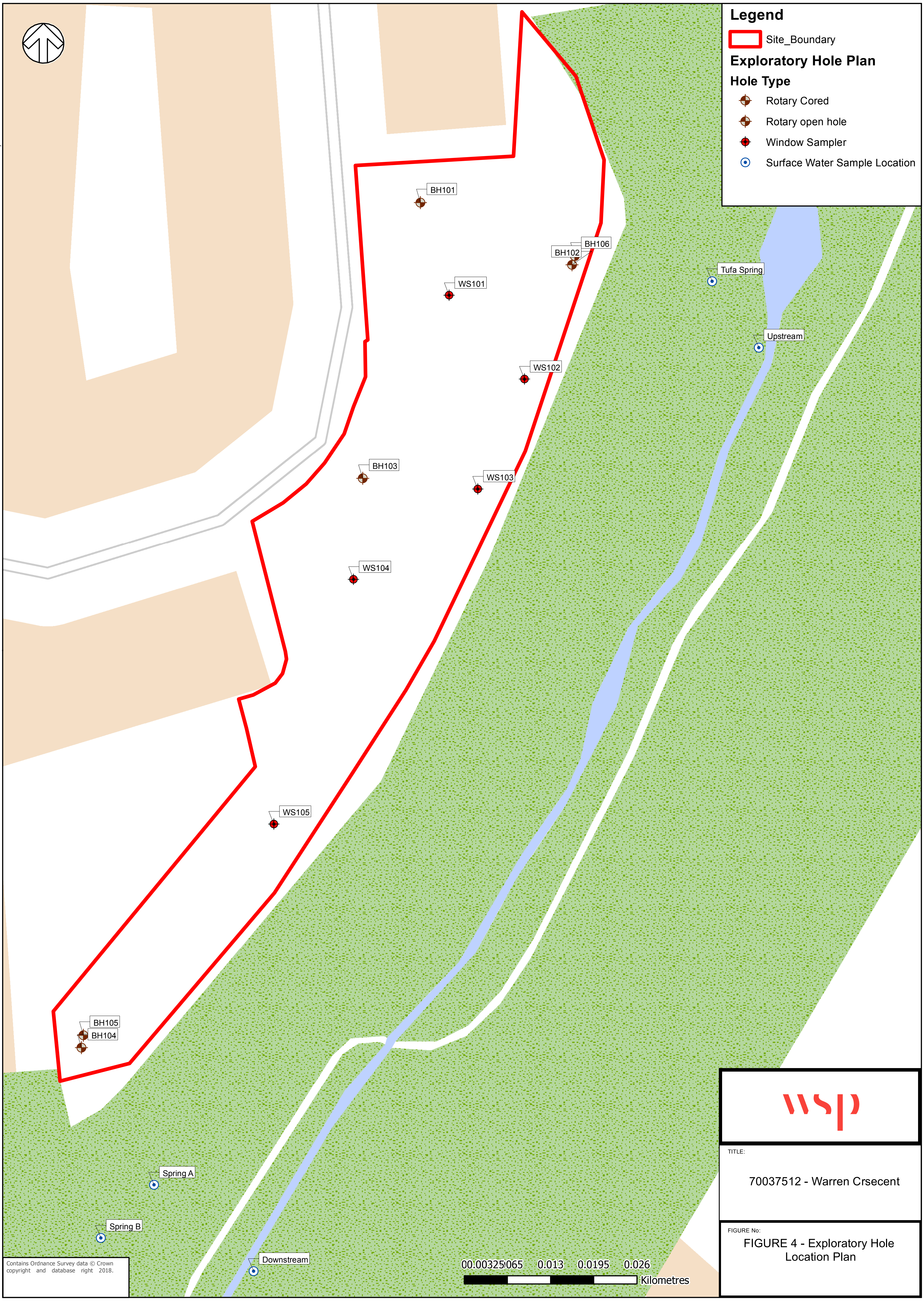
Project
Warren Cresent
Oxford

Client
Oxford City Council

Drawing Title
Site Plan
As Proposed

Date	Scale	Checked
02.01.13	1:250@A1 1:500@A3	SS
Project Ref.	**Drawing No.**	**Revision**
1932	A-L-WC-010	07

Date Modified:
Drawn By:



File:

Appendix B

LIMITATIONS

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

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No. **BH101**

Project: Warren Crescent, Oxford

Job No	Client	Date
70037512-012	Oxford City Council	10-01-18 10-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454810.103 N 206032.774	95.213

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.60-0.60	ES		0			
0.60	ES					
0.90-0.90	ES		0			
0.90	ES					
			0			
			5.2			

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology
95.08	0.13	CONCRETE.		CONC
94.61	(0.47) 0.60	Brown gravelly medium SAND. Gravel is fine and medium of concrete, brick, bitumen. Some roots. (MADE GROUND)		GMG
94.31	0.90	Yellowish brown gravelly medium and coarse SAND. Gravel is medium of limestone. (BECKLEY SAND MEMBER)		BYSA
93.31	(1.00) 1.90	Light grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA
92.51	(0.80) 2.70	Light brown medium and coarse SAND. Poor recovery of sands due to water flush. (BECKLEY SAND MEMBER)		BYSA
92.36	2.85	Grey LIMESTONE. Recovered as cobbles. (BECKLEY SAND MEMBER)		BYSA
89.61	(2.75) 5.60	Light brown coarse SAND. Occasional shells. Recovery of sands poor due to flush. (BECKLEY SAND MEMBER)		BYSA
89.51	5.70	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA
88.71	(0.80) 6.50	Assumed sand; limited recovery due to water flush. (BECKLEY SAND MEMBER)		BYSA
88.31	6.90	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA
87.21	(1.10) 8.00	Light brown coarse SAND. (BECKLEY SAND MEMBER)		BYSA
86.26	(0.95) 8.95	Grey LIMESTONE with shells. (BECKLEY SAND MEMBER)		BYSA
		Light brown coarse SAND. (BECKLEY SAND MEMBER)		BYSA

Install / Backfill: Dia. 50 mm

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks

Hole terminated at 11.7m

Limestone encountered at base of IP. Dynamic sampling not possible. Rotary coring from base of pit.

No groundwater encountered due to use of water flush.

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 UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No.	BH101
Project	Warren Crescent, Oxford
Sheet	2 of 3
Job No	70037512-012
Client	Oxford City Council
Date	10-01-18 10-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454810.103 N 206032.774	95.213

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	Dia. 50 mm
								(2.35)	Light brown coarse SAND. (BECKLEY SAND MEMBER) *(continued)*		BYSA	
							83.91	11.30				
							83.71	11.50	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA	
							83.51	11.70	Dark grey very silty SAND. (BECKLEY SAND MEMBER)		BYSA	
									End of Borehole		END	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

Chiselling				Water Added	
From	To	Hours	Tool	From	To

General Remarks
Hole terminated at 11.7m

Limestone encountered at base of IP. Dynamic sampling not possible. Rotary coring from base of pit.

No groundwater encountered due to use of water flush.

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 WARREN CRESCENT.GPJ WSPETEMPLATE7.00.GDT 26/6/18

BOREHOLE LOG

WSP UK Limited Kings Orchard, 1 Queen Street Bristol, BS2 0HQ Telephone: 0117 930 6200	BOREHOLE LOG	Hole No. BH102
	Project: Warren Crescent, Oxford	Sheet: 1 of 2
Job No: 70037512-012	Client: Oxford City Council	Date: 08-01-18 09-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454832.922 N 206023.400	95.017

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.40-0.40	ES		0			
0.40	ES					
			0.1			
4.10-4.40	ES					
4.10-4.50	ES		0			

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
94.72	0.30	Grass over TOPSOIL		TS	
91.22	3.80 (3.50)	Greyish brown fine and medium SAND with fine and medium gravel of brick, concrete, bitumen. Frequent roots. Bricks and shale at 1.85m. (MADE GROUND)		GMG	
90.92	4.10	Grey LIMESTONE recovered as cobbles. Weathered limestone band. (BECKLEY SAND MEMBER)		BYSA	
90.52	4.50	Brown coarse SAND with shells. (BECKLEY SAND MEMBER)		BYSA	
88.32	6.70 (2.20)	NO RECOVERY. Rotary open hole drilling to 6.7m to enable installation.		BYSA	
		End of Borehole		END	

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling / **Water Added**

From	To	Hours	Tool	From	To

General Remarks

Hole terminated at 6.7m

Dynamic sampling to 4.5m. followed on with rotary open hole to 6.7m

No groundwater encountered due to use of water flush.

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.

BOREHOLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No. **BH103**	Project: Warren Crescent, Oxford	Sheet: 1 of 3
Job No: 70037512-012	Client: Oxford City Council	Date: 08-01-18 09-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454801.400 N 205991.263	95.186

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.40-0.50	ES		0			
0.50-0.50	ES		0			
0.70-0.80	ES		0			
			0			
			0			

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Geology
95.04	0.15	Grass over TOPSOIL	TS
94.61	(0.43) 0.58	Brown GRAVEL and SAND. Gravel is medium and coarse subangular to angular of various lithologies limestone, concrete, tarmac, ceramic. (MADE GROUND)	GMG
94.37	0.82	Light brown clayey SAND with occasional fine gravel of limestone. Occasional roots. (BECKLEY SAND MEMBER)	BYSA
93.79	(0.58) 1.40	Light grey LIMESTONE band. (BECKLEY SAND MEMBER)	BYSA
93.54	1.65	Yellowish grey fine and medium SAND with occasional gravel and cobbles of limestone bands rock (angular, up to 6cm). (BECKLEY SAND MEMBER)	BYSA
93.47	1.72	Grey LIMESTONE. (BECKLEY SAND MEMBER)	BYSA
93.19	2.00	Light yellowish brown silty SAND with gravel of limestone. (BECKLEY SAND MEMBER)	BYSA
91.69	(1.50) 3.50	Grey SAND with limestone bands. Poor recovery- sands washed out by flush. (BECKLEY SAND MEMBER)	BYSA
89.59	(2.10) 5.60	Brown coarse SAND. (BECKLEY SAND MEMBER)	BYSA
89.29	(0.30) 5.90	Light grey LIMESTONE. (BECKLEY SAND MEMBER)	BYSA
			BYSA

Install / Backfill: Dia. 50 mm

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks

Hole terminated at 11.8m

Dynamic sampling to refusal at 2m followed by rotary core

No groundwater encountered due to use of water flush.

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.

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No.	BH103
Project	Warren Crescent, Oxford
Sheet	2 of 3
Job No	70037512-012
Client	Oxford City Council
Date	08-01-18 09-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454801.400 N 205991.263	95.186

SAMPLES & TESTS: Depth | Type | Test Result | PID (ppmV) | HSV (kN/m2) | P.Pen (kN/m2) | Water

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
87.89	(1.40) 7.30	Yellowish brown coarse SAND. Cobble of limestone at 7m. (BECKLEY SAND MEMBER) *(continued)*		BYSA	
86.84	(1.05) 8.35	Greyish brown calcareous coarse SAND with shells. (BECKLEY SAND MEMBER)		BYSA	
86.59	8.60	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA	
83.39	(3.20) 11.80	Brown calcareous coarse SAND with shells. (BECKLEY SAND MEMBER)		BYSA	
		End of Borehole		END	

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks
Hole terminated at 11.8m

Dynamic sampling to refusal at 2m followed by rotary core

No groundwater encountered due to use of water flush.

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.

BOREHOLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No.	Sheet	Project	Job No	Client	Date
BH104	1 of 2	Warren Crescent, Oxford	70037512-012	Oxford City Council	12-01-18 12-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	F Marks	E 454759.085 N 205905.568	93.111

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.30-0.30	ES		1.5			
0.30	ES					

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
92.91	0.20	Grass over TOPSOIL		TS	
91.21	1.90 (1.70)	Light brown gravelly SAND. Gravel is medium and coarse of concrete, brick, bitumen, limestone. (MADE GROUND)		GMG	
90.41	2.70 (0.80)	Yellowish brown calcareous SAND. (BECKLEY SAND MEMBER)		BYSA	
86.11	7.00 (4.30)	NO RECOVERY. Rotary open hole to install well.		BYSA	
		End of Borehole		END	

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks
Hole terminated at 7m

No groundwater encountered due to use of water flush.

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 UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No. **BH105**	Project: Warren Crescent, Oxford	Sheet: 1 of 3
Job No: 70037512-012	Client: Oxford City Council	Date: 11-01-18 11-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Hannah Biggs	E 454759.383 N 205907.458	93.083

SAMPLES & TESTS / STRATA

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology
							92.93	0.15	Grass over TOPSOIL		TS
0.60-0.60	ES		2.5						Pale brown SAND and coarse GRAVEL of brick, concrete, tarmac, bitumen, wire, nails with frequent cobbles. Cobbles of brick, concrete, tarmac. (MADE GROUND)		GMG
0.60	ES						91.18	(1.75) 1.90			
							90.38	(0.80) 2.70	Light brown medium SAND with occasional gravel and cobbles of limestone. (BECKLEY SAND MEMBER)		BYSA
2.60-2.60	ES		3.4								
2.60	ES						89.88	(0.50) 3.20	Pale yellowish brown calcareous medium SAND. (BECKLEY SAND MEMBER)		BYSA
							88.18	(1.70) 4.90	Yellowish brown SAND. Poor recovery due to use of water flush. (BECKLEY SAND MEMBER) 3.40 - 3.55 Band of limestone approximatey 0.15m		BYSA
			2.8					(6.00)	Interbedded yellowish brown SANDS and LIMESTONE; sands washed out by flush. (BECKLEY SAND MEMBER)		BYSA

Install / Backfill: Dia. 50 mm

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks
Hole terminated at 10.9m

Dynamic sampling refused at 3.4m

No groundwater encountered due to use of water flush.

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 UK Limited Kings Orchard, 1 Queen Street Bristol, BS2 0HQ Telephone: 0117 930 6200	**BOREHOLE LOG**	Hole No. **BH105**
	Project: Warren Crescent, Oxford	Sheet: 2 of 3
Job No: 70037512-012	Client: Oxford City Council	Date: 11-01-18 11-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Hannah Biggs	E 454759.383 N 205907.458	93.083

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
							82.18	10.90	Interbedded yellowish brown SANDS and LIMESTONE; sands washed out by flush. (BECKLEY SAND MEMBER) *(continued)*		BYSA	
									End of Borehole		END	

Boring Progress						Water Strikes					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt	Date	Time	Strike	Minutes	Standing	Casing

Chiselling				Water Added	
From	To	Hours	Tool	From	To

General Remarks
Hole terminated at 10.9m
Dynamic sampling refused at 3.4m
No groundwater encountered due to use of water flush.

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.

BOREHOLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No.	BH106
Project	Warren Crescent, Oxford
Sheet	1 of 3
Job No	70037512-012
Client	Oxford City Council
Date	10-01-18 11-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454833.327 N 206024.720	95.033

SAMPLES & TESTS / STRATA

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick -ness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
							94.73	0.30	Grass over TOPSOIL		TS	
							92.33	(2.40) 2.70	Brown gravelly SAND. Gravel is fine of brick, bitumen, concrete. (MADE GROUND)		GMG	
								(9.00)	NO RECOVERY. Rotary open hole drilling with no recovery to enable well installation.		BYSA	

Boring Progress

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

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

Chiselling / Water Added

From	To	Hours	Tool	From	To

General Remarks
Hole terminated at 11.7m bgl

Rotary open hole drilling to enable deeper well installation adjacent to BH102. Logging and sampling not required

No groundwater encountered due to use of water flush.

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 UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

BOREHOLE LOG

Hole No. **BH106**

Project: Warren Crescent, Oxford

Job No: 70037512-012

Client: Oxford City Council

Date: 10-01-18 / 11-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Comacchio Geo 305	Fiona Marks	E 454833.327 N 206024.720	95.033

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick -ness)	Description	Legend	Geology		Dia. 50 mm
							83.33	11.70	NO RECOVERY. Rotary open hole drilling with no recovery to enable well installation. *(continued)*		BYSA		
									End of Borehole		END		

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

Chiselling				Water Added	
From	To	Hours	Tool	From	To

General Remarks
Hole terminated at 11.7m bgl

Rotary open hole drilling to enable deeper well installation adjacent to BH102. Logging and sampling not required

No groundwater encountered due to use of water flush.

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.

LEGEND

TOPSOIL

GRANULAR MADE GROUND

No recovery

CONCRETE

SAND

Silty SAND

Clayey SAND

WINDOW SAMPLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No.	WS101
Project	Warren Crescent, Oxford
Sheet	1 of 1
Job No	70037512-012
Client	Oxford City Council
Date	12-01-18 12-01-18
Contractor / Driller	Geotechnical Engineering
Method/Plant Used	Dando Terrier
Logged By	F Marks
Co-Ordinates (NGR)	E 454814.424 N 206018.821
Ground Level (m AOD)	95.252

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.50		.	2.6			
1.60		.	2.8			

STRATA

Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
95.10	0.15	Grass over TOPSOIL		TS	
94.25	(0.85) 1.00	Brown gravelly SAND. Gravel is medium and coarse of brick, limestone, concrete, tarmac. (MADE GROUND)		GMG	
93.65	(0.60) 1.60	Greyish brown calcareous SAND. (BECKLEY SAND MEMBER)		BYSA	
		End of Borehole		END	

Hole Diameter

Depth	Diameter (mm)	Remarks

Recovery

Core Top (m)	Core Base (m)	% Recovery

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 1.6m due to refusal

No groundwater encountered.

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 WARREN CRESCENT.GPJ WSPETEMPLATE7.00.GDT 26/6/18

WINDOW SAMPLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No.	Sheet	Project	Job No	Client	Date
WS102	1 of 1	Warren Crescent, Oxford	70037512-012	Oxford City Council	12-01-18 12-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Dando Terrier	Fiona Marks	E 454825.734 N 206006.206	95.191

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.60-0.60	ES	.	0.1			
0.60	ES	.	0.1			
0.60-0.60	ES	.	0.1			
0.60	ES	.				

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Geology
94.94	0.25	Grass over TOPSOIL	TS
91.79	(3.15) 3.40	Brown gravelly SAND. Gravel is medium and coarse of limestone, brick, breeze block, concrete. (MADE GROUND)	GMG
91.49	(0.30) 3.70	Grey LIMESTONE. (BECKLEY SAND MEMBER)	BYSA
91.19	(0.30) 4.00	Greyish brown calcareous SAND. (BECKLEY SAND MEMBER)	BYSA
		End of Borehole	END

Install / Backfill Dia. 50 mm

Hole Diameter			Recovery		
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 4.0m due to refusal

No groundwater encountered.

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.

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

WINDOW SAMPLE LOG

Hole No.	Sheet	Project	Job No	Client	Date
WS103	1 of 1	Warren Crescent, Oxford	70037512-012	Oxford City Council	12-01-18 12-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Dando Terrier	Hannah Biggs	E 454818.707 N 205989.676	95.107

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
1.00-1.00	ES	.	4.2			
1.00	ES	.	4.2			
1.00-1.00	ES	.	4.2			
1.00	ES	.				
4.00		.	8.7			

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Geology
94.81	(0.30) 0.30	Grass over TOPSOIL	TS
93.51	(1.30) 1.60	Yellowish brown SAND. Fine gravel of brick, bitumen, shale and limestone. Gravel becoming coarse with depth. (MADE GROUND)	GMG
93.21	(0.30) 1.90	Light yellowish yellow medium SAND. (MADE GROUND)	GMG
92.36	(0.85) 2.75	Light brown gravelly SAND. Gravel is coarse angular of brick, concrete, limestone, bitumen. (MADE GROUND)	GMG
92.26	2.85	Light grey sandy coarse angular GRAVEL of brick and limestone. (MADE GROUND)	GMG
92.01	3.10	Brown gravelly SAND. Gravel is fine and medium of brick and limestone. (MADE GROUND)	GMG
91.21	(0.80) 3.90	Greyish brown calcareous SAND. (BECKLEY SAND MEMBER)	BYSA
89.61	(1.60) 5.50	Yellowish brown SAND. (BECKLEY SAND MEMBER)	BYSA
		End of Borehole	END

Install / Backfill Dia. 50 mm

Hole Diameter: Depth	Diameter (mm)	Remarks	Recovery: Core Top (m)	Core Base (m)	% Recovery

Water Strikes: Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 5.5m

No groundwater encountered.

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.

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

WINDOW SAMPLE LOG

Hole No.	WS104
Project	Warren Crescent, Oxford
Sheet	1 of 1
Job No	70037512-012
Client	Oxford City Council
Date	12-01-18 12-01-18

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Engineering	Dando Terrier	F Marks	E 454800.027 N 205976.074	94.930

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
0.70-0.70	ES	.	2.2			
0.70	ES	.	2.2			
0.70-0.70	ES	.	2.2			
0.70	ES	.				

STRATA

Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
94.63	(0.30) 0.30	Grass over TOPSOIL		TS	
93.98	(0.60) 0.95	Yellowish brown gravelly SAND. Gravel is fine and medium of brick, concrete. (MADE GROUND)		GMG	
93.73	1.20	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA	
92.73	(1.00) 2.20	Greyish brown calcareous SAND. Thin limestone bands. (BECKLEY SAND MEMBER)		BYSA	
		End of Borehole		END	

Hole Diameter			Recovery		
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 2.2m due to refusal

No groundwater encountered.

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 WARREN CRESCENT.GPJ WSPETEMPLATE7.00.GDT 26/6/18

WINDOW SAMPLE LOG

WSP UK Limited
Kings Orchard, 1 Queen Street
Bristol, BS2 0HQ
Telephone: 0117 930 6200

Hole No.	WS105
Project	Warren Crescent, Oxford
Sheet	1 of 1
Job No	70037512-012
Client	Oxford City Council
Date	12-01-18 12-01-18
Contractor / Driller	Geotechnical Engineering
Method/Plant Used	Dando Terrier
Logged By	F Marks
Co-Ordinates (NGR)	E 454788.019 N 205939.248
Ground Level (m AOD)	93.878

SAMPLES & TESTS

Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
1.20-1.20	ES	.	3			
1.20	ES	.	3			
1.20-1.20	ES	.	3			
1.20	ES	.				

STRATA

Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
93.68	0.20	Grass over TOPSOIL		TS	
90.68	3.20 (3.00)	Light brown gravelly SAND. Gravel is fine and medium of predominantly limestone with some brick, bitumen. (MADE GROUND)		GMG	
90.28	3.60 (0.40)	Grey LIMESTONE. (BECKLEY SAND MEMBER)		BYSA	
89.38	4.50 (0.90)	Yellowish brown calcareous SAND. (BECKLEY SAND MEMBER)		BYSA	
		End of Borehole		END	

Hole Diameter

Depth	Diameter (mm)	Remarks

Recovery

Core Top (m)	Core Base (m)	% Recovery

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Hole terminated at 4.5m due to refusal

No groundwater encountered.

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.

Appendix D

HUMAN HEALTH ASSESSMENT METHODOLOGY, LABORATORY DATA AND SCREENING

Appendix D.1

METHODOLOGY FOR DERIVATION OF GENERIC QUANTITATIVE ASSESSMENT CRITERIA

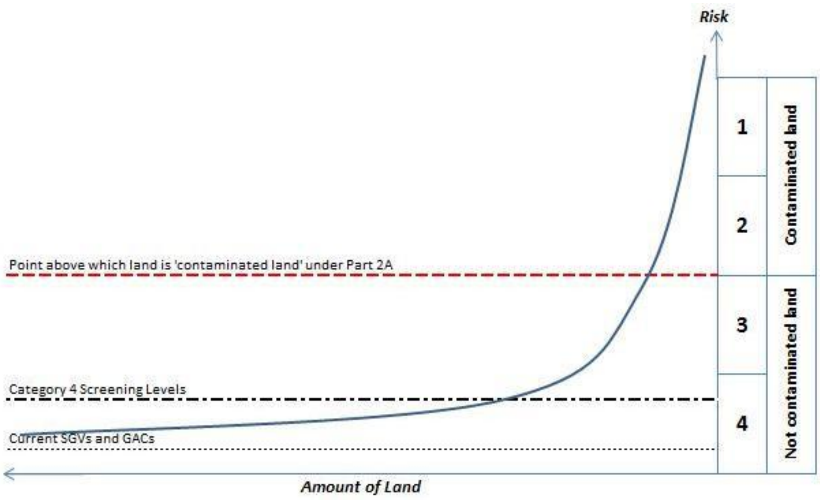
METHODOLOGY FOR THE DERIVATION OF GENERIC QUANTITATIVE ASSESSMENT CRITERIA TO EVALUATE RISKS TO HUMAN HEALTH FROM SOIL & GROUNDWATER CONTAMINATION

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.

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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:

- DWI data from water company tap water testing from previous years;
- COT; and
- 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.

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[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.

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[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 $\mu g kg^{-1}{}_{bw} day^{-1}$ to $\mu g m^{-3}$ 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.

Appendix D.2

LABORATORY CERTIFICATES

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: Fiona Marks

CERTIFICATE OF ANALYSIS

Date:	30 January 2018
Customer:	H_WSP_BRI
Sample Delivery Group (SDG):	180112-62
Your Reference:	70037512
Location:	Warren Crescent
Report No:	442091

We received 8 samples on Friday January 12, 2018 and 5 of these samples were scheduled for analysis which was completed on Tuesday January 30, 2018. 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).

Approved By:

Sonia McWhan
Operations Manager

MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA UKAS TESTING 1291

ALS Environmental is part of 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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16862065	BH101		0.60 - 0.60	10/01/2018
16862066	BH101		0.90 - 0.90	10/01/2018
16862063	BH102		0.40 - 0.40	09/01/2018
16862064	BH102		4.10 - 4.40	09/01/2018
16862061	BH103		0.50 - 0.50	08/01/2018
16862062	BH103		0.70 - 0.80	08/01/2018
16862067	BH105		0.60 - 0.60	11/01/2018
16862068	BH105		2.60 - 2.60	11/01/2018

Maximum Sample/Coolbox Temperature (°C) : **6.6**

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.

CERTIFICATE OF ANALYSIS

Validated

SDG:	180112-62	**Client Reference:**	70037512
Location:	Warren Crescent	**Order Number:**	70037512-012
Report Number:	442091	**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)			16862065			16862063			16862064			16862062			16862067		
Customer Sample Reference			BH101			BH102			BH102			BH103			BH105		
AGS Reference																	
Depth (m)			0.60 - 0.60			0.40 - 0.40			4.10 - 4.40			0.70 - 0.80			0.60 - 0.60		
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Alkali Metals by iCap-OES (Soil)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Ammonium Soil by Titration	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Anions by ion Chromatography	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Boron Water Soluble	All	NDPs: 0 Tests: 5		X			X			X			X			X	
CEN Readings	All	NDPs: 0 Tests: 3	X			X									X		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3	X			X									X		
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 5			X			X			X			X			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 3	X			X									X		
Mercury Dissolved	All	NDPs: 0 Tests: 3	X			X									X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 5		X			X			X			X			X	

CERTIFICATE OF ANALYSIS

Validated

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)			16862065			16862063			16862064			16862062			16862067		
Customer Sample Reference			BH101			BH102			BH102			BH103			BH105		
AGS Reference																	
Depth (m)			0.60 - 0.60			0.40 - 0.40			4.10 - 4.40			0.70 - 0.80			0.60 - 0.60		
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
PAH by GCMS	All	NDPs: 0 Tests: 5		X			X			X			X			X	
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 3	X			X									X		
PCBs by GCMS	All	NDPs: 0 Tests: 5		X			X			X			X			X	
pH	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Phosphate (Ortho as PO4) (s)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Sample description	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Semi Volatile Organic Compounds	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Total Organic Carbon	All	NDPs: 0 Tests: 5		X			X			X			X			X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
VOC MS (S)	All	NDPs: 0 Tests: 5			X			X			X			X			X

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
16862065	BH101	0.60 - 0.60	Dark Brown	Clay Loam	Stones	None
16862063	BH102	0.40 - 0.40	Dark Brown	Sandy Clay Loam	Stones	N/A
16862064	BH102	4.10 - 4.40	Light Brown	Sand	None	None
16862062	BH103	0.70 - 0.80	Dark Brown	Clay Loam	Stones	N/A
16862067	BH105	0.60 - 0.60	Dark Brown	Sand	Stones	Concrete/Aggregate

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.

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH102	BH103	BH105	
		Depth (m)	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
		Date Sampled	10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
		Sampled Time	.	.	.	.	.	
		Date Received	12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
		SDG Ref	180112-62	180112-62	180112-62	180112-62	180112-62	
		Lab Sample No.(s)	16862065	16862063	16862064	16862062	16862067	
		AGS Reference						
Component	**LOD/Units**	**Method**						
Moisture Content Ratio (% of as received sample)	%	PM024	15	13	17	16	13	
Nitrate as NO3, 2:1 water soluble	<0.5 mg/kg	TM019	13.2	11.7	35.6	12	18.5	
Exchangeable Ammonia as N	<12 mg/kg	TM024	<12 M	<12 M	<12 M	<12 M	<12 M	
Phenol	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	
Soil Organic Matter (SOM)	<0.35 %	TM132	1.21 #	1.49 #	0.421 #	1.72 #	3.33 #	
pH	1 pH Units	TM133	8.41 M	8.4 M	8.7 M	8.39 M	8.77 M	
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	
PCB congener 28	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 52	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 101	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 118	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 138	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 153	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
PCB congener 180	<0.003 mg/kg	TM168	<0.003 M	<0.003 M	<0.003 M	<0.003 M	<0.003 M	
Sum of detected PCB 7 Congeners	<0.021 mg/kg	TM168	<0.021	<0.021	<0.021	<0.021	<0.021	
Arsenic	<0.6 mg/kg	TM181	8.92 M	11.1 M	8.07 M	10.3 M	17.6 M	
Barium	<0.6 mg/kg	TM181	28.3 #	51.5 #	6.72 #	65.8 #	49.9 #	
Beryllium	<0.01 mg/kg	TM181	0.507 M	0.481 M	0.222 M	0.948 M	0.754 M	
Cadmium	<0.02 mg/kg	TM181	0.136 M	0.177 M	0.0469 M	0.177 M	0.262 M	
Chromium	<0.9 mg/kg	TM181	10.3 M	7.97 M	7.88 M	13.3 M	12.3 M	
Copper	<1.4 mg/kg	TM181	9.59 M	10.5 M	3.01 M	10.8 M	<14 M	
Lead	<0.7 mg/kg	TM181	22 M	43.2 M	3.52 M	31.5 M	21.1 M	
Mercury	<0.14 mg/kg	TM181	0.302 M	0.164 M	<0.14 M	0.321 M	<1.4 M	
Nickel	<0.2 mg/kg	TM181	13.3 M	17.7 M	9.95 M	19 M	20.5 M	
Phosphorus	<1 mg/kg	TM181	294	564	133	373	1380	
Selenium	<1 mg/kg	TM181	<1 #	<1 #	<1 #	<1 #	<10 #	
Vanadium	<0.2 mg/kg	TM181	19.3 #	25.3 #	18.9 #	26.1 #	40.4 #	
Zinc	<1.9 mg/kg	TM181	30.3 M	92.3 M	11.8 M	35.3 M	53.7 M	
Boron, water soluble	<1 mg/kg	TM222	1.68 M	<1 M	<1 M	<1 M	<1 M	
Potassium	<16 mg/kg	TM224	1360	1420	636	2080	1350	
Phosphate (ortho) as PO4	<1 mg/kg	TM243	<1	<1	<1	3.78	1.99	
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	<0.004 M	<0.004 M	0.0201 M	<0.004 M	0.0438 M	

CERTIFICATE OF ANALYSIS

Validated

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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*	Subcontracted test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH102	BH103	BH105	
		Depth (m)	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
		Date Sampled	10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
		Sampled Time	.	.	.	.	.	
		Date Received	12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
		SDG Ref	180112-62	180112-62	180112-62	180112-62	180112-62	
		Lab Sample No.(s)	16862065	16862063	16862064	16862062	16862067	
		AGS Reference						
Component	**LOD/Units**	**Method**						
Nitrite (soluble) as N	<0.03 mg/kg	TM243	0.3	0.254	0.193	0.5	0.325	

CERTIFICATE OF ANALYSIS

SDG:	180112-62	Client Reference:	70037512	Report Number:	442091
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH102	BH103	BH105	
Customer Sample Ref.			BH101	BH102	BH102	BH103	BH105	
Depth (m)			0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled			10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
Sampled Time			.	.	.	.	.	
Date Received			12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
SDG Ref			180112-62	180112-62	180112-62	180112-62	180112-62	
Lab Sample No.(s)			16862065	16862063	16862064	16862062	16862067	
AGS Reference								
Naphthalene-d8 % recovery**	%	TM218	105	93.7	107	92.4	93	
Acenaphthene-d10 % recovery**	%	TM218	101	92.7	103	94.3	92.8	
Phenanthrene-d10 % recovery**	%	TM218	98.4	91.8	101	94.9	92.2	
Chrysene-d12 % recovery**	%	TM218	90.9	94.1	91.9	105	95.5	
Perylene-d12 % recovery**	%	TM218	103	94.7	105	106	96.5	
Naphthalene	<0.009 mg/kg	TM218	<0.009 M	<0.009 M	<0.009 M	0.0128 M	0.0135 M	
Acenaphthylene	<0.012 mg/kg	TM218	<0.012 M	0.0372 M	<0.012 M	0.0607 M	0.0361 M	
Acenaphthene	<0.008 mg/kg	TM218	<0.008 M	<0.008 M	<0.008 M	<0.008 M	<0.008 M	
Fluorene	<0.01 mg/kg	TM218	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	
Phenanthrene	<0.015 mg/kg	TM218	0.0247 M	0.0357 M	<0.015 M	0.0566 M	0.0408 M	
Anthracene	<0.016 mg/kg	TM218	<0.016 M	<0.016 M	<0.016 M	<0.016 M	<0.016 M	
Fluoranthene	<0.017 mg/kg	TM218	0.0711 M	0.0687 M	<0.017 M	0.0995 M	0.0439 M	
Pyrene	<0.015 mg/kg	TM218	0.0576 M	0.0604 M	<0.015 M	0.0819 M	0.0412 M	
Benz(a)anthracene	<0.014 mg/kg	TM218	0.069 M	0.0374 M	<0.014 M	0.0991 M	0.0213 M	
Chrysene	<0.01 mg/kg	TM218	0.0428 M	0.0531 M	<0.01 M	0.0734 M	0.0284 M	
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	0.069 M	0.0849 M	<0.015 M	0.109 M	0.0621 M	
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	0.0205 M	0.0384 M	<0.014 M	0.0433 M	<0.014 M	
Benzo(a)pyrene	<0.015 mg/kg	TM218	0.0536 M	0.0693 M	<0.015 M	0.0928 M	0.0408 M	
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	0.0385 M	0.0452 M	<0.018 M	0.0637 M	0.0371 M	
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	<0.023 M	<0.023 M	<0.023 M	<0.023 M	<0.023 M	
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	0.0484 M	0.0597 M	<0.024 M	0.068 M	0.0532 M	
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	0.495	0.59	<0.118	0.86	0.418	

Validated

CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Semi Volatile Organic Compounds

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH102	BH103	BH105	
Customer Sample Ref.			BH101	BH102	BH102	BH103	BH105	
Depth (m)			0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled			10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
Sampled Time			.	.	.	.	.	
Date Received			12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
SDG Ref			180112-62	180112-62	180112-62	180112-62	180112-62	
Lab Sample No.(s)			16862065	16862063	16862064	16862062	16862067	
AGS Reference								
Phenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Pentachlorophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
n-Nitroso-n-dipropylamine	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Nitrobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Isophorone	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachloroethane	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachlorocyclopentadiene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachlorobutadiene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachlorobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
n-Dioctyl phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Dimethyl phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Diethyl phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
n-Dibutyl phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Dibenzofuran	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Carbazole	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Butylbenzyl phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
bis(2-Ethylhexyl) phthalate	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
bis(2-Chloroethoxy)methane	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
bis(2-Chloroethyl)ether	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Azobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Nitrophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Nitroaniline	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Methylphenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Chlorophenylphenylether	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Chloroaniline	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Chloro-3-methylphenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
4-Bromophenylphenylether	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
3-Nitroaniline	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2-Nitrophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2-Nitroaniline	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2-Methylphenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
1,2,4-Trichlorobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	

CERTIFICATE OF ANALYSIS

Validated

SDG:	180112-62	Client Reference:	70037512	Report Number:	442091
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Semi Volatile Organic Compounds

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	BH101	BH102	BH102	BH103	BH105	
Depth (m)	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled	10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
Sampled Time	.	.	.	.	.	
Date Received	12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
SDG Ref	180112-62	180112-62	180112-62	180112-62	180112-62	
Lab Sample No.(s)	16862065	16862063	16862064	16862062	16862067	
AGS Reference						

Component	LOD/Units	Method	BH101	BH102	BH102	BH103	BH105	
2-Chlorophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,6-Dinitrotoluene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,4-Dinitrotoluene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,4-Dimethylphenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,4-Dichlorophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,4,6-Trichlorophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2,4,5-Trichlorophenol	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
1,4-Dichlorobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
1,3-Dichlorobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
1,2-Dichlorobenzene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2-Chloronaphthalene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
2-Methylnaphthalene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthylene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Anthracene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(a)anthracene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(b)fluoranthene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(k)fluoranthene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(a)pyrene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(g,h,i)perylene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Chrysene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluorene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Indeno(1,2,3-cd)pyrene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Phenanthrene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Pyrene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Naphthalene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	
Dibenzo(a,h)anthracene	<0.1 mg/kg	TM157	<0.1	<0.1	<0.1	<0.1	<0.1	

CERTIFICATE OF ANALYSIS

SDG:	180112-62	Client Reference:	70037512	Report Number:	442091
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH102	BH103	BH105	
		Depth (m)	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
		Date Sampled	10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
		Sampled Time	.	.	.	.	.	
		Date Received	12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
		SDG Ref	180112-62	180112-62	180112-62	180112-62	180112-62	
		Lab Sample No.(s)	16862065	16862063	16862064	16862062	16862067	
		AGS Reference						
Component	**LOD/Units**	**Method**						
GRO Surrogate % recovery**	%	TM089	113	105	106	130	81	
GRO TOT (Moisture Corrected)	<0.044 mg/kg	TM089	<0.044 M	<0.044 M	<0.044 M	<0.044 M	<0.044 M	
Aliphatics >C5-C6	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C6-C8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C8-C10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C10-C12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aliphatics >C12-C16	<0.1 mg/kg	TM173	<0.1	<0.1	<0.1	0.418	1.34	
Aliphatics >C16-C21	<0.1 mg/kg	TM173	0.259	0.544	<0.1	0.8	6.93	
Aliphatics >C21-C35	<0.1 mg/kg	TM173	3.21	4.61	1.97	4.54	15.6	
Aliphatics >C35-C44	<0.1 mg/kg	TM173	0.184	<0.1	<0.1	<0.1	<0.1	
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173	3.65	5.16	1.97	5.75	23.8	
Aromatics >EC5-EC7	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC7-EC8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC8-EC10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC10-EC12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	
Aromatics >EC12-EC16	<0.1 mg/kg	TM173	<0.1	<0.1	<0.1	<0.1	<0.1	
Aromatics >EC16-EC21	<0.1 mg/kg	TM173	<0.1	<0.1	<0.1	0.666	2.07	
Aromatics >EC21-EC35	<0.1 mg/kg	TM173	2.61	3.82	<0.1	6.21	16.7	
Aromatics >EC35-EC44	<0.1 mg/kg	TM173	0.672	1.23	<0.1	1.96	3.96	
Aromatics >EC40-EC44	<0.1 mg/kg	TM173	<0.1	<0.1	<0.1	<0.1	1.36	
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173	3.28	5.05	<0.1	8.83	22.7	
Total Aliphatics & Aromatics >C5-C44	<0.1 mg/kg	TM173	6.93	10.2	1.97	14.6	46.5	
Aromatics >EC16-EC35	<0.1 mg/kg	TM173	2.61	3.82	<0.1	6.87	18.7	

CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
- ** % 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
- 1-5&+§@ Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH102	BH102	BH103	BH105	
Depth (m)			0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled			10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
Sampled Time			.	.	.	.	.	
Date Received			12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
SDG Ref			180112-62	180112-62	180112-62	180112-62	180112-62	
Lab Sample No.(s)			16862065	16862063	16862064	16862062	16862067	
AGS Reference								
Component	**LOD/Units**	**Method**						
Dibromofluoromethane**	%	TM116	108	108	107	109	104	
Toluene-d8**	%	TM116	106	115	101	104	109	
4-Bromofluorobenzene**	%	TM116	94.8	98.4	96	103	86.1	
Dichlorodifluoromethane	<0.006 mg/kg	TM116	<0.06 M	<0.06 M	<0.06 M	<0.06 M	<0.06 M	
Chloromethane	<0.007 mg/kg	TM116	<0.07 #	<0.07 #	<0.07 #	<0.07 #	<0.07 #	
Vinyl Chloride	<0.006 mg/kg	TM116	<0.06 M	<0.06 M	<0.06 M	<0.06 M	<0.06 M	
Bromomethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Chloroethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Trichlorofluoromethane	<0.006 mg/kg	TM116	<0.06 M	<0.06 M	<0.06 M	<0.06 M	<0.06 M	
1,1-Dichloroethene	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #	
Carbon Disulphide	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M	<0.07 M	<0.07 M	
Dichloromethane	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #	
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
trans-1,2-Dichloroethene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
1,1-Dichloroethane	<0.008 mg/kg	TM116	<0.08 M	<0.08 M	<0.08 M	<0.08 M	<0.08 M	
cis-1,2-Dichloroethene	<0.006 mg/kg	TM116	<0.06 M	<0.06 M	<0.06 M	<0.06 M	<0.06 M	
2,2-Dichloropropane	<0.01 mg/kg	TM116	<0.1	<0.1	<0.1	<0.1	<0.1	
Bromochloromethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Chloroform	<0.008 mg/kg	TM116	<0.08 M	<0.08 M	<0.08 M	<0.08 M	<0.08 M	
1,1,1-Trichloroethane	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M	<0.07 M	<0.07 M	
1,1-Dichloropropene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Carbontetrachloride	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
1,2-Dichloroethane	<0.005 mg/kg	TM116	<0.05 M	<0.05 M	<0.05 M	<0.05 M	<0.05 M	
Benzene	<0.009 mg/kg	TM116	<0.09 M	<0.09 M	<0.09 M	<0.09 M	<0.09 M	
Trichloroethene	<0.009 mg/kg	TM116	<0.09 #	<0.09 #	<0.09 #	<0.09 #	<0.09 #	
1,2-Dichloropropane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Dibromomethane	<0.009 mg/kg	TM116	<0.09 M	<0.09 M	<0.09 M	<0.09 M	<0.09 M	
Bromodichloromethane	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M	<0.07 M	<0.07 M	
cis-1,3-Dichloropropene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Toluene	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M	<0.07 M	<0.07 M	
trans-1,3-Dichloropropene	<0.01 mg/kg	TM116	<0.1	<0.1	<0.1	<0.1	<0.1	
1,1,2-Trichloroethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	

Validated

CERTIFICATE OF ANALYSIS

SDG:	180112-62	Client Reference:	70037512	Report Number:	442091
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH102	BH103	BH105
Customer Sample Ref.			BH101	BH102	BH102	BH103	BH105
Depth (m)			0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Date Sampled			10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018
Sampled Time			.	.	.	.	.
Date Received			12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018
SDG Ref			180112-62	180112-62	180112-62	180112-62	180112-62
Lab Sample No.(s)			16862065	16862063	16862064	16862062	16862067
AGS Reference							
1,3-Dichloropropane	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M	<0.07 M	<0.07 M
Tetrachloroethene	<0.005 mg/kg	TM116	<0.05 M	<0.05 M	<0.05 M	<0.05 M	<0.05 M
Dibromochloromethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
1,2-Dibromoethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
Chlorobenzene	<0.005 mg/kg	TM116	<0.05 M	<0.05 M	<0.05 M	<0.05 M	<0.05 M
1,1,1,2-Tetrachloroethane	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
Ethylbenzene	<0.004 mg/kg	TM116	<0.04 M	<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 #	<0.1 #
o-Xylene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
Styrene	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
Bromoform	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
Isopropylbenzene	<0.005 mg/kg	TM116	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #
1,1,2,2-Tetrachloroethane	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
1,2,3-Trichloropropane	<0.016 mg/kg	TM116	<0.16 M	<0.16 M	<0.16 M	<0.16 M	<0.16 M
Bromobenzene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
Propylbenzene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
2-Chlorotoluene	<0.009 mg/kg	TM116	<0.09 M	<0.09 M	<0.09 M	<0.09 M	<0.09 M
1,3,5-Trimethylbenzene	<0.008 mg/kg	TM116	<0.08 M	<0.08 M	<0.08 M	<0.08 M	<0.08 M
4-Chlorotoluene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
tert-Butylbenzene	<0.014 mg/kg	TM116	<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
1,2,4-Trimethylbenzene	<0.009 mg/kg	TM116	<0.09 #	<0.09 #	<0.09 #	<0.09 #	<0.09 #
sec-Butylbenzene	<0.01 mg/kg	TM116	<0.1	<0.1	<0.1	<0.1	<0.1
4-Isopropyltoluene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
1,3-Dichlorobenzene	<0.008 mg/kg	TM116	<0.08 M	<0.08 M	<0.08 M	<0.08 M	<0.08 M
1,4-Dichlorobenzene	<0.005 mg/kg	TM116	<0.05 M	<0.05 M	<0.05 M	<0.05 M	<0.05 M
n-Butylbenzene	<0.011 mg/kg	TM116	<0.11	<0.11	<0.11	<0.11	<0.11
1,2-Dichlorobenzene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M
1,2-Dibromo-3-chloropropane	<0.014 mg/kg	TM116	<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
Tert-amyl methyl ether	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
1,2,4-Trichlorobenzene	<0.02 mg/kg	TM116	<0.2	<0.2	<0.2	<0.2	<0.2
Hexachlorobutadiene	<0.02 mg/kg	TM116	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	<0.013 mg/kg	TM116	<0.13 M	<0.13 M	<0.13 M	<0.13 M	<0.13 M

CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH102	BH103	BH105	
		Depth (m)	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60	
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
		Date Sampled	10/01/2018	09/01/2018	09/01/2018	08/01/2018	11/01/2018	
		Sampled Time	.	.	.	.	.	
		Date Received	12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
		SDG Ref	180112-62	180112-62	180112-62	180112-62	180112-62	
		Lab Sample No.(s)	16862065	16862063	16862064	16862062	16862067	
		AGS Reference						
1,2,3-Trichlorobenzene	<0.02 mg/kg	TM116	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	

Asbestos Identification - Soil

Sample		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	BH101 0.60 - 0.60 SOLID 10/01/2018 00:00:00 12/01/2018 14:10:55 180112-62 16862065 TM048	15/01/2018	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	BH102 0.40 - 0.40 SOLID 09/01/2018 00:00:00 12/01/2018 15:46:54 180112-62 16862063 TM048	15/01/2018	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	BH102 4.10 - 4.40 SOLID 09/01/2018 00:00:00 12/01/2018 15:43:44 180112-62 16862064 TM048	15/01/2018	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	BH103 0.70 - 0.80 SOLID 08/01/2018 00:00:00 12/01/2018 15:45:42 180112-62 16862062 TM048	15/01/2018	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	BH105 0.60 - 0.60 SOLID 11/01/2018 00:00:00 12/01/2018 14:08:30 180112-62 16862067 TM048	15/01/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Validated

CERTIFICATE OF ANALYSIS

SDG:	180112-62	Client Reference:	70037512	Report Number:	442091
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Warren Crescent
Mass Sample taken (kg)	0.103	**Natural Moisture Content (%)**	14.9
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	87
Particle Size <4mm	>95%		

Case	
SDG	180112-62
Lab Sample Number(s)	16862063
Sampled Date	09-Jan-2018
Customer Sample Ref.	BH102
Depth (m)	0.40 - 0.40

Eluate Analysis	C_2 Conc^n in 10:1 eluate (mg/l)		A_2 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00292	<0.0005	0.0292	<0.005	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0103	<0.0002	0.103	<0.002	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0088	<0.005	0.088	<0.05	-	-	-
Phenanthrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.0031	<0.0003	0.031	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000456	<0.0002	0.00456	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.000587	<0.0004	0.00587	<0.004	-	-	-
Selenium	0.000802	<0.0005	0.00802	<0.005	-	-	-
Vanadium	0.00179	<0.001	0.0179	<0.01	-	-	-
Zinc	0.00251	<0.001	0.0251	<0.01	-	-	-

Leach Test Information

Date Prepared	15-Jan-2018
pH (pH Units)	7.97
Conductivity (µS/cm)	74.20
Temperature (ºC)	18.50
Volume Leachant (Litres)	0.887

Mcerts Certification does not apply to leachates

30/01/2018 09:57:58

CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Warren Crescent
Mass Sample taken (kg)	0.106	**Natural Moisture Content (%)**	17.6
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	85
Particle Size <4mm	>95%		

Case	
SDG	180112-62
Lab Sample Number(s)	16862065
Sampled Date	10-Jan-2018
Customer Sample Ref.	BH101
Depth (m)	0.60 - 0.60

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Naphthalene (diss.filt)	0.0000113	<0.00001	0.000113	<0.0001	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00118	<0.0005	0.0118	<0.005	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00365	<0.0002	0.0365	<0.002	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0597	<0.005	0.597	<0.05	-	-	-
Phenanthrene (diss.filt)	0.00000732	<0.000005	0.0000732	<0.00005	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00138	<0.0003	0.0138	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000315	<0.0002	0.00315	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.000609	<0.0004	0.00609	<0.004	-	-	-
Selenium	0.000706	<0.0005	0.00706	<0.005	-	-	-
Vanadium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00124	<0.001	0.0124	<0.01	-	-	-

Leach Test Information

Date Prepared	15-Jan-2018
pH (pH Units)	8.05
Conductivity (µS/cm)	107.00
Temperature (ºC)	17.80
Volume Leachant (Litres)	0.884

Mcerts Certification does not apply to leachates

30/01/2018 09:57:58

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	Warren Crescent
Mass Sample taken (kg)	0.103	Natural Moisture Content (%)	14.9
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	87
Particle Size <4mm	>95%		

Case	
SDG	180112-62
Lab Sample Number(s)	16862067
Sampled Date	11-Jan-2018
Customer Sample Ref.	BH105
Depth (m)	0.60 - 0.60

Eluate Analysis	C_2 Conc^n in 10:1 eluate (mg/l)		A_2 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00484	<0.0005	0.0484	<0.005	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00418	<0.0002	0.0418	<0.002	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000536	<0.000005	0.000536	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000244	<0.000005	0.000244	<0.00005	-	-	-
Boron	0.00665	<0.005	0.0665	<0.05	-	-	-
Phenanthrene (diss.filt)	0.000145	<0.000005	0.00145	<0.00005	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000163	<0.000005	0.000163	<0.00005	-	-	-
Chrysene (diss.filt)	0.00000625	<0.000005	0.0000625	<0.00005	-	-	-
Pyrene (diss.filt)	0.0000647	<0.000005	0.000647	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.00000934	<0.000005	0.0000934	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.0024	<0.0003	0.024	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000904	<0.0002	0.00904	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.00032	<0.000082	0.0032	<0.00082	-	-	-
Nickel	0.000599	<0.0004	0.00599	<0.004	-	-	-
Selenium	0.000523	<0.0005	0.00523	<0.005	-	-	-
Vanadium	0.00837	<0.001	0.0837	<0.01	-	-	-
Zinc	0.00178	<0.001	0.0178	<0.01	-	-	-

Leach Test Information

Date Prepared	15-Jan-2018
pH (pH Units)	7.79
Conductivity (µS/cm)	98.10
Temperature (ºC)	19.20
Volume Leachant (Litres)	0.887

Mcerts Certification does not apply to leachates

30/01/2018 09:57:58

Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM019	Modified: US EPA Method 9056	Determination of Anions in Soils using Ion Chromatography
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
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) and BTEX (MTBE) compounds 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
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM157	HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).	Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
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
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM224	US EPA Method 6010B	Determination of Alkaline Metals by iCap 6500 Duo ICP-OES
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
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

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

Test Completion Dates

Lab Sample No(s)	16862065	16862063	16862064	16862062	16862067
Customer Sample Ref.	BH101	BH102	BH102	BH103	BH105
AGS Ref.					
Depth	0.60 - 0.60	0.40 - 0.40	4.10 - 4.40	0.70 - 0.80	0.60 - 0.60
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkali Metals by iCap-OES (Soil)	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
Ammonium Soil by Titration	18-Jan-2018	18-Jan-2018	18-Jan-2018	18-Jan-2018	18-Jan-2018
Anions by ion Chromatography	30-Jan-2018	30-Jan-2018	30-Jan-2018	30-Jan-2018	30-Jan-2018
Anions by Kone (soil)	16-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	16-Jan-2018
Asbestos ID in Solid Samples	15-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018
Boron Water Soluble	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018
CEN 10:1 Leachate (1 Stage)	15-Jan-2018	15-Jan-2018			15-Jan-2018
CEN Readings	16-Jan-2018	16-Jan-2018			16-Jan-2018
Dissolved Metals by ICP-MS	18-Jan-2018	18-Jan-2018			18-Jan-2018
EPH CWG (Aliphatic) GC (S)	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018
EPH CWG (Aromatic) GC (S)	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018
GRO by GC-FID (S)	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
Hexavalent Chromium (s)	17-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
Hexavalent Chromium (w)	18-Jan-2018	18-Jan-2018			18-Jan-2018
Mercury Dissolved	18-Jan-2018	18-Jan-2018			18-Jan-2018
Metals in solid samples by OES	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	17-Jan-2018
NO3, NO2 and TON by KONE (s)	18-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	18-Jan-2018
PAH by GCMS	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
PAH in waters by GC-MS (diss.filt)	18-Jan-2018	18-Jan-2018			18-Jan-2018
PCBs by GCMS	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
pH	15-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018
Phenols by HPLC (S)	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018
Phosphate (Ortho as PO4) (s)	18-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	18-Jan-2018
Sample description	12-Jan-2018	12-Jan-2018	12-Jan-2018	12-Jan-2018	12-Jan-2018
Semi Volatile Organic Compounds	18-Jan-2018	18-Jan-2018	18-Jan-2018	18-Jan-2018	18-Jan-2018
Total Organic Carbon	25-Jan-2018	25-Jan-2018	25-Jan-2018	30-Jan-2018	30-Jan-2018
TPH CWG GC (S)	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018
VOC MS (S)	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018

Validated

CERTIFICATE OF ANALYSIS

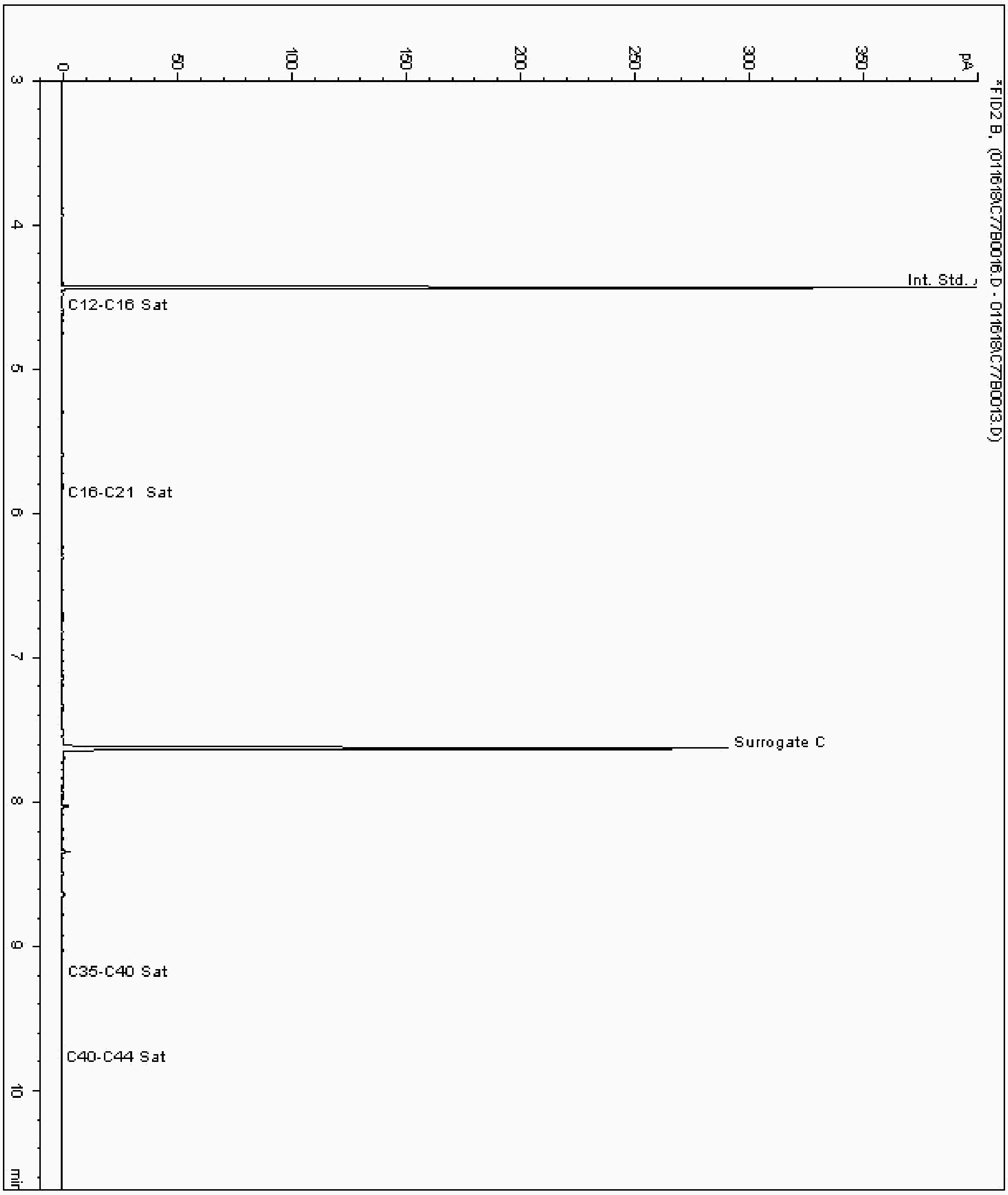
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aliphatic) GC (S)	**Sample No :**	16864114	**Depth :**	0.60 - 0.60
		Sample ID :	BH101		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15825524-
Date Acquired   :  16/01/2018 11:32:07 PM
Units           :  ppb
Dilution:
```



CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

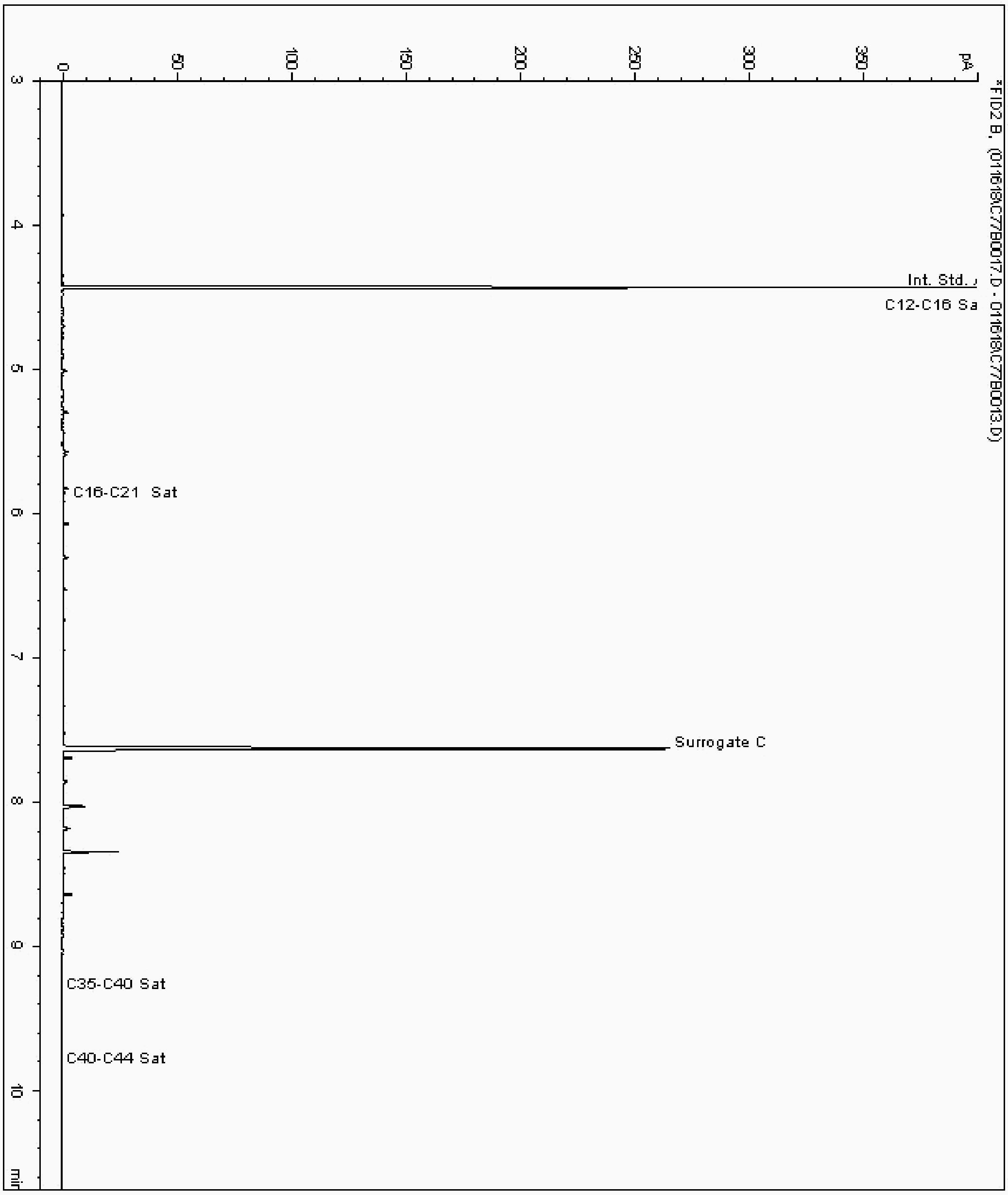
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16864335
Sample ID : BH105

Depth : 0.60 - 0.60

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15825552-
Date Acquired : 16/01/2018 11:52:23 PM
Units : ppb
Dilution:



CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aliphatic) GC (S)	**Sample No :**	16864527	**Depth :**	0.40 - 0.40
		Sample ID :	BH102		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15825475-
Date Acquired   :  16/01/2018 12:12:29 PM
Units           :  ppb
Dilution:
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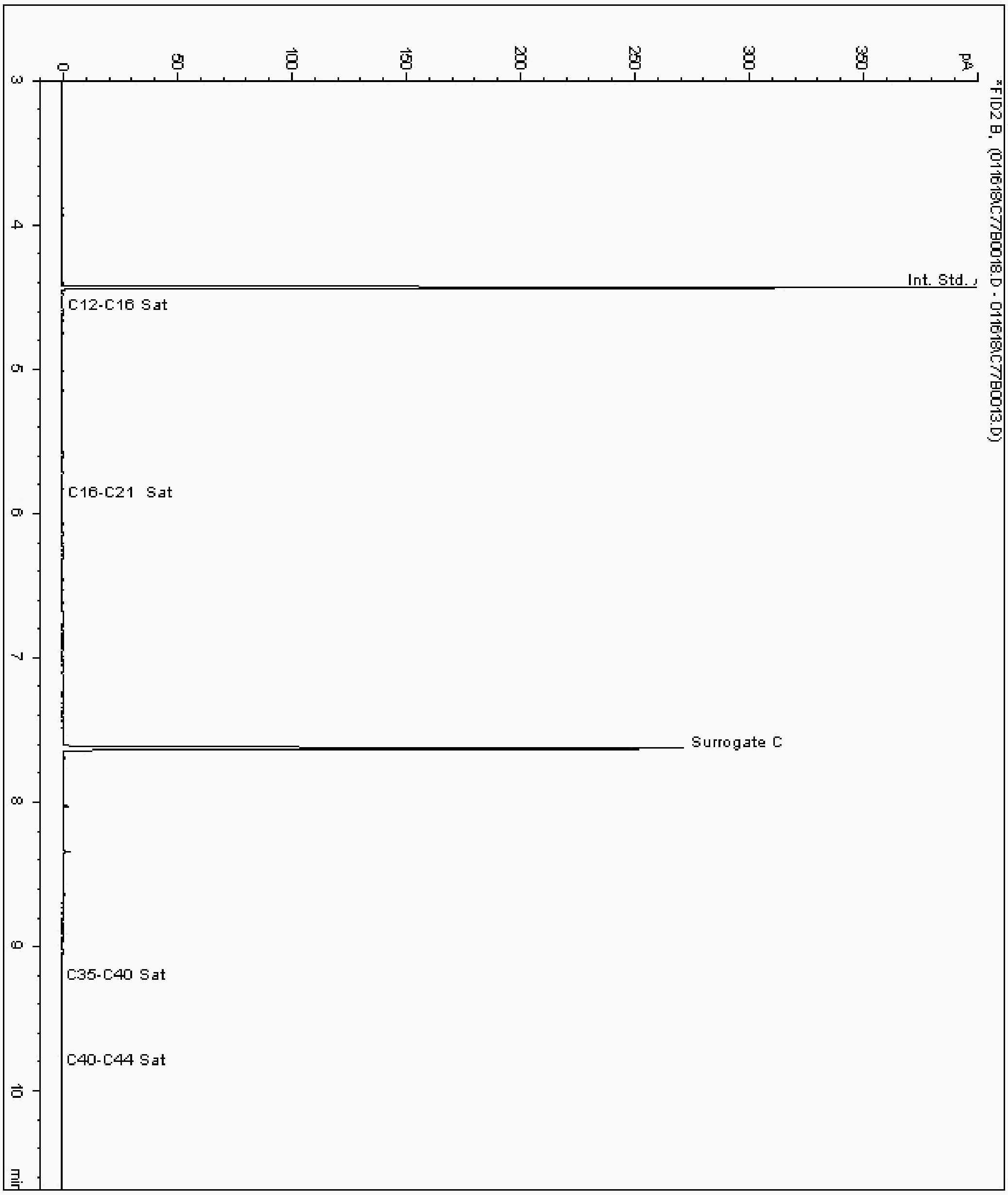


CERTIFICATE OF ANALYSIS

Validated

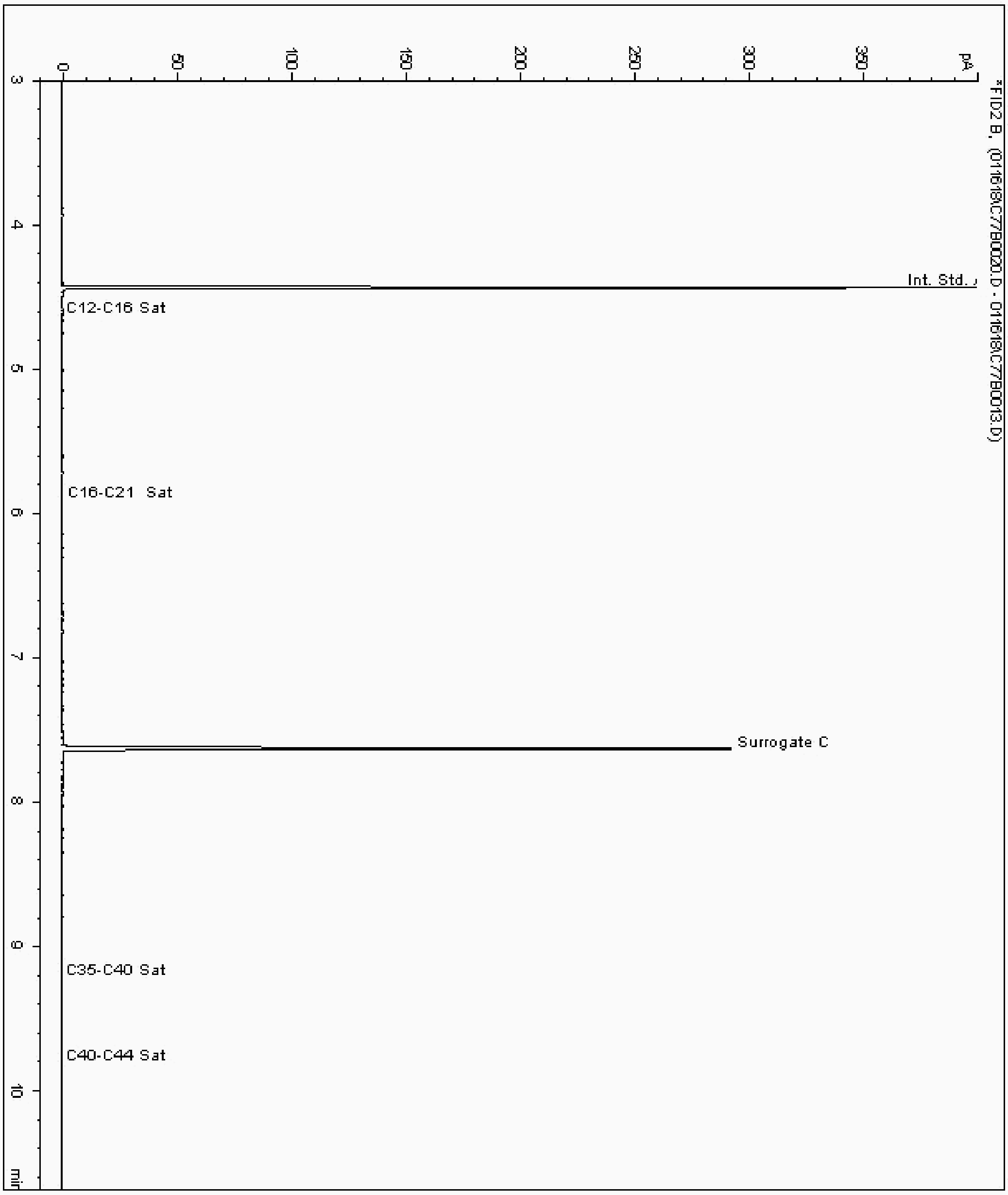
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aliphatic) GC (S)	**Sample No :**	16865086	**Depth :**	4.10 - 4.40
		Sample ID :	BH102		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:   15825428-
Date Acquired   :  16/01/2018 12:52:52 PM
Units           :  ppb
Dilution:
```



CERTIFICATE OF ANALYSIS

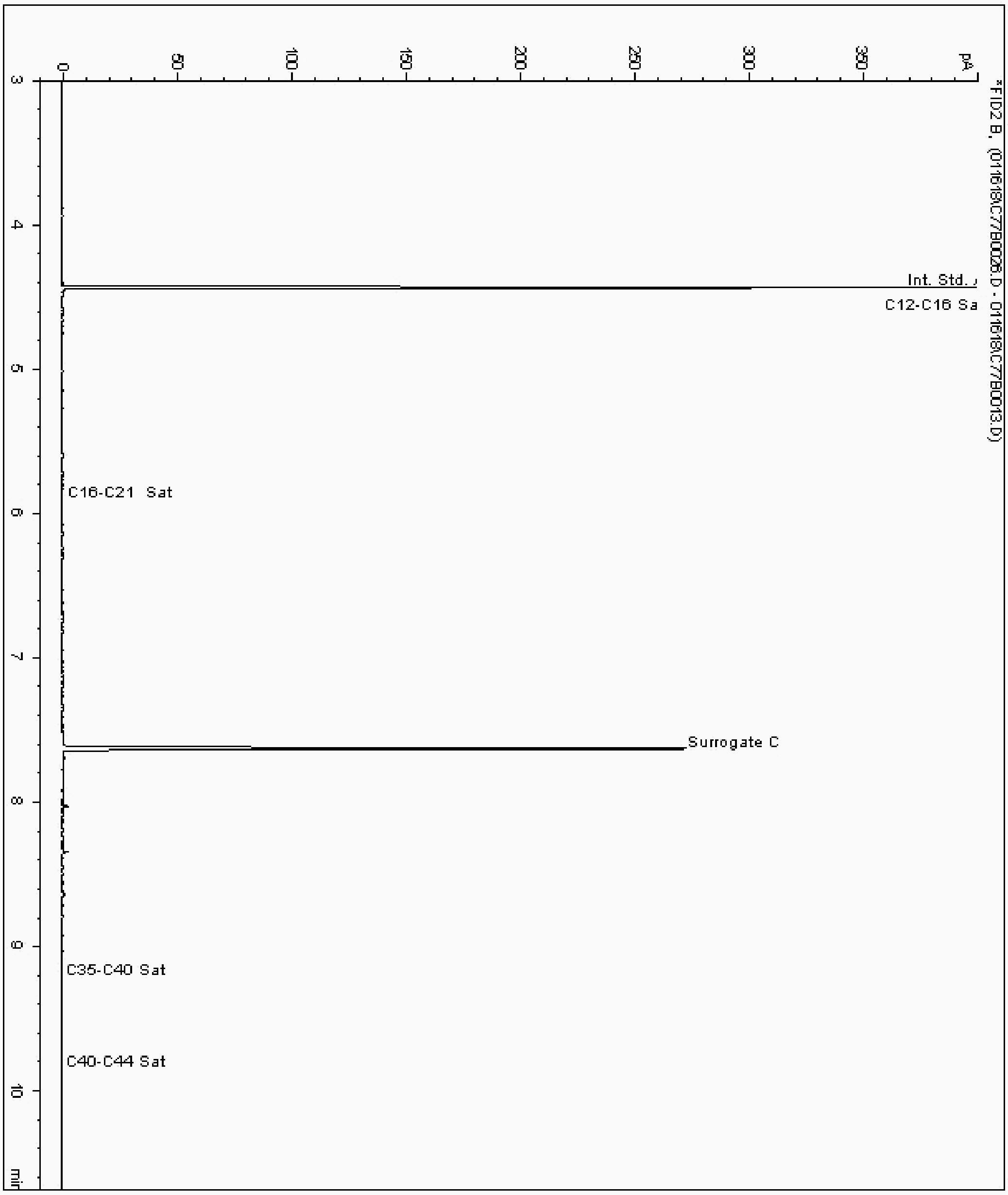
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aliphatic) GC (S)	**Sample No :**	16865175	**Depth :**	0.70 - 0.80
		Sample ID :	BH103		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15825385-
Date Acquired   :  16/01/2018 14:53:52 PM
Units           :  ppb
Dilution:
```



Validated

CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aromatic) GC (S)	**Sample No :**	16864114	**Depth :**	0.60 - 0.60
		Sample ID :	BH101		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15825525-
Date Acquired  :  16/01/2018 11:32:08 PM
Units          :  ppb
Dilution:
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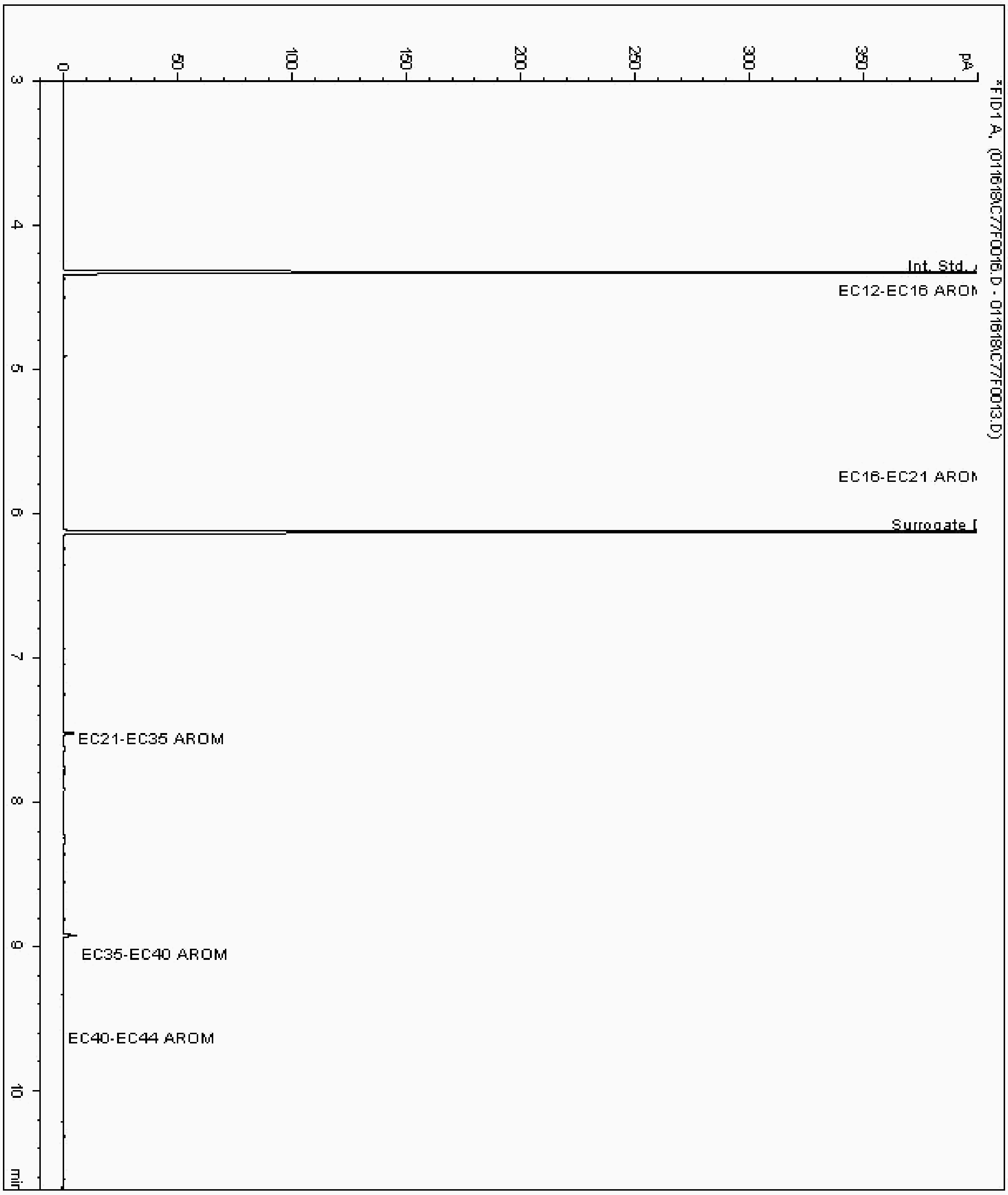

Chromatogram

Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16864335
Sample ID : BH105

Depth : 0.60 - 0.60

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15825553-
Date Acquired   :  16/01/2018 11:52:24 PM
Units           :  ppb
Dilution:
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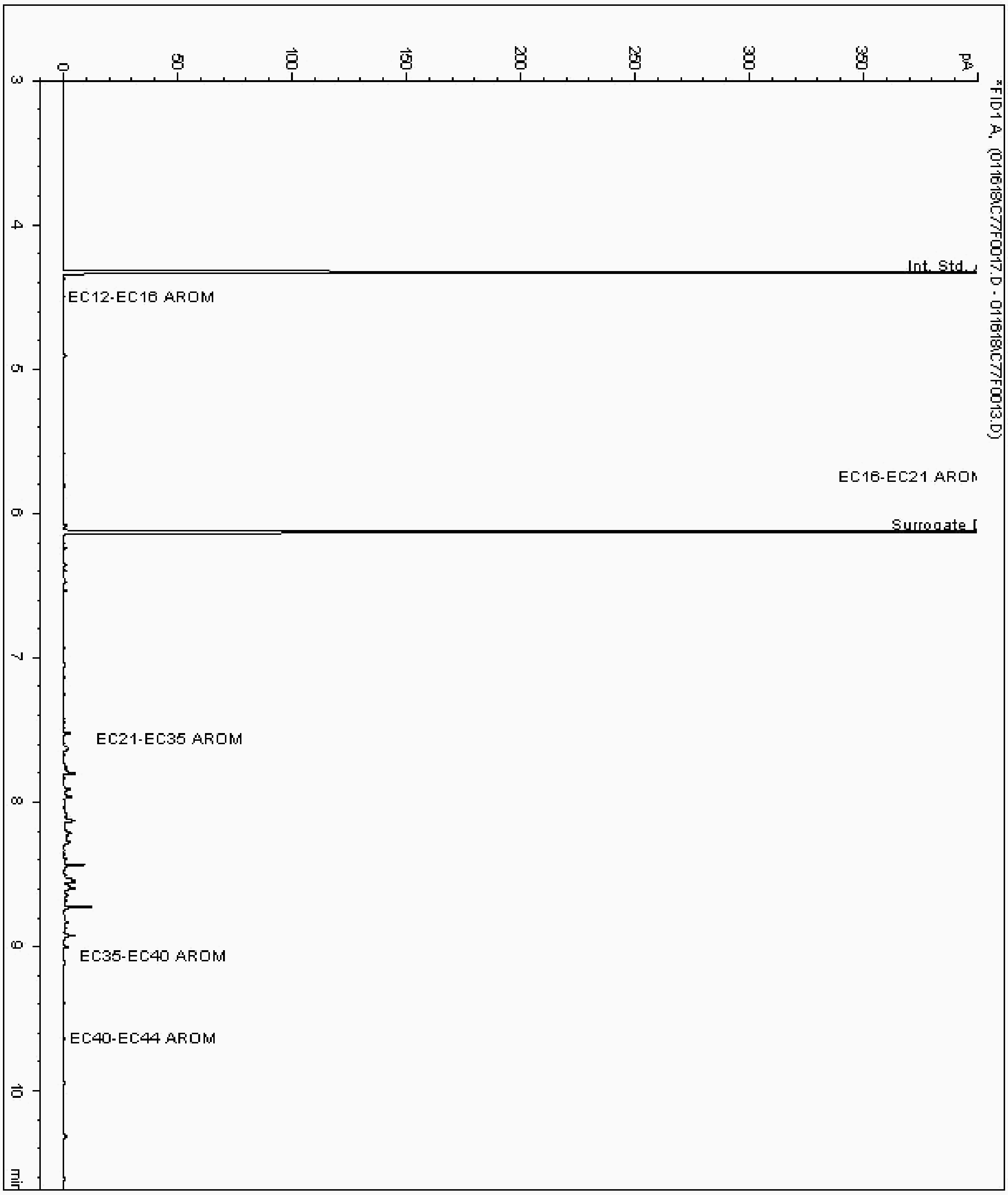


Validated

CERTIFICATE OF ANALYSIS

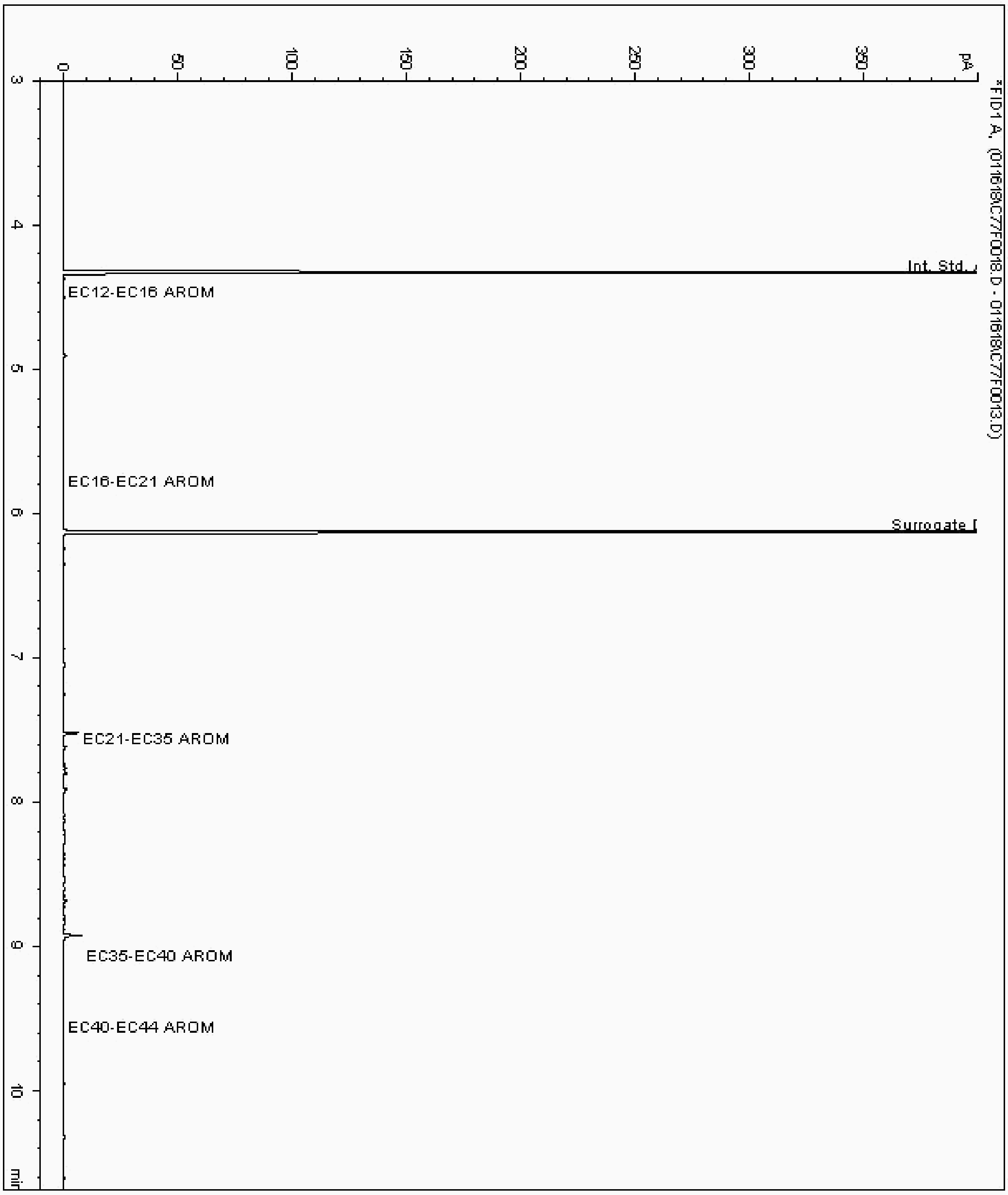
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aromatic) GC (S)	**Sample No :**	16864527	**Depth :**	0.40 - 0.40
		Sample ID :	BH102		

Speciated TPH - SATS (C12 - C40)

```
Sample Identity:  15825476-
Date Acquired  :  16/01/2018 12:12:28 PM
Units          :  ppb
Dilution:
```



Validated

CERTIFICATE OF ANALYSIS

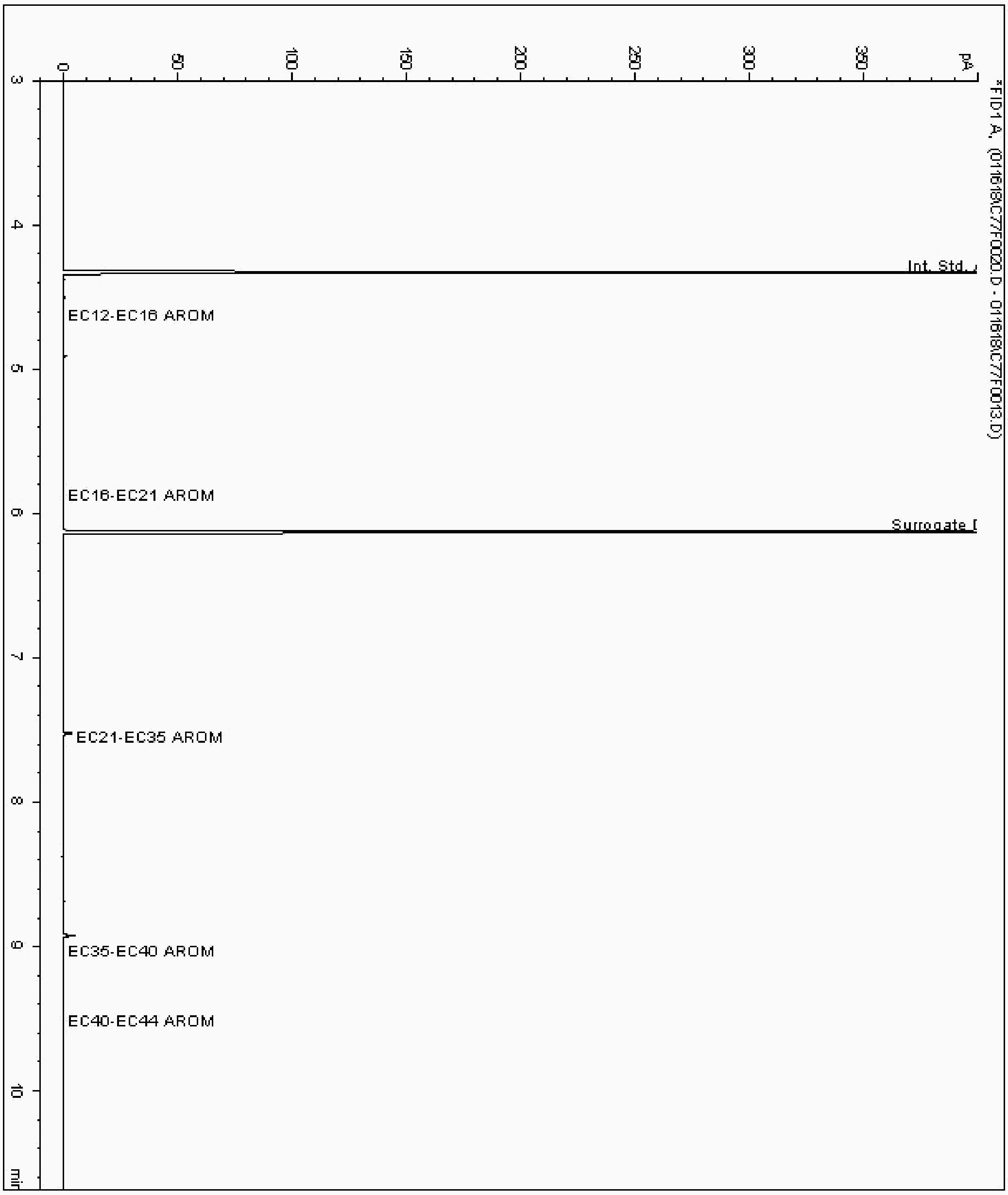
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) GC (S) **Sample No :** 16865086 **Depth :** 4.10 - 4.40
Sample ID : BH102

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15825429-
Date Acquired : 16/01/2018 12:52:51 PM
Units : ppb
Dilution:



CERTIFICATE OF ANALYSIS

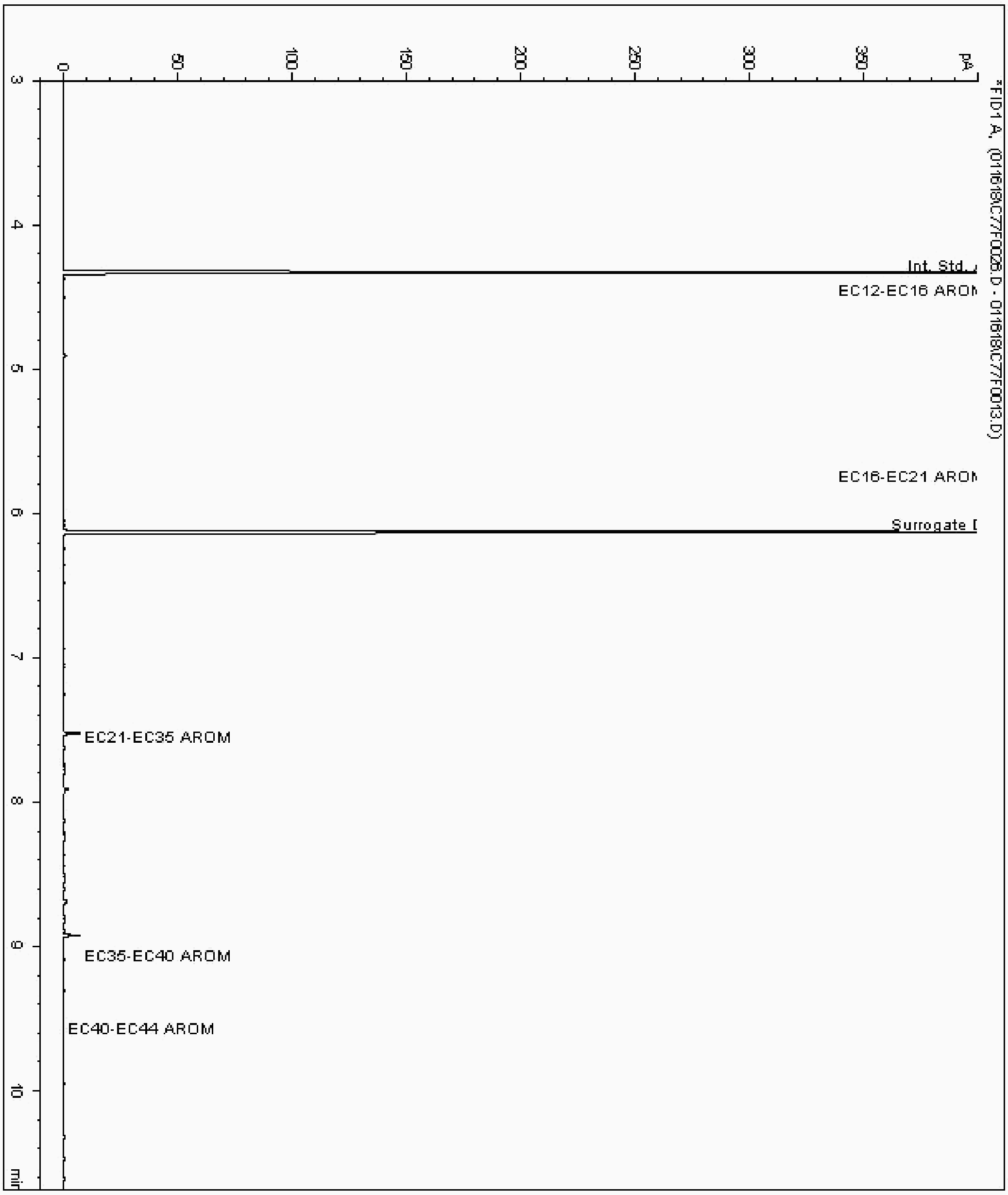
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) GC (S) **Sample No :** 16865175 **Depth :** 0.70 - 0.80
Sample ID : BH103

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15825386-
Date Acquired : 16/01/2018 14:53:52 PM
Units : ppb
Dilution:



CERTIFICATE OF ANALYSIS

Validated

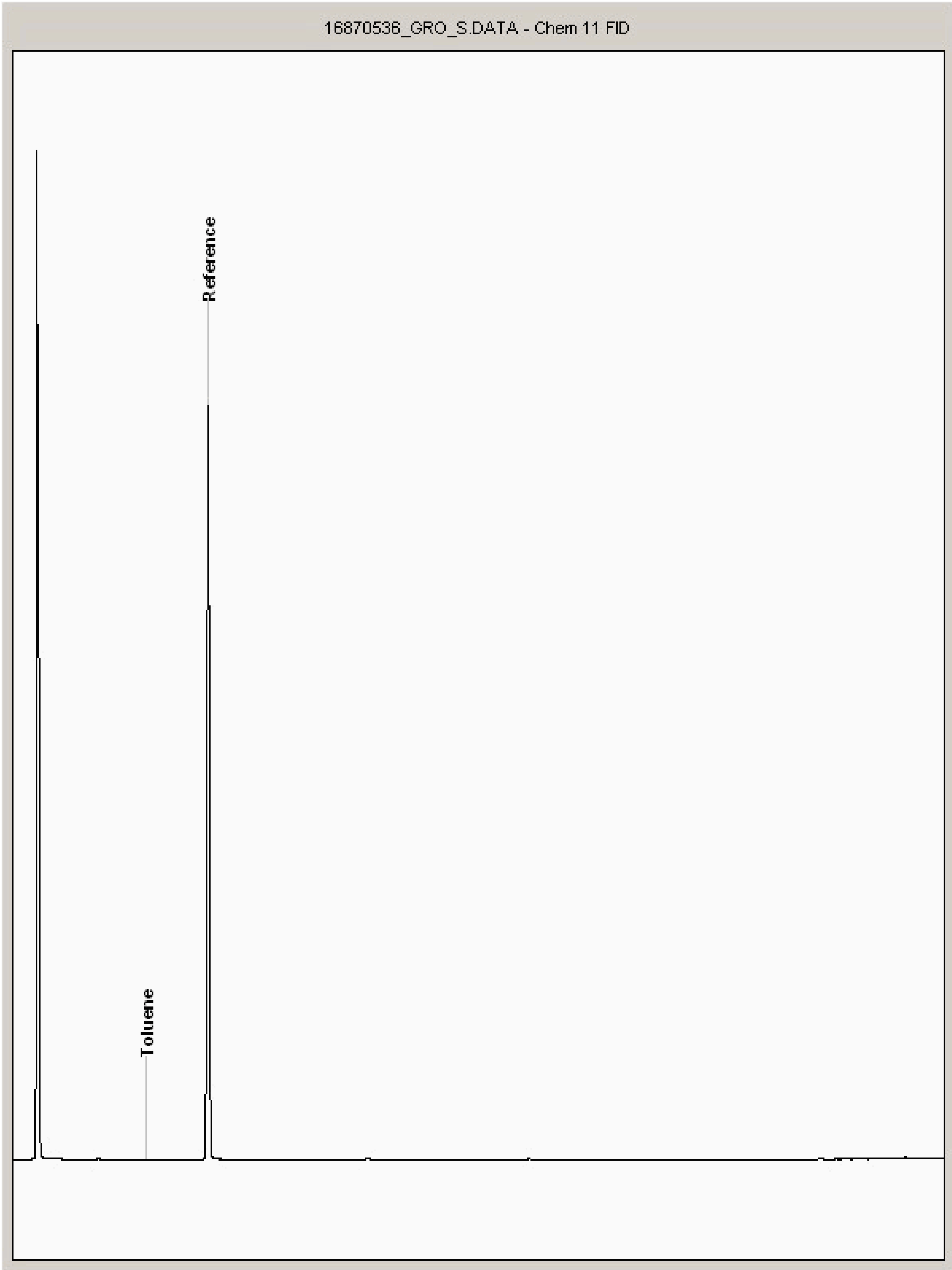
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16870536
Sample ID : BH102

Depth : 0.40 - 0.40



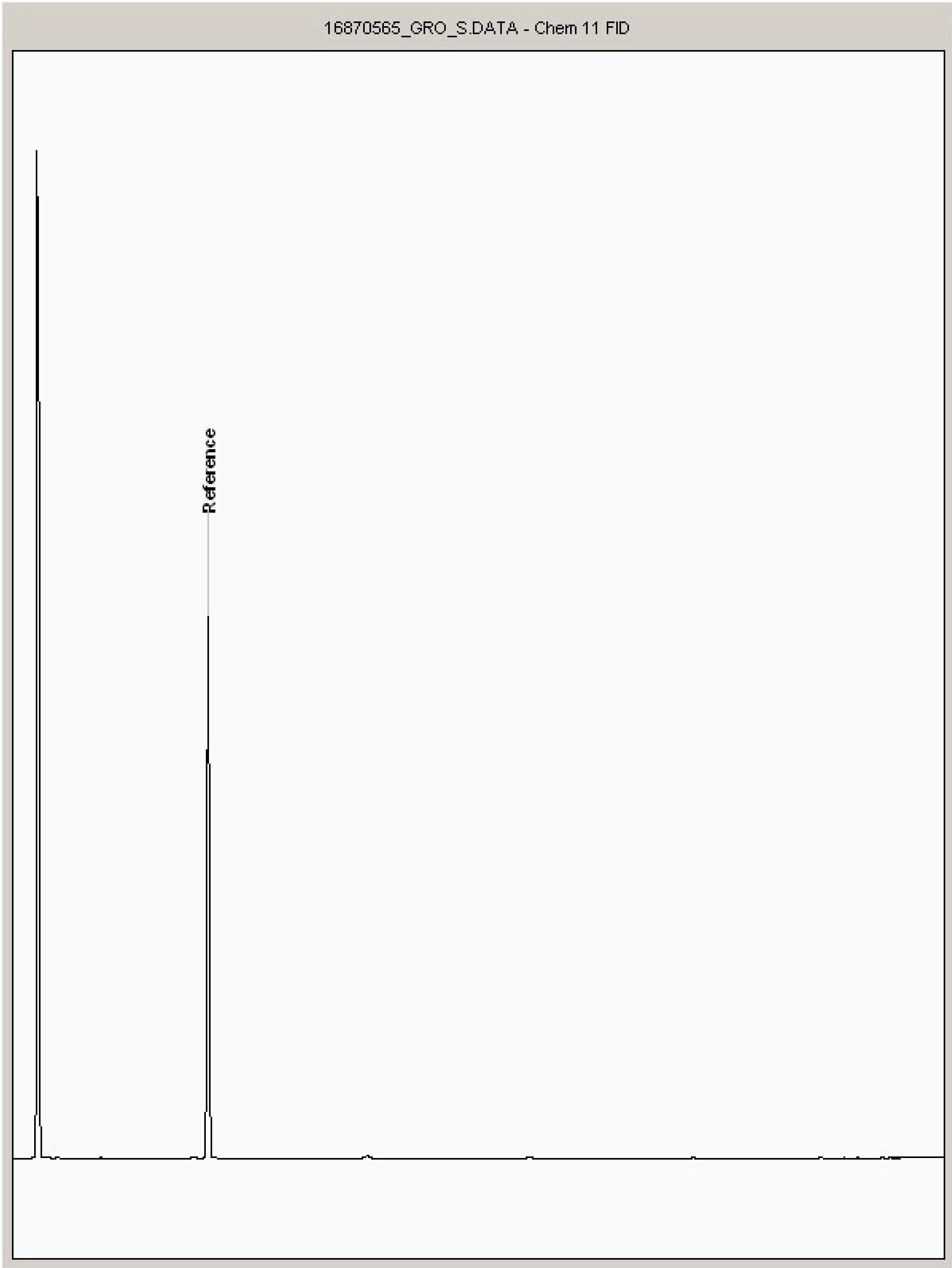
CERTIFICATE OF ANALYSIS

Validated

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

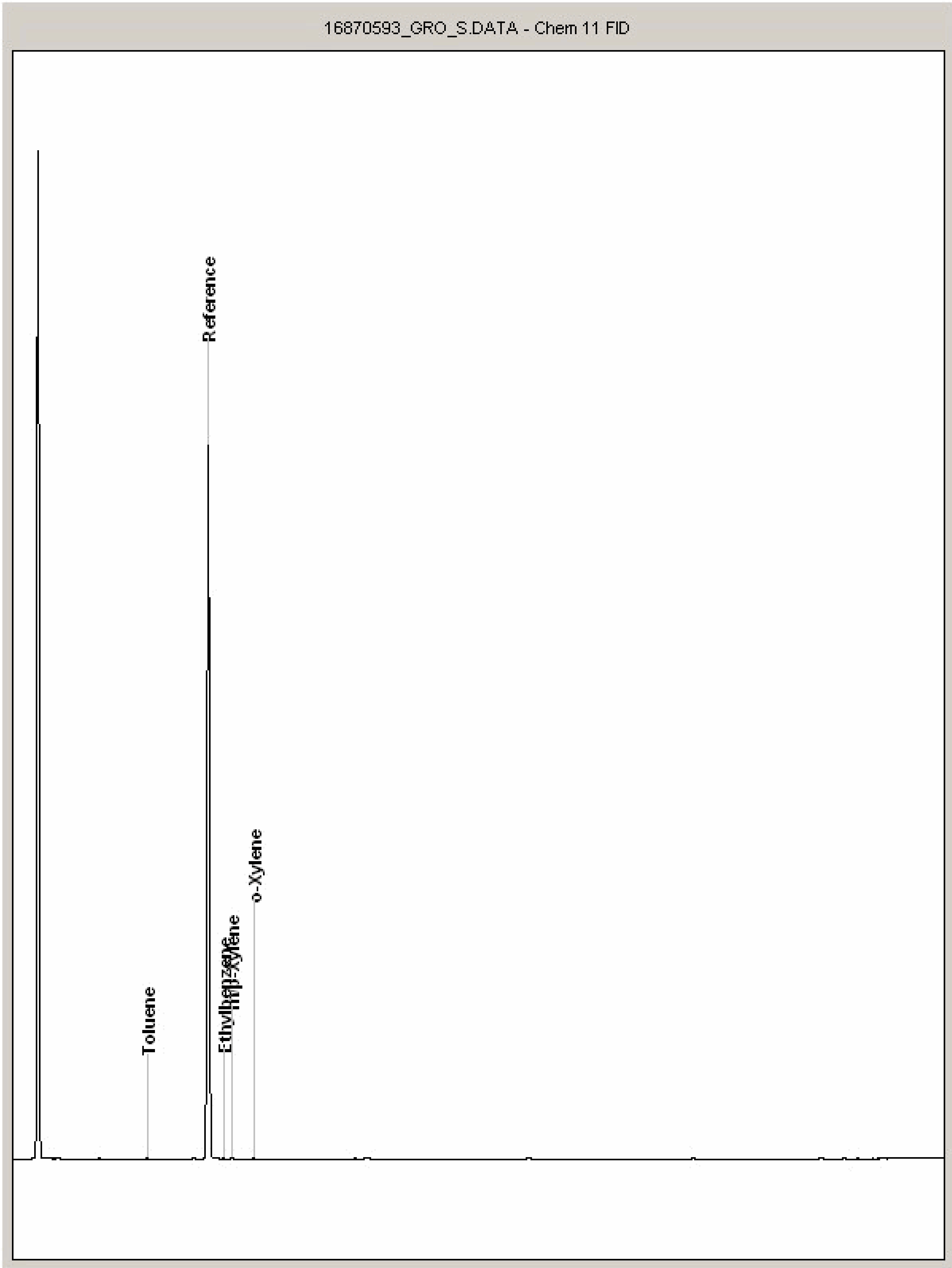
Chromatogram

Analysis:	GRO by GC-FID (S)	**Sample No :**	16870565	**Depth :**	4.10 - 4.40
		Sample ID :	BH102		



Chromatogram

Analysis: GRO by GC-FID (S) **Sample No :** 16870593 **Depth :** 0.70 - 0.80
Sample ID : BH103

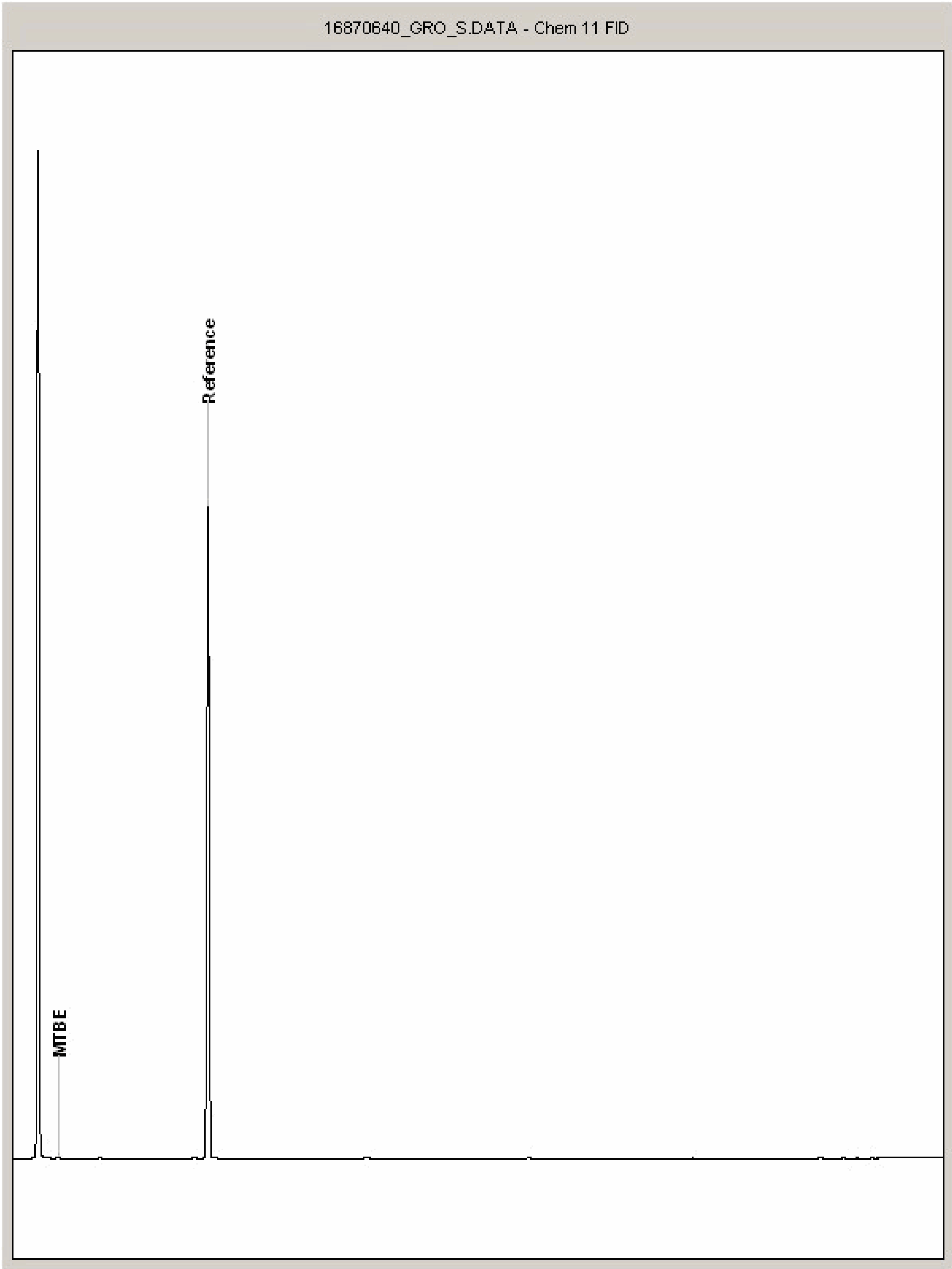


CERTIFICATE OF ANALYSIS

SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S) **Sample No :** 16870640 **Depth :** 0.60 - 0.60
Sample ID : BH101



Validated

CERTIFICATE OF ANALYSIS

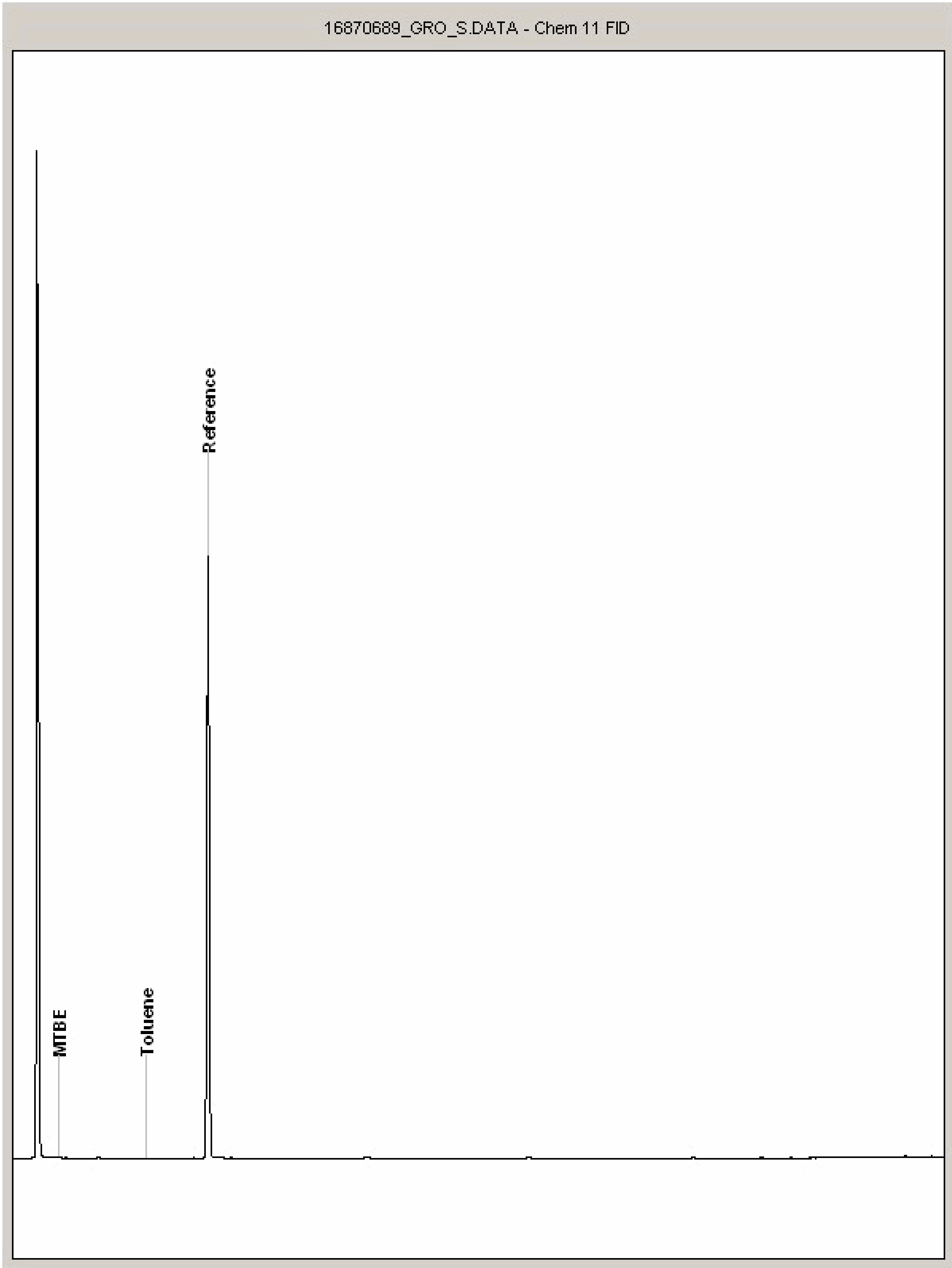
SDG:	180112-62	**Client Reference:**	70037512	**Report Number:**	442091
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16870689 **Depth :** 0.60 - 0.60

Sample ID : BH105



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. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 asbestos present is not determined unless specifically requested.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

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

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

21. 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.

22. 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.

23. 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.

24. **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.

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**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

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.

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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WSP PB BBC
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BS2 0HQ

Attention: Fiona Marks

CERTIFICATE OF ANALYSIS

Date:	30 January 2018
Customer:	H_WSP_BRI
Sample Delivery Group (SDG):	180116-61
Your Reference:	70037512
Location:	Warren Crescent
Report No:	442092

We received 5 samples on Tuesday January 16, 2018 and 5 of these samples were scheduled for analysis which was completed on Tuesday January 30, 2018. 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).

Approved By:

Sonia McWhan
Operations Manager

ALS Environmental is part of 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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16876993	BH104	ES	0.30 - 0.30	12/01/2018
16877010	WS102	ES	0.60 - 0.60	12/01/2018
16877004	WS103	ES	1.00 - 1.00	12/01/2018
16876999	WS104	ES	0.70 - 0.70	12/01/2018
16877017	WS105	ES	1.20 - 1.20	12/01/2018

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)			16876993		16877010			16877004			16876999			16877017	
Customer Sample Reference			BH104		WS102			WS103			WS104			WS105	
AGS Reference			ES		ES			ES			ES			ES	
Depth (m)			0.30 - 0.30		0.60 - 0.60			1.00 - 1.00			0.70 - 0.70			1.20 - 1.20	
Container			1kg TUB	250g Amber Jar (ALE210)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S
Alkali Metals by iCap-OES (Soil)	All	NDPs: 0 Tests: 3				X			X			X			
Ammonium Soil by Titration	All	NDPs: 0 Tests: 3				X			X			X			
Anions by ion Chromatography	All	NDPs: 0 Tests: 3				X			X			X			
Anions by Kone (soil)	All	NDPs: 0 Tests: 3				X			X			X			
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 5	X		X			X			X			X	
Boron Water Soluble	All	NDPs: 0 Tests: 5		X		X			X			X			X
CEN Readings	All	NDPs: 0 Tests: 2						X			X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2						X			X				
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 3				X			X			X			
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 3				X			X			X			
GRO by GC-FID (S)	All	NDPs: 0 Tests: 3					X			X			X		
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3				X			X			X			
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2						X			X				
Mercury Dissolved	All	NDPs: 0 Tests: 2						X			X				
Metals in solid samples by OES	All	NDPs: 0 Tests: 5		X		X			X			X			X

CERTIFICATE OF ANALYSIS

SDG: 180116-61
Location: Warren Crescent
Client Reference: 70037512
Order Number: 70037512-012
Report Number: 442092
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)			16876993	16876993	16877010	16877010	16877010	16877004	16877004	16877004	16876999	16876999	16876999	16877017	16877017
Customer Sample Reference			BH104	BH104	WS102	WS102	WS102	WS103	WS103	WS103	WS104	WS104	WS104	WS105	WS105
AGS Reference			ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Depth (m)			0.30 - 0.30	0.30 - 0.30	0.60 - 0.60	0.60 - 0.60	0.60 - 0.60	1.00 - 1.00	1.00 - 1.00	1.00 - 1.00	0.70 - 0.70	0.70 - 0.70	0.70 - 0.70	1.20 - 1.20	1.20 - 1.20
Container			1kg TUB	250g Amber Jar (ALE210)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 3				X			X			X			
PAH by GCMS	All	NDPs: 0 Tests: 3				X			X			X			
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2						X			X				
pH	All	NDPs: 0 Tests: 5		X		X			X			X			X
Phosphate (Ortho as PO4) (s)	All	NDPs: 0 Tests: 3				X			X			X			
Sample description	All	NDPs: 0 Tests: 5		X		X			X			X			X
TPH CWG GC (S)	All	NDPs: 0 Tests: 3				X			X			X			
VOC MS (S)	All	NDPs: 0 Tests: 3					X			X			X		

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
16876993	BH104	0.30 - 0.30	Dark Brown	Sandy Silt Loam	Stones	Vegetation
16877010	WS102	0.60 - 0.60	Dark Brown	Sandy Clay Loam	Stones	Crushed Brick
16877004	WS103	1.00 - 1.00	Dark Brown	Sandy Silt Loam	Stones	None
16876999	WS104	0.70 - 0.70	Dark Brown	Sandy Silt Loam	Stones	Vegetation
16877017	WS105	1.20 - 1.20	Dark Brown	Sandy Loam	Brick	Stones

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:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH104	WS102	WS103	WS104	WS105	
Customer Sample Ref.			BH104	WS102	WS103	WS104	WS105	
Depth (m)			0.30 - 0.30	0.60 - 0.60	1.00 - 1.00	0.70 - 0.70	1.20 - 1.20	
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled			12/01/2018	12/01/2018	12/01/2018	12/01/2018	12/01/2018	
Sampled Time			.	.	.	.	.	
Date Received			16/01/2018	16/01/2018	16/01/2018	16/01/2018	16/01/2018	
SDG Ref			180116-61	180116-61	180116-61	180116-61	180116-61	
Lab Sample No.(s)			16876993	16877010	16877004	16876999	16877017	
AGS Reference			ES	ES	ES	ES	ES	
Moisture Content Ratio (% of as received sample)	%	PM024	20	13	10	14	20	
Nitrate as NO3, 2:1 water soluble	<0.5 mg/kg	TM019		12.9	44.6	6.32		
Exchangeable Ammonia as N	<12 mg/kg	TM024		<12 M	<12 M	<12 M		
pH	1 pH Units	TM133	8.09 M	8.45 M	8.53 M	8.39 M	8.35 M	
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #		
Arsenic	<0.6 mg/kg	TM181	12.1 M	10 M	12.3 M	9.53 M	6.35 M	
Barium	<0.6 mg/kg	TM181	48.1 #	63 #	125 #	50.3 #	21.1 #	
Beryllium	<0.01 mg/kg	TM181	0.429 M	0.584 M	1.15 M	0.465 M	0.416 M	
Cadmium	<0.02 mg/kg	TM181	0.918 M	0.228 M	0.237 M	0.242 M	<0.02 M	
Chromium	<0.9 mg/kg	TM181	9.97 M	10.8 M	8.03 M	7.74 M	5.41 M	
Copper	<1.4 mg/kg	TM181	8.61 M	9.03 M	13 M	12.7 M	4.81 M	
Lead	<0.7 mg/kg	TM181	22.3 M	21.4 M	30.8 M	34.2 M	8.5 M	
Mercury	<0.14 mg/kg	TM181	0.344 M	0.404 M	<0.14 M	<0.14 M	<0.14 M	
Nickel	<0.2 mg/kg	TM181	13.8 M	17.5 M	15.4 M	15.4 M	12.5 M	
Phosphorus	<1 mg/kg	TM181		461	480	523		
Selenium	<1 mg/kg	TM181	<1 #	<1 #	1.27 #	<1 #	<1 #	
Vanadium	<0.2 mg/kg	TM181	21.7 #	24.2 #	27.1 #	22 #	18.5 #	
Zinc	<1.9 mg/kg	TM181	52.7 M	45.2 M	66.6 M	57.3 M	21.7 M	
Boron, water soluble	<1 mg/kg	TM222	<1 M	<1 M	<1 M	<1 M	1.15 M	
Potassium	<16 mg/kg	TM224		1700	2150	1030		
Phosphate (ortho) as PO4	<1 mg/kg	TM243		<1	<1	1.02		
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		<0.004 M	0.0682 M	<0.004 M		
Nitrite (soluble) as N	<0.03 mg/kg	TM243		0.231	0.154	0.137		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	WS102	WS103	WS104			
Depth (m)			0.60 - 0.60	1.00 - 1.00	0.70 - 0.70			
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
Date Sampled			12/01/2018	12/01/2018	12/01/2018			
Sampled Time			.	.	.			
Date Received			16/01/2018	16/01/2018	16/01/2018			
SDG Ref			180116-61	180116-61	180116-61			
Lab Sample No.(s)			16877010	16877004	16876999			
AGS Reference			ES	ES	ES			
Naphthalene-d8 % recovery**	%	TM218	98.2	93.1	96.8			
Acenaphthene-d10 % recovery**	%	TM218	94.4	90.3	93.2			
Phenanthrene-d10 % recovery**	%	TM218	92.8	88.3	91			
Chrysene-d12 % recovery**	%	TM218	91.8	91.4	86.7			
Perylene-d12 % recovery**	%	TM218	97.9	95.6	90.1			
Naphthalene	<0.009 mg/kg	TM218	<0.009 M	0.299 M	<0.009 M			
Acenaphthylene	<0.012 mg/kg	TM218	0.0185 M	0.449 M	<0.012 M			
Acenaphthene	<0.008 mg/kg	TM218	<0.008 M	2.01 M	<0.008 M			
Fluorene	<0.01 mg/kg	TM218	<0.01 M	0.943 M	<0.01 M			
Phenanthrene	<0.015 mg/kg	TM218	0.0823 M	15.8 M	0.0198 M			
Anthracene	<0.016 mg/kg	TM218	0.028 M	4.39 M	<0.016 M			
Fluoranthene	<0.017 mg/kg	TM218	0.287 M	28 M	0.037 M			
Pyrene	<0.015 mg/kg	TM218	0.262 M	23.9 M	0.031 M			
Benz(a)anthracene	<0.014 mg/kg	TM218	0.179 M	10.3 M	<0.014 M			
Chrysene	<0.01 mg/kg	TM218	0.159 M	10 M	0.0255 M			
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	0.251 M	17.8 M	0.0238 M			
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	0.118 M	6.68 M	<0.014 M			
Benzo(a)pyrene	<0.015 mg/kg	TM218	0.232 M	15.3 M	0.0306 M			
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	0.17 M	9.17 M	0.0224 M			
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	0.0422 M	2.33 M	<0.023 M			
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	0.213 M	10.5 M	0.033 M			
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	2.04	158	0.223			

Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	WS102	WS103	WS104			
Customer Sample Ref.			WS102	WS103	WS104			
Depth (m)			0.60 - 0.60	1.00 - 1.00	0.70 - 0.70			
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
Date Sampled			12/01/2018	12/01/2018	12/01/2018			
Sampled Time			.	.	.			
Date Received			16/01/2018	16/01/2018	16/01/2018			
SDG Ref			180116-61	180116-61	180116-61			
Lab Sample No.(s)			16877010	16877004	16876999			
AGS Reference			ES	ES	ES			
GRO Surrogate % recovery**	%	TM089	113	73	138			
GRO TOT (Moisture Corrected)	<0.044 mg/kg	TM089	<0.044 M	<0.044 M	<0.044 M			
Aliphatics >C5-C6	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aliphatics >C6-C8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aliphatics >C8-C10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aliphatics >C10-C12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aliphatics >C12-C16	<0.1 mg/kg	TM173	0.215	4.51	<0.1			
Aliphatics >C16-C21	<0.1 mg/kg	TM173	1.31	14.2	<0.1			
Aliphatics >C21-C35	<0.1 mg/kg	TM173	12.3	85	<0.1			
Aliphatics >C35-C44	<0.1 mg/kg	TM173	3.38	59.7	<0.1			
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173	17.2	163	<0.1			
Aromatics >EC5-EC7	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aromatics >EC7-EC8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aromatics >EC8-EC10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aromatics >EC10-EC12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01			
Aromatics >EC12-EC16	<0.1 mg/kg	TM173	<0.1	15.6	<0.1			
Aromatics >EC16-EC21	<0.1 mg/kg	TM173	0.909	156	<0.1			
Aromatics >EC21-EC35	<0.1 mg/kg	TM173	16.4	500	0.174			
Aromatics >EC35-EC44	<0.1 mg/kg	TM173	9.7	231	<0.1			
Aromatics >EC40-EC44	<0.1 mg/kg	TM173	3.83	91.9	<0.1			
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173	27.1	903	0.174			
Total Aliphatics & Aromatics >C5-C44	<0.1 mg/kg	TM173	44.3	1070	0.174			
Aromatics >EC16-EC35	<0.1 mg/kg	TM173	17.4	656	0.174			

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

		Customer Sample Ref.	WS102	WS103	WS104			
		Depth (m)	0.60 - 0.60	1.00 - 1.00	0.70 - 0.70			
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
		Date Sampled	12/01/2018	12/01/2018	12/01/2018			
		Sampled Time	.	.	.			
		Date Received	16/01/2018	16/01/2018	16/01/2018			
		SDG Ref	180116-61	180116-61	180116-61			
		Lab Sample No.(s)	16877010	16877004	16876999			
		AGS Reference	ES	ES	ES			
Component	**LOD/Units**	**Method**						
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M			
Benzene	<0.009 mg/kg	TM116	<0.09 M	<0.09 M	<0.09 M			
Toluene	<0.007 mg/kg	TM116	<0.07 M	<0.07 M	<0.07 M			
Ethylbenzene	<0.004 mg/kg	TM116	<0.04 M	<0.04 M	<0.04 M			
p/m-Xylene	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #			
o-Xylene	<0.01 mg/kg	TM116	<0.1 M	<0.1 M	<0.1 M			
Tert-amyl methyl ether	<0.01 mg/kg	TM116	<0.1 #	<0.1 #	<0.1 #			

Asbestos Identification - Soil

		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	BH104 ES 0.30 - 0.30 SOLID 12/01/2018 00:00:00 16/01/2018 14:46:15 180116-61 16876993 TM048	19/01/2018	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	WS102 ES 0.60 - 0.60 SOLID 12/01/2018 00:00:00 16/01/2018 14:44:52 180116-61 16877010 TM048	19/01/2018	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	WS103 ES 1.00 - 1.00 SOLID 12/01/2018 00:00:00 16/01/2018 14:47:15 180116-61 16877004 TM048	19/01/2018	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	WS104 ES 0.70 - 0.70 SOLID 12/01/2018 00:00:00 17/01/2018 07:24:34 180116-61 16876999 TM048	19/01/2018	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	WS105 ES 1.20 - 1.20 SOLID 12/01/2018 00:00:00 16/01/2018 14:43:34 180116-61 16877017 TM048	19/01/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

CERTIFICATE OF ANALYSIS

SDG:	180116-61	Client Reference:	70037512	Report Number:	442092
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Warren Crescent
Mass Sample taken (kg)	0.105	**Natural Moisture Content (%)**	16.3
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	86
Particle Size <4mm	>95%		

Case	
SDG	180116-61
Lab Sample Number(s)	16876999
Sampled Date	12-Jan-2018
Customer Sample Ref.	WS104 ESZ
Depth (m)	0.70 - 0.70

Eluate Analysis	C_2 Conc^n in 10:1 eluate (mg/l)		A_2 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Arsenic	0.00113	<0.0005	0.0113	<0.005	-	-	-
Barium	0.00673	<0.0002	0.0673	<0.002	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Boron	<0.005	<0.005	<0.05	<0.05	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Copper	0.00143	<0.0003	0.0143	<0.003	-	-	-
Lead	0.000416	<0.0002	0.00416	<0.002	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Vanadium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00168	<0.001	0.0168	<0.01	-	-	-
PAH Spec MS - Aqueous (W)							
Naphthalene by GCMS	0.0000768	<0.00002	0.000768	<0.0002	-	-	-
Acenaphthene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Acenaphthylene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Fluoranthene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Anthracene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Phenanthrene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Fluorene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Chrysene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Pyrene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benz(a)anthracene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benzo(b)fluoranthene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benzo(k)fluoranthene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benzo(a)pyrene by GCMS	<0.000004	<0.000004	<0.00004	<0.00004	-	-	-
Dibenzo(ah)anthracene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benzo(ghi)perylene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Indeno(123cd)pyrene by GCMS	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
PAH 16 EPA Total by GCMS	<0.000164	<0.000164	<0.00164	<0.00164	-	-	-

Leach Test Information

Date Prepared	17-Jan-2018
pH (pH Units)	8.59
Conductivity (µS/cm)	74.50
Temperature (ºC)	17.10
Volume Leachant (Litres)	0.885

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG:	180116-61	Client Reference:	70037512	Report Number:	442092
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Warren Crescent
Mass Sample taken (kg)	0.100	**Natural Moisture Content (%)**	11.1
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	90
Particle Size <4mm	>95%		

Case	
SDG	180116-61
Lab Sample Number(s)	16877004
Sampled Date	12-Jan-2018
Customer Sample Ref.	WS103 ESZ
Depth (m)	1.00 - 1.00

Eluate Analysis	C_2 Concⁿ in 10:1 eluate (mg/l)		A_2 10:1 concⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Arsenic	0.00312	<0.0005	0.0312	<0.005	-	-	-
Barium	0.0101	<0.0002	0.101	<0.002	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Boron	<0.005	<0.005	<0.05	<0.05	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Copper	0.0021	<0.0003	0.021	<0.003	-	-	-
Lead	0.000328	<0.0002	0.00328	<0.002	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	0.000646	<0.0005	0.00646	<0.005	-	-	-
Vanadium	0.00205	<0.001	0.0205	<0.01	-	-	-
Zinc	0.0011	<0.001	0.011	<0.01	-	-	-
PAH Spec MS - Aqueous (W)							
Naphthalene by GCMS	0.000456	<0.00002	0.00456	<0.0002	-	-	-
Acenaphthene by GCMS	0.00355	<0.00001	0.0355	<0.0001	-	-	-
Acenaphthylene by GCMS	0.000159	<0.00001	0.00159	<0.0001	-	-	-
Fluoranthene by GCMS	0.00211	<0.00001	0.0211	<0.0001	-	-	-
Anthracene by GCMS	0.00111	<0.00001	0.0111	<0.0001	-	-	-
Phenanthrene by GCMS	0.00652	<0.00001	0.0652	<0.0001	-	-	-
Fluorene by GCMS	0.00133	<0.00001	0.0133	<0.0001	-	-	-
Chrysene by GCMS	0.000363	<0.00001	0.00363	<0.0001	-	-	-
Pyrene by GCMS	0.00156	<0.00001	0.0156	<0.0001	-	-	-
Benz(a)anthracene by GCMS	0.0004	<0.00001	0.004	<0.0001	-	-	-
Benzo(b)fluoranthene by GCMS	0.000459	<0.00001	0.00459	<0.0001	-	-	-
Benzo(k)fluoranthene by GCMS	0.000206	<0.00001	0.00206	<0.0001	-	-	-
Benzo(a)pyrene by GCMS	0.000333	<0.000004	0.00333	<0.00004	-	-	-
Dibenzo(ah)anthracene by GCMS	0.0000708	<0.00001	0.000708	<0.0001	-	-	-
Benzo(ghi)perylene by GCMS	0.000389	<0.00001	0.00389	<0.0001	-	-	-
Indeno(123cd)pyrene by GCMS	0.000277	<0.00001	0.00277	<0.0001	-	-	-
PAH 16 EPA Total by GCMS	0.0193	<0.000164	0.193	<0.00164	-	-	-

Leach Test Information

Date Prepared	17-Jan-2018
pH (pH Units)	8.74
Conductivity (µS/cm)	96.60
Temperature (°C)	18.70
Volume Leachant (Litres)	0.890

Mcerts Certification does not apply to leachates

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Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM019	Modified: US EPA Method 9056	Determination of Anions in Soils using Ion Chromatography
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds 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
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
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
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
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM224	US EPA Method 6010B	Determination of Alkaline Metals by iCap 6500 Duo ICP-OES
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
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

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

Test Completion Dates

Lab Sample No(s)	16876993	16877010	16877004	16876999	16877017
Customer Sample Ref.	BH104	WS102	WS103	WS104	WS105
AGS Ref.	ES	ES	ES	ES	ES
Depth	0.30 - 0.30	0.60 - 0.60	1.00 - 1.00	0.70 - 0.70	1.20 - 1.20
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkali Metals by iCap-OES (Soil)		23-Jan-2018	23-Jan-2018	23-Jan-2018	
Ammonium Soil by Titration		23-Jan-2018	23-Jan-2018	23-Jan-2018	
Anions by ion Chromatography		30-Jan-2018	30-Jan-2018	30-Jan-2018	
Anions by Kone (soil)		22-Jan-2018	22-Jan-2018	22-Jan-2018	
Asbestos ID in Solid Samples	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018
Boron Water Soluble	22-Jan-2018	19-Jan-2018	22-Jan-2018	19-Jan-2018	22-Jan-2018
CEN 10:1 Leachate (1 Stage)			17-Jan-2018	17-Jan-2018	
CEN Readings			18-Jan-2018	18-Jan-2018	
Dissolved Metals by ICP-MS			23-Jan-2018	23-Jan-2018	
EPH CWG (Aliphatic) GC (S)		18-Jan-2018	18-Jan-2018	18-Jan-2018	
EPH CWG (Aromatic) GC (S)		18-Jan-2018	18-Jan-2018	18-Jan-2018	
GRO by GC-FID (S)		18-Jan-2018	18-Jan-2018	18-Jan-2018	
Hexavalent Chromium (s)		23-Jan-2018	23-Jan-2018	23-Jan-2018	
Hexavalent Chromium (w)			22-Jan-2018	22-Jan-2018	
Mercury Dissolved			19-Jan-2018	19-Jan-2018	
Metals in solid samples by OES	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	22-Jan-2018
NO3, NO2 and TON by KONE (s)		20-Jan-2018	20-Jan-2018	20-Jan-2018	
PAH by GCMS		18-Jan-2018	18-Jan-2018	18-Jan-2018	
PAH Spec MS - Aqueous (W)			22-Jan-2018	22-Jan-2018	
pH	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018	17-Jan-2018
Phosphate (Ortho as PO4) (s)		20-Jan-2018	20-Jan-2018	20-Jan-2018	
Sample description	16-Jan-2018	16-Jan-2018	16-Jan-2018	16-Jan-2018	17-Jan-2018
TPH CWG GC (S)		18-Jan-2018	18-Jan-2018	19-Jan-2018	
VOC MS (S)		18-Jan-2018	18-Jan-2018	18-Jan-2018	

CERTIFICATE OF ANALYSIS

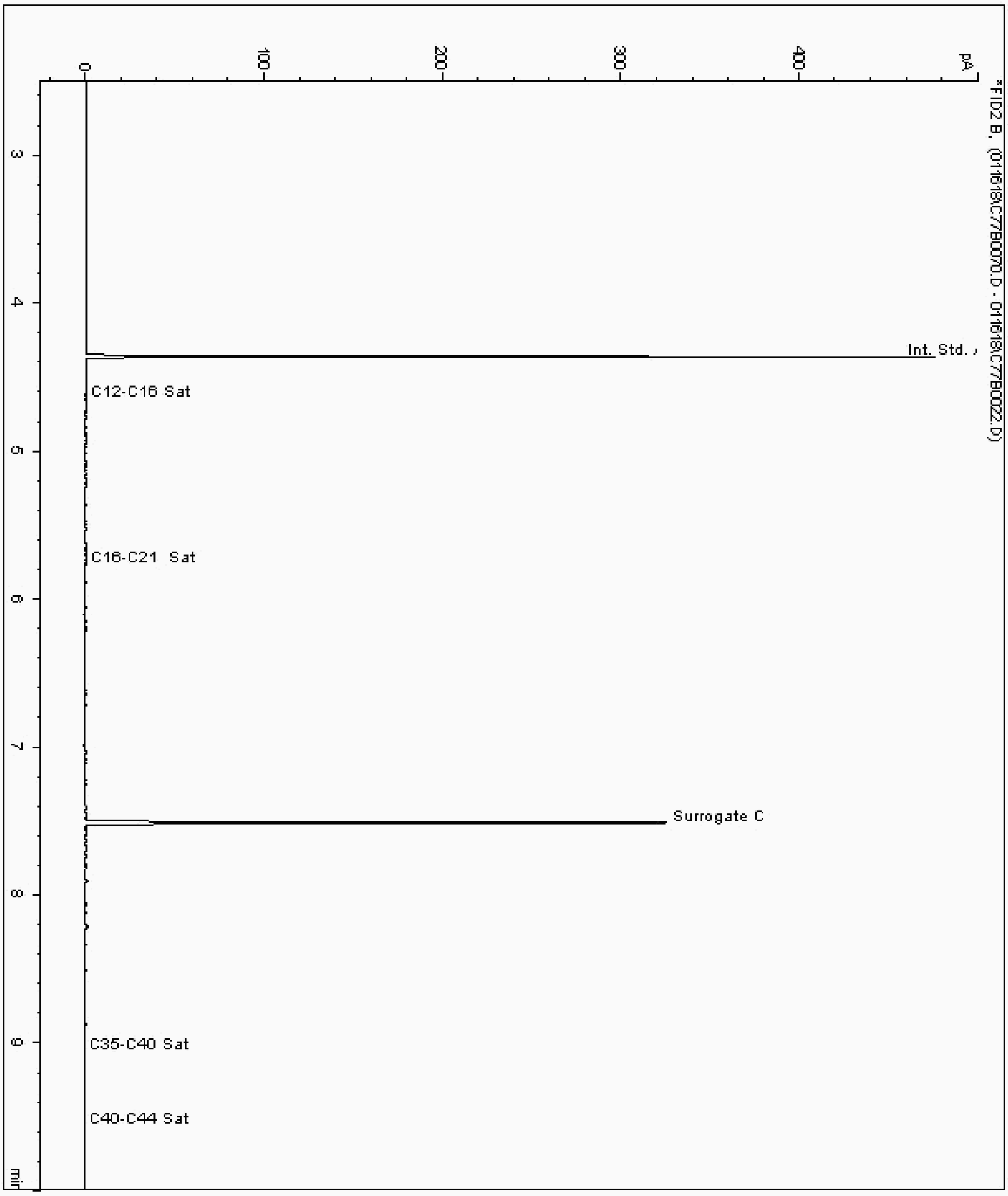
SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S) **Sample No :** 16877398 **Depth :** 0.70 - 0.70
Sample ID : WS104

```
Alcontrol/Geochem Analytical Services
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15838229-
Date Acquired  :  1/17/2018 10:19:34 AM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.960
```



CERTIFICATE OF ANALYSIS

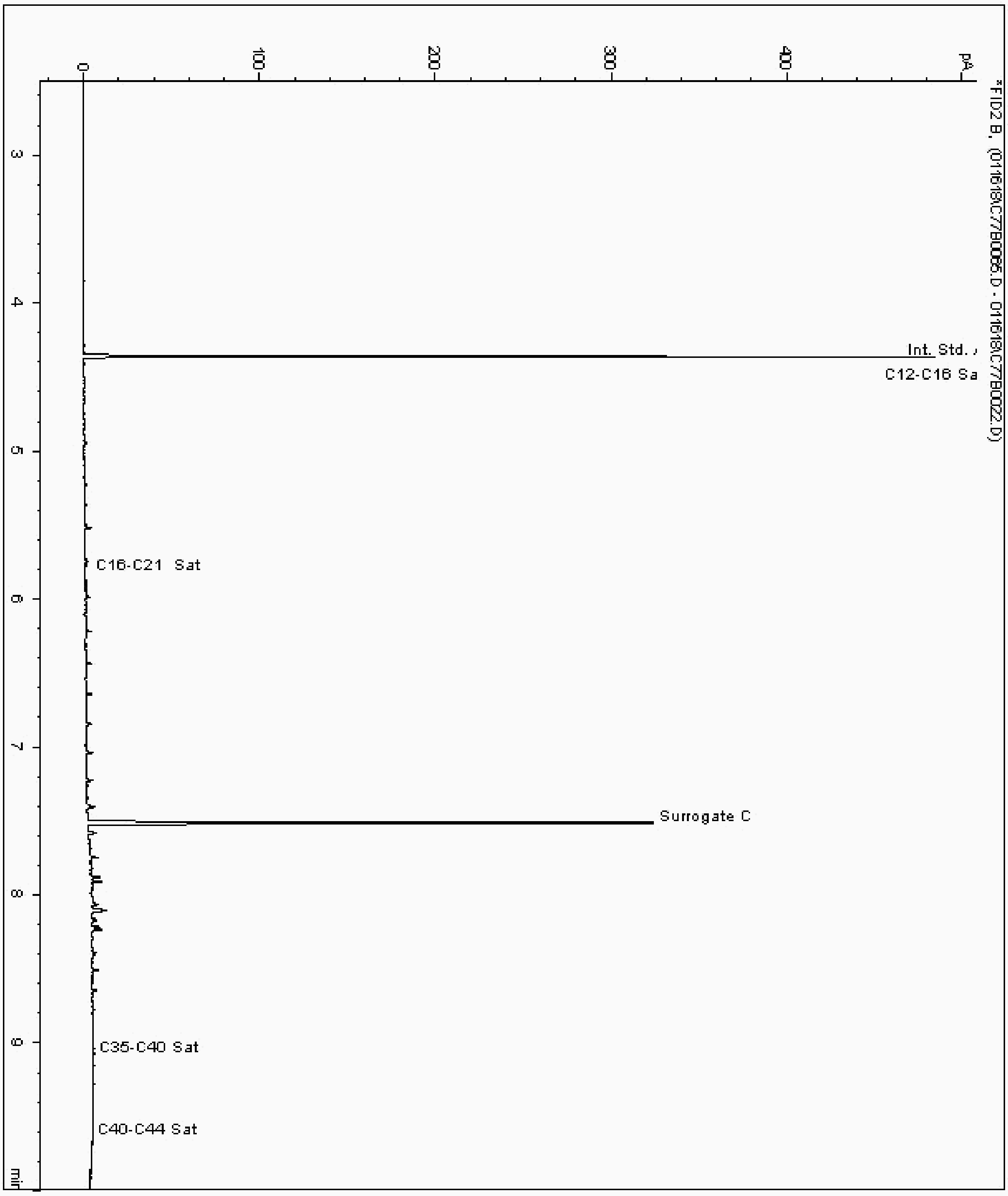
SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S) **Sample No :** 16877497 **Depth :** 1.00 - 1.00
Sample ID : WS103

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 15838254-
Date Acquired : 1/17/2018 9:04:28 AM
Units : ppb
Dilution :
CF : 1
Multiplier : 1.000



CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S)　**Sample No :** 16877916　**Depth :** 0.60 - 0.60
Sample ID : WS102

```
Alcontrol/Geochem Analytical Services
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15838196-
Date Acquired  :  1/17/2018 8:44:36 AM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  1.010
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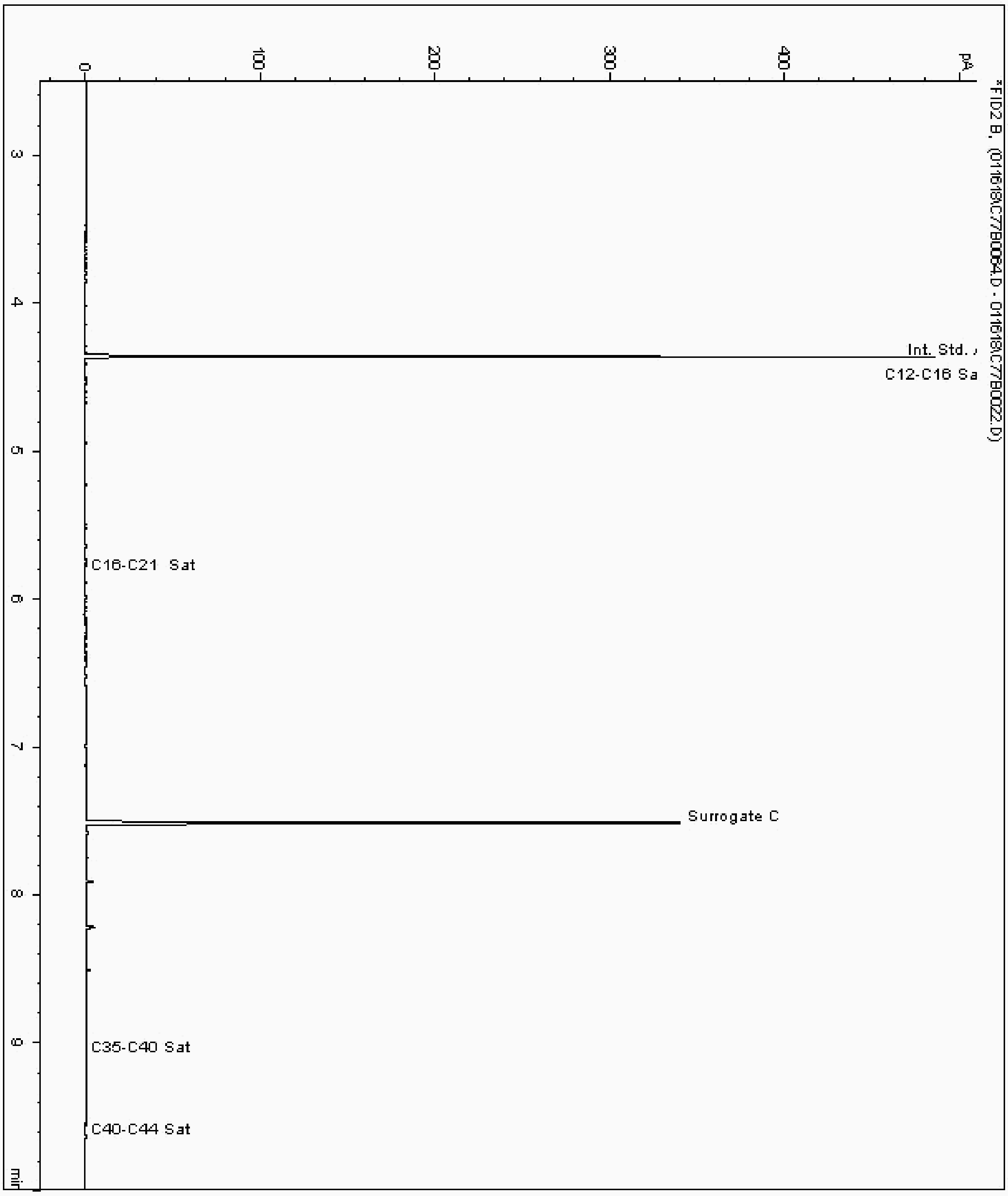
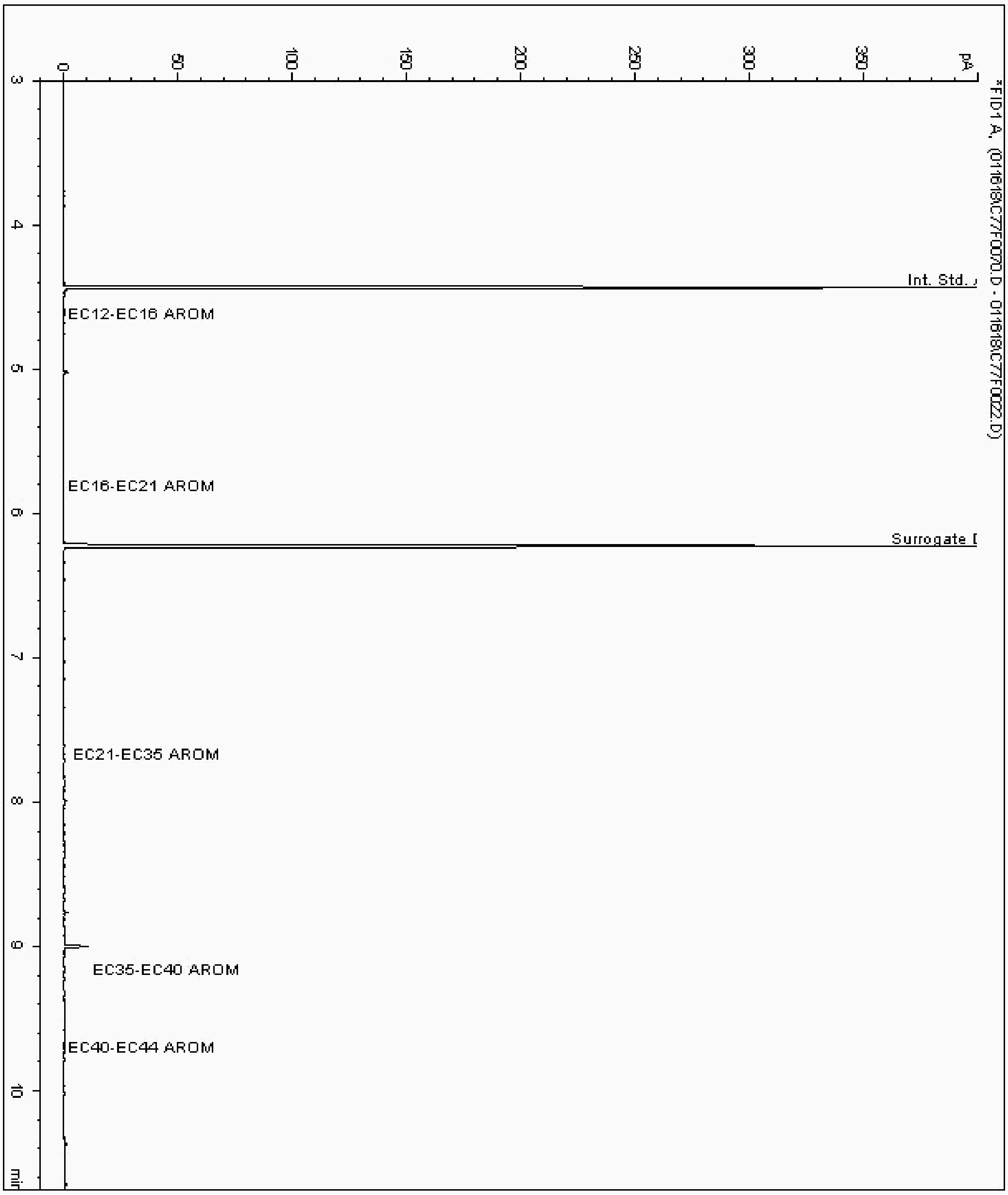


Chromatogram

Analysis: EPH CWG (Aromatic) GC (S) **Sample No :** 16877398 **Depth :** 0.70 - 0.70
Sample ID : WS104

Speciated TPH - AROM (C12 - C40)

Sample Identity: 15838230-
Date Acquired : 1/17/2018 10:19:34 AM
Units : ppb
Dilution:



Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	Client Reference:	70037512	Report Number:	442092
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Chromatogram

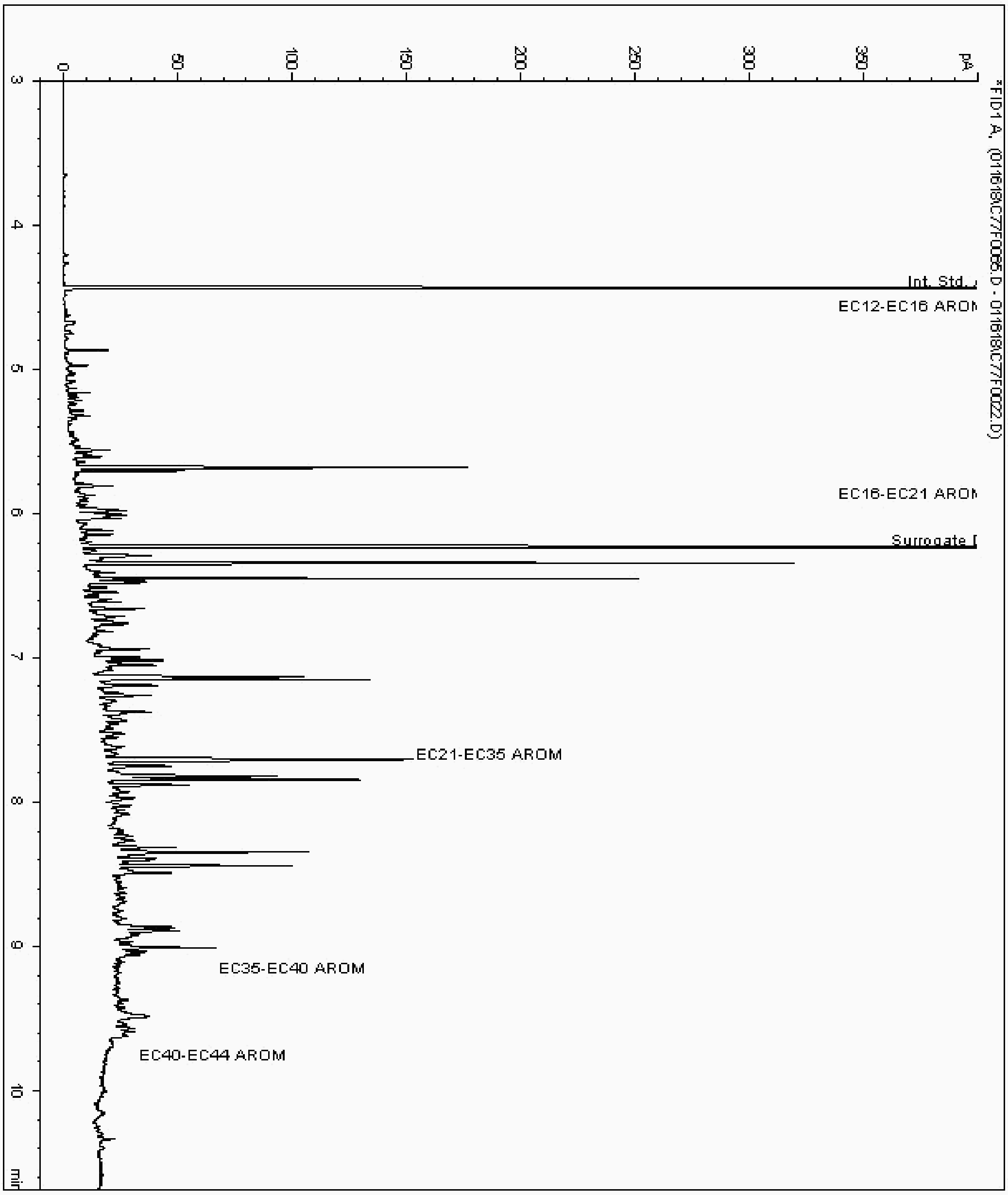
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16877497
Sample ID : WS103

Depth : 1.00 - 1.00

Speciated TPH - AROM (C12 - C40)

Sample Identity: 15838255-
Date Acquired : 1/17/2018 9:04:28 AM
Units : ppb
Dilution:



Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

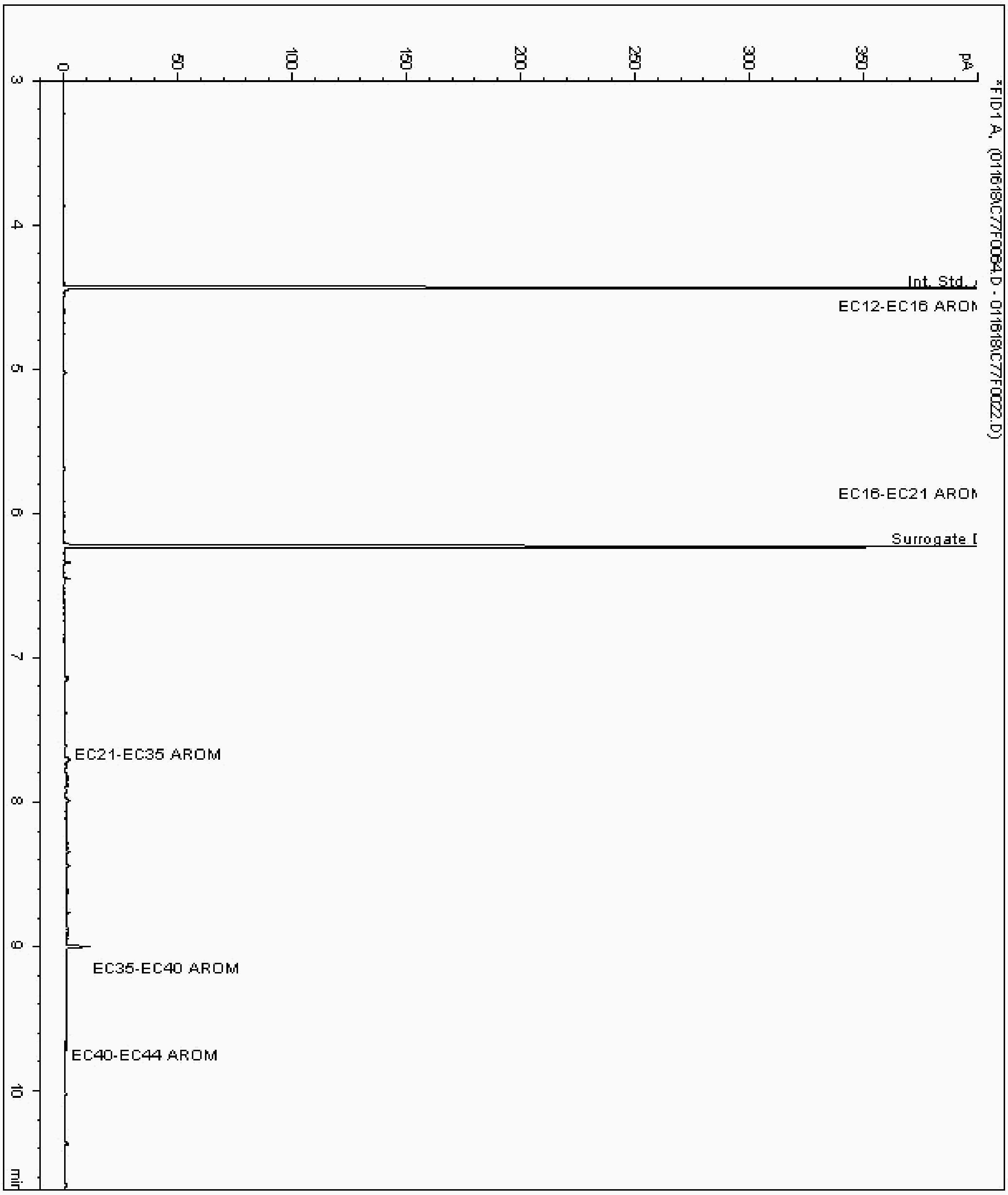
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16877916
Sample ID : WS102

Depth : 0.60 - 0.60

Speciated TPH - AROM (C12 - C40)

Sample Identity: 15838197-
Date Acquired : 1/17/2018 8:44:36 AM
Units : ppb
Dilution:



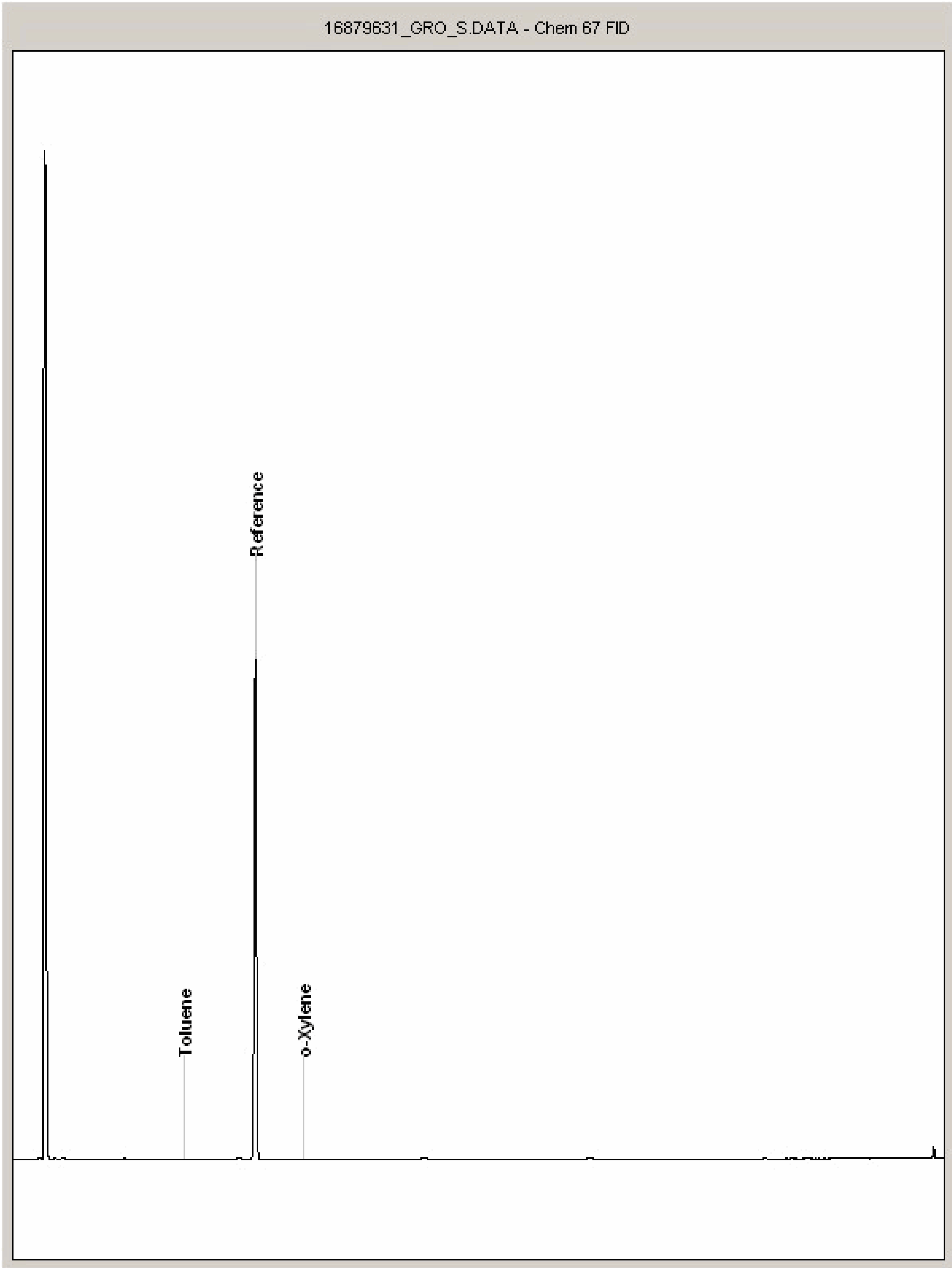
Validated

CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (S)	**Sample No :**	16879631	**Depth :**	0.60 - 0.60
		Sample ID :	WS102		

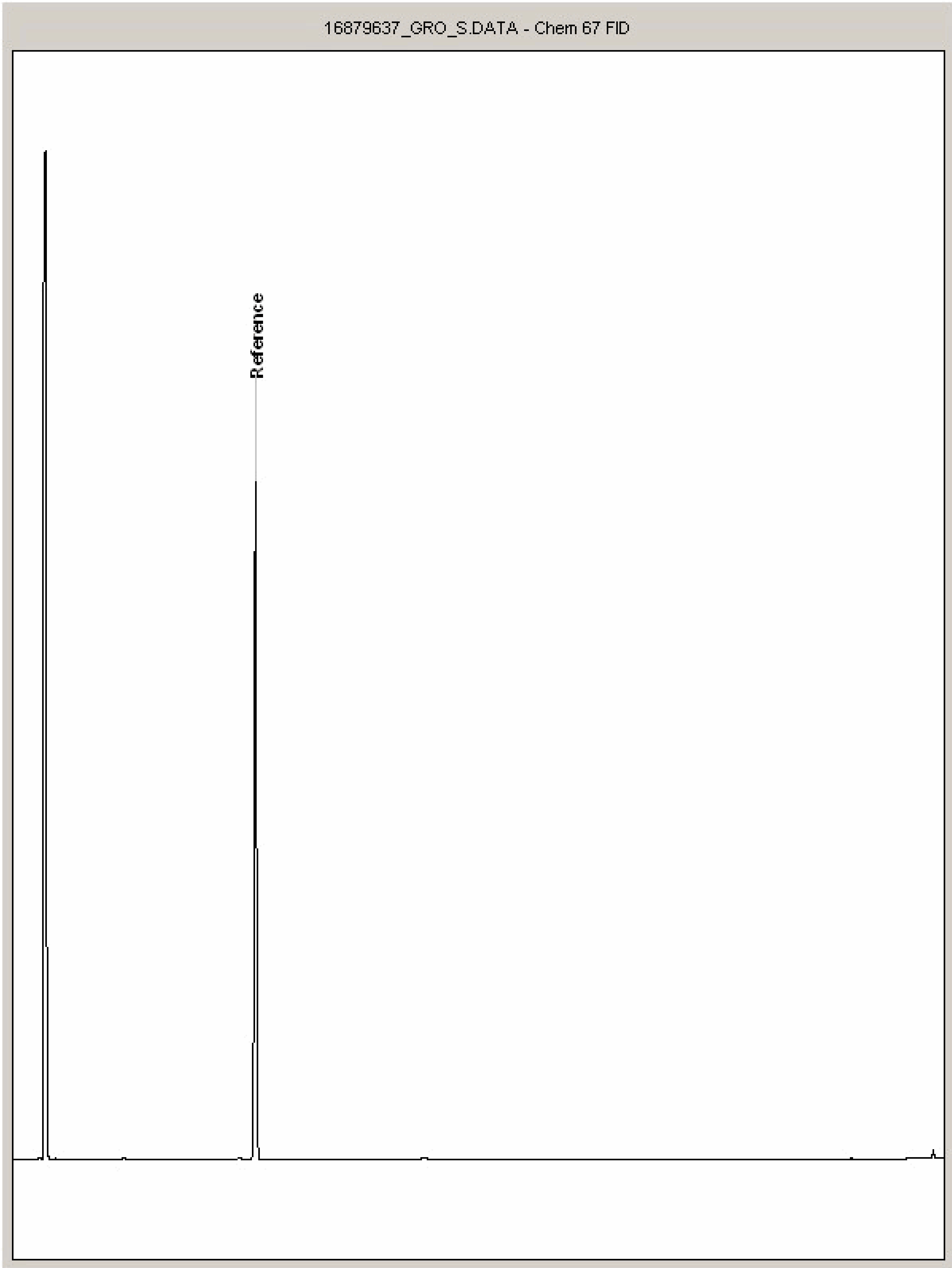


CERTIFICATE OF ANALYSIS

SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S) **Sample No :** 16879637 **Depth :** 0.70 - 0.70
Sample ID : WS104



CERTIFICATE OF ANALYSIS

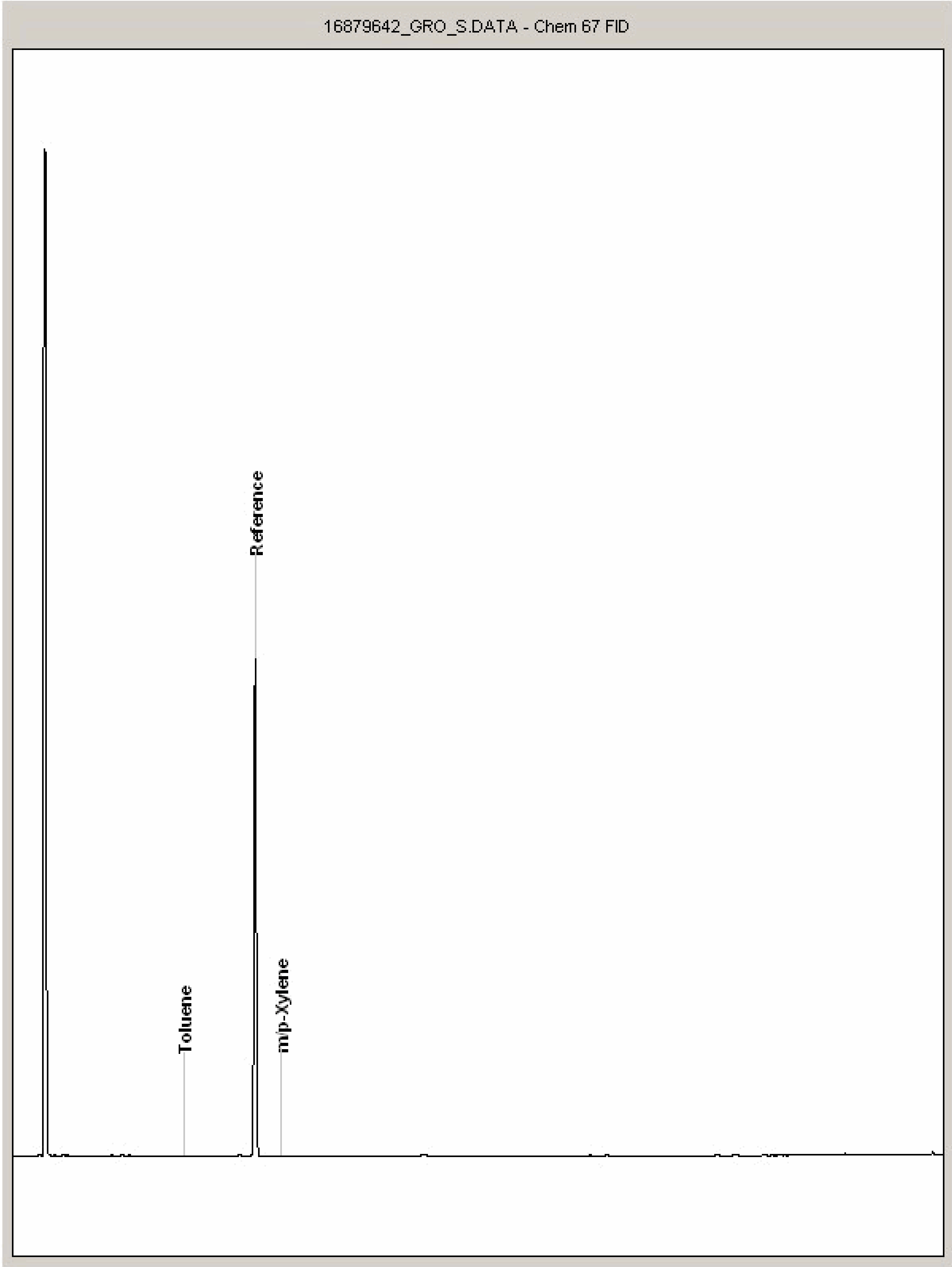
SDG:	180116-61	**Client Reference:**	70037512	**Report Number:**	442092
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16879642
Sample ID : WS103

Depth : 1.00 - 1.00



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. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 asbestos present is not determined unless specifically requested.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

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

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

21. 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.

22. 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.

23. 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.

24. **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.

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**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

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.

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 D.3

HUMAN HEALTH SCREENING

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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	0.005	0.010	0.010	0.005	0.010	42.0	mg/kg	7	8	0	0	
Aliphatic C06-C08	0.010	0.005	0.010	0.010	0.005	0.010	103	mg/kg	7	8	0	0	
Aliphatic C08-C10	0.010	0.005	0.010	0.010	0.005	0.010	27.0	mg/kg	7	8	0	0	
Aliphatic C10-C12	0.010	0.005	0.010	0.010	0.005	0.010	132	mg/kg	7	8	0	0	
Aliphatic C12-C16	0.10	1.23	4.51	0.10	0.17	0.42	1,030	mg/kg	7	8	4	0	
Aliphatic C16-C21	0.10	4.61	14.2	0.10	0.37	0.80	-	mg/kg	7	8	6	0	
Aliphatic C21-C35	0.10	23.5	85.0	1.97	3.24	4.54	-	mg/kg	7	8	7	0	
Aliphatic C35-C44	0.10	12.6	59.7	0.10	0.095	0.18	88,400	mg/kg	7	8	3	0	
Aliphatics C12-C44	0.10	41.8	163	1.97	3.79	5.75	-	mg/kg	7	8	7	0	
Aromatic C06-C07	0.010	0.005	0.010	0.010	0.005	0.010	-	mg/kg	7	8	0	0	
Aromatic C07-C08	0.010	0.005	0.010	0.010	0.005	0.010	130	mg/kg	7	8	0	0	
Aromatic C08-C10	0.010	0.005	0.010	0.010	0.005	0.010	34.0	mg/kg	7	8	0	0	
Aromatic C10-C12	0.010	0.005	0.010	0.010	0.005	0.010	74.0	mg/kg	7	8	0	0	
Aromatic C12-C16	0.10	3.16	15.6	0.10	0.050	0.10	141	mg/kg	7	8	1	0	
Aromatic C12-C44	0.17	192	903	0.10	4.05	8.83	-	mg/kg	7	8	7	0	
Aromatic C16-C21	0.10	31.8	156	0.10	0.26	0.67	249	mg/kg	7	8	4	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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 Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Aromatic C16-C35	0.17	139	656	0.10	3.18	6.87	-	mg/kg	7	8	7	0	
Aromatic C21-C35	0.17	107	500	0.10	2.96	6.21	873	mg/kg	7	8	7	0	
Aromatic C35-C44	0.10	49.2	231	0.10	0.89	1.96	873	mg/kg	7	8	6	0	
Aromatic C40-C44	0.10	19.4	91.9	0.10	0.050	0.10	-	mg/kg	7	8	3	0	
Total Aliphatics and Aromatics (C5-C44)	0.17	234	1,070	1.97	7.83	14.6	-	mg/kg	7	8	8	0	
TPH Hazard Index	0.002	0.33	1.58	0.001	0.007	0.014	1.00	mg/kg	7	8	N/A	1	WS103

Alkali and Alkaline Earth Metals

Analyte	Madeground Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Barium	21.1	58.4	125	6.72	33.6	65.8	1,210	mg/kg	9	10	10	0	
Beryllium	0.42	0.61	1.15	0.22	0.56	0.95	1.70	mg/kg	9	10	10	0	
Potassium	1,030	1,530	2,150	636	1,359	2,080	-	mg/kg	7	8	8	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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 Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Asbestos Ex. actinolite	-	-	-	-	-	-	-	No units	9	10	0	0	
Asbestos Ex. Amosite	-	-	-	-	-	-	-	No units	9	10	0	0	
Asbestos Ex. anthophyllite	-	-	-	-	-	-	-	No units	9	10	0	0	
Asbestos Ex. Chrysotile	-	-	-	-	-	-	-	No units	9	10	0	0	
Asbestos Ex. crocidolite	-	-	-	-	-	-	-	No units	9	10	0	0	
Asbestos Ex. tremolite	-	-	-	-	-	-	-	No units	9	10	0	0	
Non-Asbestos Fibres	-	-	-	-	-	-	-	No units	9	10	0	0	

Residential HG Veg, SOM=1%

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							
1,2,4-Trimethylbenzene	0.090	0.045	0.090	0.090	0.045	0.090	5.00	mg/kg	4	5	0	0	
1,3,5-Trimethylbenzene	0.080	0.040	0.080	0.080	0.040	0.080	-	mg/kg	4	5	0	0	
Benzene	0.090	0.045	0.090	0.090	0.045	0.090	0.089	mg/kg	7	8	0	0	
Ethylbenzene	0.040	0.020	0.040	0.040	0.020	0.040	47.0	mg/kg	7	8	0	0	
Methyl t-butylether (MTBE)	0.10	0.050	0.10	0.10	0.050	0.10	62.0	mg/kg	7	8	0	0	
Tertiary Amyl Methyl Ether (TAME)	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	7	8	0	0	
Toluene	0.070	0.035	0.070	0.070	0.035	0.070	131	mg/kg	7	8	0	0	
Xylene - Total (Summed)	0.10	0.10	0.10	0.10	0.10	0.10	57.0	mg/kg	7	8	8	0	
Xylene-m & p	0.10	0.050	0.10	0.10	0.050	0.10	57.0	mg/kg	7	8	0	0	
Xylene-o	0.10	0.050	0.10	0.10	0.050	0.10	57.0	mg/kg	7	8	0	0	

Residential HG Veg, SOM=1%

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

Chlorinated Aliphatics

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							
1,1,1,2-Tetrachloroethane	0.10	0.050	0.10	0.10	0.050	0.10	1.20	mg/kg	4	5	0	0	
1,1,1-Trichloroethane	0.070	0.035	0.070	0.070	0.035	0.070	21.0	mg/kg	4	5	0	0	
1,1,2,2-Tetrachloroethane	0.10	0.050	0.10	0.10	0.050	0.10	1.60	mg/kg	4	5	0	0	
1,1,2-Trichloroethane	0.10	0.050	0.10	0.10	0.050	0.10	0.76	mg/kg	4	5	0	0	
1,1-Dichloroethane	0.080	0.040	0.080	0.080	0.040	0.080	3.40	mg/kg	4	5	0	0	
1,1-Dichloroethene	0.10	0.050	0.10	0.10	0.050	0.10	0.32	mg/kg	4	5	0	0	
1,1-Dichloropropene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
1,2,3-Trichloropropane	0.16	0.080	0.16	0.16	0.080	0.16	-	mg/kg	4	5	0	0	
1,2-Dichloroethane	0.050	0.025	0.050	0.050	0.025	0.050	0.007	mg/kg	4	5	0	0	
1,2-Dichloropropane	0.10	0.050	0.10	0.10	0.050	0.10	0.034	mg/kg	4	5	0	0	
1,3-Dichloropropane	0.070	0.035	0.070	0.070	0.035	0.070	-	mg/kg	4	5	0	0	
2,2-Dichloropropane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Carbon tetrachloride	0.10	0.050	0.10	0.10	0.050	0.10	0.36	mg/kg	4	5	0	0	
Chloroethane	0.10	0.050	0.10	0.10	0.050	0.10	12.0	mg/kg	4	5	0	0	
Chloroform	0.080	0.040	0.080	0.080	0.040	0.080	0.92	mg/kg	4	5	0	0	
Chloromethane	0.070	0.035	0.070	0.070	0.035	0.070	0.012	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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

Chlorinated Aliphatics

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							
Cis 1,2-Dichloroethene	0.060	0.030	0.060	0.060	0.030	0.060	0.16	mg/kg	4	5	0	0	
Cis 1,3-Dichloropropene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Dichloromethane	0.10	0.050	0.10	0.10	0.050	0.10	0.62	mg/kg	4	5	0	0	
Hexachlorobutadiene	0.10	0.050	0.10	0.10	0.050	0.10	0.31	mg/kg	4	5	0	0	
Hexachloroethane	0.10	0.050	0.10	0.10	0.050	0.10	0.27	mg/kg	4	5	0	0	
Tetrachloroethene (PCE)	0.050	0.025	0.050	0.050	0.025	0.050	0.18	mg/kg	4	5	0	0	
Trans-1,2-Dichloroethene	0.10	0.050	0.10	0.10	0.050	0.10	0.27	mg/kg	4	5	0	0	
Trans-1,3-Dichloropropene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Trichloroethene (TCE)	0.090	0.045	0.090	0.090	0.045	0.090	0.016	mg/kg	4	5	0	0	
Vinyl chloride	0.060	0.030	0.060	0.060	0.030	0.060	0.0006	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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

Chlorinated 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							
1,2,3-Trichlorobenzene	0.20	0.10	0.20	0.20	0.10	0.20	1.50	mg/kg	4	5	0	0	
1,2,4-Trichlorobenzene	0.10	0.050	0.10	0.10	0.050	0.10	2.50	mg/kg	4	5	0	0	
1,2-Dichlorobenzene	0.10	0.050	0.10	0.10	0.050	0.10	23.0	mg/kg	4	5	0	0	
1,3-Dichlorobenzene	0.080	0.040	0.080	0.080	0.040	0.080	0.41	mg/kg	4	5	0	0	
1,4-Dichlorobenzene	0.050	0.025	0.050	0.050	0.025	0.050	6.60	mg/kg	4	5	0	0	
2-Chlorotoluene	0.090	0.045	0.090	0.090	0.045	0.090	-	mg/kg	4	5	0	0	
4-Chlorotoluene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Chlorobenzene	0.050	0.025	0.050	0.050	0.025	0.050	0.62	mg/kg	4	5	0	0	
Hexachlorobenzene	0.10	0.050	0.10	0.10	0.050	0.10	1.60	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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

Chlorinated 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							
2,4,5-Trichlorophenol	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
2,4,6-Trichlorophenol	0.10	0.050	0.10	0.10	0.050	0.10	2.20	mg/kg	4	5	0	0	
2,4-Dichlorophenol	0.10	0.050	0.10	0.10	0.050	0.10	2.20	mg/kg	4	5	0	0	
2-Chlorophenol	0.10	0.050	0.10	0.10	0.050	0.10	2.20	mg/kg	4	5	0	0	
4-Chloro-3-Methlphenol	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Chlorophenols - Total (Summed Isomers)	0.10	0.10	0.10	0.10	0.10	0.10	2.20	mg/kg	4	5	5	0	

Dioxins and Furans

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							
Dibenzofuran	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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

Dyes

Analyte	Madeground Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
3-Nitroaniline	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
4-Nitroaniline	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	

Explosives

Analyte	Madeground Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
2,4-Dinitrotoluene	0.10	0.050	0.10	0.10	0.050	0.10	1.50	mg/kg	4	5	0	0	
2,6-Dinitrotoluene	0.10	0.050	0.10	0.10	0.050	0.10	0.81	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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

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	8.09	8.43	8.77	8.39	8.50	8.70	-	pH Units	9	10	10	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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

Halogonated Hydrocarbons

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							
1,2-Dibromo-3-Chloropropane	0.14	0.070	0.14	0.14	0.070	0.14	-	mg/kg	4	5	0	0	
1,2-Dibromoethane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Bromobenzene	0.10	0.050	0.10	0.10	0.050	0.10	1.20	mg/kg	4	5	0	0	
Bromochloromethane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Bromodichloromethane	0.070	0.035	0.070	0.070	0.035	0.070	0.022	mg/kg	4	5	0	0	
Bromoform	0.10	0.050	0.10	0.10	0.050	0.10	3.50	mg/kg	4	5	0	0	
Bromomethane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Dibromochloromethane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Dibromomethane	0.090	0.045	0.090	0.090	0.045	0.090	-	mg/kg	4	5	0	0	
Dichlorodifluoromethane	0.060	0.030	0.060	0.060	0.030	0.060	-	mg/kg	4	5	0	0	
Trichlorofluoromethane	0.060	0.030	0.060	0.060	0.030	0.060	-	mg/kg	4	5	0	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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 Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Ammoniacal nitrogen	12.0	6.00	12.0	12.0	6.00	12.0	-	mg/kg	7	8	0	0	
Nitrate	6.32	18.8	44.6	12.0	20.3	35.6	-	mg/kg	7	8	8	0	
Orthophosphate	1.00	0.90	1.99	1.00	1.59	3.78	-	mg/kg	7	8	3	0	
Phosphorous	461	682	1,380	133	267	373	-	mg/kg	7	8	8	0	
Sulphate as SO4	4,000	23,600	68,200	4,000	8,033	20,100	-	ug/l	7	8	3	0	

Ketones

Analyte	Madeground Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Isophorone	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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 Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
Arsenic	6.35	11.3	17.6	8.07	9.10	10.3	32.0	mg/kg	9	10	10	0	
Boron	1.00	0.59	1.15	1.00	0.89	1.68	300	mg/kg	9	10	2	0	
Cadmium	0.020	0.30	0.92	0.047	0.12	0.18	12.0	mg/kg	9	10	9	0	
Chromium	5.41	8.89	12.3	7.88	10.5	13.3	-	mg/kg	9	10	10	0	
Copper	4.81	9.38	14.0	3.01	7.80	10.8	2,490	mg/kg	9	10	9	0	
Hexavalent Chromium	0.60	0.30	0.60	0.60	0.30	0.60	4.50	mg/kg	7	8	0	0	
Lead	8.50	25.9	43.2	3.52	19.0	31.5	148	mg/kg	9	10	10	0	
Mercury	0.14	0.26	1.40	0.14	0.23	0.32	39.0	mg/kg	9	10	5	0	
Nickel	12.5	16.1	20.5	9.95	14.1	19.0	126	mg/kg	9	10	10	0	
Selenium	1.00	1.25	10.0	1.00	0.50	1.00	258	mg/kg	9	10	1	0	
Vanadium	18.5	25.6	40.4	18.9	21.4	26.1	413	mg/kg	9	10	10	0	
Zinc	21.7	55.6	92.3	11.8	25.8	35.3	3,860	mg/kg	9	10	10	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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 MIN	MADEGROUND MEAN*	MADEGROUND MAX	NATURAL GROUND MIN	NATURAL GROUND MEAN*	NATURAL GROUND MAX	ASSESSMENT CRITERIA (AC)	UNITS	NO. OF LOCATIONS	NO. OF SAMPLES	NO. OF SAMPLES > LOD	NO. OF LOCATIONS >AC	LOCATIONS FAILING SCREENING
Soil Organic Matter (SOM)	1.49	2.89	4.28	0.42	1.30	2.28	-	%	4	5	5	0	
2-Chloronaphthalene	0.10	0.050	0.10	0.10	0.050	0.10	5.30	mg/kg	4	5	0	0	
4-Bromophenylphenyl ether	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
4-Chloroaniline	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
4-Chlorophenyl phenyl ether	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Azobenzene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Bis (2-chloroethoxy) methane	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Bis (2-chloroethyl) ether	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Carbazole	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Carbon Disulphide	0.070	0.035	0.070	0.070	0.035	0.070	0.14	mg/kg	4	5	0	0	
Nitrobenzene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
n-Nitrosodi-n-Propylamine	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Styrene	0.10	0.050	0.10	0.10	0.050	0.10	8.90	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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							
2-Methylnaphthalene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Acenaphthene	0.008	0.41	2.01	0.008	0.004	0.008	-	mg/kg	7	8	1	0	
Acenaphthylene	0.012	0.11	0.45	0.012	0.024	0.061	-	mg/kg	7	8	5	0	
Anthracene	0.016	0.89	4.39	0.016	0.008	0.016	-	mg/kg	7	8	2	0	
Benzo (a) anthracene	0.014	2.11	10.3	0.014	0.058	0.099	-	mg/kg	7	8	6	0	
Benzo (a) pyrene	0.031	3.13	15.3	0.015	0.051	0.093	1.60	mg/kg	7	8	7	1	WS103
Benzo (b) fluoranthene	0.024	3.64	17.8	0.015	0.062	0.11	-	mg/kg	7	8	7	0	
Benzo (ghi) perylene	0.033	2.17	10.5	0.024	0.043	0.068	-	mg/kg	7	8	7	0	
Benzo (k) fluoranthene	0.014	1.37	6.68	0.014	0.024	0.043	-	mg/kg	7	8	5	0	
Chrysene	0.026	2.05	10.0	0.010	0.040	0.073	-	mg/kg	7	8	7	0	
Dibenzo (ah) anthracene	0.023	0.48	2.33	0.023	0.012	0.023	-	mg/kg	7	8	2	0	
Fluoranthene	0.037	5.69	28.0	0.017	0.060	0.100	-	mg/kg	7	8	7	0	
Fluorene	0.010	0.19	0.94	0.010	0.005	0.010	-	mg/kg	7	8	1	0	
Indeno (1,2,3-cd) pyrene	0.022	1.89	9.17	0.018	0.037	0.064	-	mg/kg	7	8	7	0	
Naphthalene	0.009	0.065	0.30	0.009	0.007	0.013	2.30	mg/kg	7	8	3	0	
PAH Total (EPA 16)	0.22	32.3	158	0.12	0.47	0.86	-	mg/kg	7	8	7	0	

Residential HG Veg, SOM=1%

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							
Phenanthrene	0.020	3.20	15.8	0.015	0.030	0.057	-	mg/kg	7	8	7	0	
Pyrene	0.031	4.86	23.9	0.015	0.049	0.082	-	mg/kg	7	8	7	0	

Residential HG Veg, SOM=1%

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

PCBs

Analyte	Madeground Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
PCB101	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB118	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB138	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB153	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB180	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB28	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
PCB52	0.003	0.002	0.003	0.003	0.002	0.003	-	mg/kg	4	5	0	0	
Total PCB Congeners ICES 7	0.021	0.011	0.021	0.021	0.011	0.021	0.19	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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

Pesticides, Herbicides and Insecticides

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							
Hexachlorocyclopentadiene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Pentachlorophenol	0.10	0.050	0.10	0.10	0.050	0.10	3.00	mg/kg	4	5	0	0	

Pharmaceuticals

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							
2-Nitroaniline	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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							
2,4-Dimethylphenol	0.10	0.050	0.10	0.10	0.050	0.10	20.0	mg/kg	4	5	0	0	
2-Methylphenol (o-Cresol)	0.10	0.050	0.10	0.10	0.050	0.10	84.0	mg/kg	4	5	0	0	
2-Nitrophenol	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
4-Methylphenol	0.10	0.050	0.10	0.10	0.050	0.10	84.0	mg/kg	4	5	0	0	
4-Nitrophenol	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Methylphenols Total (Summed)	0.10	0.10	0.10	0.10	0.10	0.10	84.0	mg/kg	4	5	5	0	
Phenol	0.010	0.005	0.010	0.010	0.005	0.010	102	mg/kg	4	5	0	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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

Phthalates

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							
Bis (2-ethylhexyl) phthalate	0.10	0.050	0.10	0.10	0.050	0.10	284	mg/kg	4	5	0	0	
Butyl benzyl phthalate	0.10	0.050	0.10	0.10	0.050	0.10	1,440	mg/kg	4	5	0	0	
Diethyl phthalate	0.10	0.050	0.10	0.10	0.050	0.10	123	mg/kg	4	5	0	0	
Dimethyl phthalate	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Di-n-butyl phthalate	0.10	0.050	0.10	0.10	0.050	0.10	13.0	mg/kg	4	5	0	0	
Di-n-octyl phthalate	0.10	0.050	0.10	0.10	0.050	0.10	2,240	mg/kg	4	5	0	0	

Residential HG Veg, SOM=1%

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 Min	Madeground Mean*	Madeground Max	Natural Ground Min	Natural Ground Mean*	Natural Ground Max	Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
4-Bromofluorobenzene	86.1	92.3	98.4	94.8	97.9	103	-	%	4	5	5	0	
Acenaphthene-d10	90.3	92.7	94.4	94.3	99.4	103	-	%	7	8	8	0	
Chrysene-d12	86.7	91.9	95.5	90.9	95.9	105	-	%	7	8	8	0	
Dibromofluoromethane	104	106	108	107	108	109	-	%	4	5	5	0	
Naphthalene-d8	93.0	95.0	98.2	92.4	101	107	-	%	7	8	8	0	
Perylene-d12**	90.1	95.0	97.9	103	105	106	-	%	7	8	8	0	
Phenanthrene-d10 IS	88.3	91.2	92.8	94.9	98.1	101	-	%	7	8	8	0	
Toluene-d8 Surrogate	109	112	115	101	104	106	-	%	4	5	5	0	

Warren Crescent, Oxford

Residential HG Veg, SOM=1%

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

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	73.0	102	138	106	116	130	-	%	7	8	8	0	
PRO (C5-C12)	0.044	0.022	0.044	0.044	0.022	0.044	-	mg/kg	7	8	0	0	

VOCs

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							
4-Isopropyltoluene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
iso-Propylbenzene	0.050	0.025	0.050	0.050	0.025	0.050	15.0	mg/kg	4	5	0	0	
n-Butylbenzene	0.11	0.055	0.11	0.11	0.055	0.11	-	mg/kg	4	5	0	0	
n-Propylbenzene	0.10	0.050	0.10	0.10	0.050	0.10	46.0	mg/kg	4	5	0	0	
Sec-Butylbenzene	0.10	0.050	0.10	0.10	0.050	0.10	-	mg/kg	4	5	0	0	
Tert-Butylbenzene	0.14	0.070	0.14	0.14	0.070	0.14	-	mg/kg	4	5	0	0	

EXCEEDANCES OF Residential HG Veg, SOM=1%

Aliphatics and Aromatics

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
TPH Hazard Index Calculation	WS103	1 - 1	1.58	1.00	mg/kg	Made Ground Granular

PAHs

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Benzo (a) pyrene	WS103	1 - 1	15.3	1.60	mg/kg	Made Ground Granular

Water Vapour Screening, Landuse=Residential, Soil Type=Sand

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

PointID				BH101	BH102	BH103	BH104	BH105	BH106	Downstream	Spring A	Spring B	Tufa Spring	Upstream
Response Zone Depth (m bgl)				8 - 11.7	4 - 6.7	8.8 - 11.8	3 - 7	6.4 - 10.9	8 - 12	0	0	0	0	0
Sample Date				23/01/18	23/01/18	23/01/18	23/01/18	23/01/18	23/01/18	23/01/18	31/01/18	31/01/18	31/01/18	23/01/18
Analyte	Units	LOD	GAC											
Aliphatic C05-C06	ug/l	10.0	3,030	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatic C06-C08	ug/l	10.0	2,330	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatic C08-C10	ug/l	10.0	84.0	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatic C10-C12	ug/l	10.0	GAC > Sol	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatic C07-C08	ug/l	10.0	343,200	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatic C08-C10	ug/l	10.0	2,870	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatic C10-C12	ug/l	10.0	10,000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Water Vapour Screening, Landuse=Residential, Soil Type=Sand

Site Area(s): Whole site
Phase(s): All phases

BTEX and Fuel Additives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

			PointID	BH101		BH102	BH103	BH104		BH105	BH106	Downstream	Spring A	Spring B	Tufa Spring	Upstream
			Response Zone Depth (m bgl)	8 - 11.7		4 - 6.7	8.8 - 11.8	3 - 7		6.4 - 10.9	8 - 12	0	0	0	0	0
			Sample Date	23/01/18	22/03/18	23/01/18	23/01/18	23/01/18	21/03/18	23/01/18	23/01/18	23/01/18	31/01/18	31/01/18	31/01/18	23/01/18
Analyte	Units	LOD	GAC													
1,2,4-Trimethylbenzene	ug/l	1.00	540	<1	<1	<1		<1	<1			<1				<1
Benzene	ug/l	1.00	318	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	1.00	16,200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl t-butylether (MTBE)	ug/l	1.00	126,900	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	1.00	346,500	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylene - Total (Summed)	ug/l	-999	15,500	1	1	1	1	1	1	1	1	1	1	1	1	1

Water Vapour Screening, Landuse=Residential, Soil Type=Sand

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aliphatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

			PointID	BH101		BH102	BH104		Downstream	Upstream
			Response Zone Depth (m bgl)	8 - 11.7		4 - 6.7	3 - 7		0	0
			Sample Date	23/01/18	22/03/18	23/01/18	23/01/18	21/03/18	23/01/18	23/01/18
Analyte	Units	LOD	GAC							
1,2-Dichloroethane	ug/l	1.00	13.0	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	ug/l	1.00	133	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	1.00	4.00	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene (PCE)	ug/l	1.00	53.0	<1	<1	<1	<1	<1	<1	<1
Trichloroethene (TCE)	ug/l	1.00	9.00	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride	ug/l	1.00	1.00	<1	<1	<1	<1	<1	<1	<1

Water Vapour Screening, Landuse=Residential, Soil Type=Sand

Site Area(s): Whole site
Phase(s): All phases

Other

Result > Assessment Criteria

Limit of detection > Assessment Criteria

			PointID	BH101		BH102	BH104		Downstream	Upstream
			Response Zone Depth (m bgl)	8 - 11.7		4 - 6.7	3 - 7		0	0
			Sample Date	23/01/18	22/03/18	23/01/18	23/01/18	21/03/18	23/01/18	23/01/18
Analyte	Units	LOD	GAC							
Carbon Disulphide	ug/l	1.00	83.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Water Vapour Screening, Landuse=Residential, Soil Type=Sand

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

			PointID	BH101		BH102		BH103	BH104		BH105		BH106	Downstream	Spring A	Spring B	Tufa Spring		Upstream
			Response Zone Depth (m bgl)	8 - 11.7		4 - 6.7		8.8 - 11.8	3 - 7		6.4 - 10.9		8 - 12	0	0	0	0		0
			Sample Date	23/01/18	22/03/18	23/01/18	22/03/18	23/01/18	23/01/18	21/03/18	23/01/18	21/03/18	23/01/18	23/01/18	31/01/18	31/01/18	31/01/18	21/03/18	23/01/18
Analyte	Units	LOD	GAC																
Naphthalene	ug/l	0.010 - 1.00	373	0.0171	<1	<0.01	<0.01	0.0178	<0.01	<1	0.0117	<0.01	0.0352	0.0112	0.0186	0.0105	0.188	<0.01	0.0136

Appendix E

GAS MONITORING RESULTS

Warren Crescent, Oxford

Key:

Depth to water		**Methane**	**Carbon Dioxide**	**Gas Flow**
Response zone *fully* flooded during sampling		> 1% v/v	> 5% v/v	> 70 l/hr
Response zone *significantly* flooded during sampling				
Datum or reponse zone information missing. Response zone flooding cannot be calculated				

Visit 1, Event: Jan-18, Date: 31/01/2018 — Sheet 1 of 1

Engineer	Hannah Biggs
Start/End Time	15:39 - 16:01
Pressure Start/End (mB)	989 - 990
Temperature (Deg C)	
Weather Conditions	Overcast

Equipment	**SerialNo**	**Calibrated**
Gas Analyser		Yes
Interface Probe		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
BH101	8.00	11.70	0.00	0.00	0	0.00	0.00	0.30	0.30	19.80	19.80	0.00	0.00	0.00	5.38	11.64	N/A	No
BH102	4.00	6.70	0.00	0.00	0	0.00	0.00	0.30	0.30	19.80	19.80	0.00	0.00	0.00	5.67	6.48	N/A	No
BH104	3.00	7.00	0.00	0.00	0	0.00	0.00	3.60	3.60	16.10	16.10	0.00	0.00	0.00	4.22	6.86	N/A	No
BH105	6.40	10.90	0.00	0.00	0	0.00	0.00	0.40	0.40	19.90	19.90	0.00	0.00	0.00	4.29	10.74	N/A	No
BH106	8.00	12.00	0.00	0.00	0	0.00	0.00	0.00	0.00	20.00	20.00	0.00	0.00	0.00	5.67	10.40	N/A	No
WS101	0.60	1.60	0.00	0.00	0	0.00	0.00	1.40	1.40	17.10	17.10	0.00	0.00	0.00		1.51	N/A	No
WS102	0.50	3.20	0.00	0.00	0	0.00	0.00	0.40	0.40	19.70	19.70	0.00	0.00	0.00		3.13	N/A	No
WS103	4.00	5.50	0.00	0.00	0	0.00	0.00	1.60	1.60	17.90	17.90	0.00	0.00	0.00		5.53	N/A	No
WS104	0.70	2.20	0.00	0.00	0	0.00	0.00	1.90	1.90	16.60	16.60	0.00	0.00	0.00		2.20	N/A	No
WS105	3.50	4.50	0.00	0.00	0	0.00	0.00	2.90	2.90	16.10	16.10	0.00	0.00	0.00		4.57	N/A	No

Warren Crescent, Oxford

Key:

	Depth to water		Methane	Carbon Dioxide	Gas Flow
(dark blue)	Response zone *fully* flooded during sampling	(yellow)	> 1% v/v	> 5% v/v	> 70 l/hr
(light blue)	Response zone *significantly* flooded during sampling				
(grey)	Datum or reponse zone information missing. Response zone flooding cannot be calculated				

Visit 2, Event: Feb-18, Date: 21/02/2018

Engineer	Hannah Biggs
Start/End Time	13:18 - 16:30
Pressure Start/End (mB)	1015 - 1014
Temperature (Deg C)	5.00
Weather Conditions	Overcast

Equipment	SerialNo	Calibrated
Gas Analyser	11974	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
BH101	8.00	11.70	-7.80	0.00	1,014	0.00	0.00	0.00	0.70	19.70	19.40		0.00	0.00	5.41	11.67	N/A	No
BH102	4.00	6.70	0.00	0.00	1,014	0.00	0.00	0.00	0.00	20.00	20.10	1.00	0.00	0.00	5.68	6.56	N/A	No
BH104	3.00	7.00	4.20	0.00	1,014	0.00	0.00	0.00	4.20	20.10	15.70	0.00	0.00		4.24	6.93	N/A	No
BH105	6.40	10.90	0.00	0.00	1,015	0.00	0.00	0.00	1.00	20.00	19.40	0.00	0.00	0.00	4.31	10.76	N/A	No
BH106	8.00	12.00	-1.00		1,014	0.00	0.00	0.00	0.70	20.20	19.20		0.00		5.64	10.47	N/A	No
WS101	0.60	1.60	0.00	0.00	1,014	0.00	0.00	0.00	2.30	20.40	15.70	0.00	0.00	0.00		1.55	N/A	No
WS102	0.50	3.20	0.00	0.00	1,013	0.00	0.00	0.00	1.20	19.90	18.70	0.00	0.00	0.00		3.18	N/A	No
WS103	4.00	5.50	0.00	0.00	1,014	0.00	0.00	0.00	1.70	19.80	18.40	0.00	0.00	0.00		5.59	N/A	No
WS104	0.70	2.20	0.00	0.00	1,014	0.00	0.00	0.00	2.20	20.00	16.00	0.00	0.00	0.00		2.16	N/A	No
WS105	3.50	4.50	0.00	0.00	1,013	0.00	0.00	0.00	2.90	20.00	16.50	0.00	0.00	0.00		4.61	N/A	No

Warren Crescent, Oxford

Key:

	Depth to water		Methane	Carbon Dioxide	Gas Flow
(dark blue)	Response zone *fully* flooded during sampling	(yellow)	> 1% v/v	> 5% v/v	> 70 l/hr
(light blue)	Response zone *significantly* flooded during sampling				
(grey)	Datum or reponse zone information missing. Response zone flooding cannot be calculated				

Visit 4, Event: Mar-18, Date: 21/03/2018

Engineer	Hannah Biggs
Start/End Time	16:17 - 17:28
Pressure Start/End (mB)	1016 - 1013
Temperature (Deg C)	
Weather Conditions	Fine

Equipment	SerialNo	Calibrated
Gas Analyser		Yes
Dipmeter		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	0.60	1.60	0.00	0.00		0.00	0.00	0.00	3.30	19.80	15.10	1.00				1.51	N/A	No
WS102	0.50	3.20	0.00	0.00		0.00	0.00	0.00	1.30	20.10	19.20	1.00				3.12	N/A	No
WS103	4.00	5.50	0.00	0.00		0.00	0.00	0.00	0.00	19.40	20.10	1.00				5.52	N/A	No
WS104	0.70	2.20	0.00	0.00		0.00	0.00	0.00	2.70	19.70	15.70	1.00				2.15	N/A	No
WS105	3.50	4.50	0.00	0.00		0.00	0.00	0.00	4.00	19.70	15.50	1.00				4.55	N/A	No

Appendix F

CONTROLLED WATERS LABORATORY DATA AND SCREENING

Appendix F.1

M-BAT TOOL

Metal Bioavailability Assessment Tool (M-BAT)

Back

Calculate

Clear Data

INPUT DATA											RESULTS (Copper)				RESULTS (Zinc)				RESULTS (Mn)				RESULTS (Ni)			
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) ($\mu g\ l^{-1}$)	Measured Zn Concentration (dissolved) ($\mu g\ l^{-1}$)	Measured Mn Concentration (dissolved) ($\mu g\ l^{-1}$)	Measured Ni Concentration (dissolved) ($\mu g\ l^{-1}$)	pH	DOC	Ca	Site-specific PNEC Dissolved Copper ($\mu g\ l^{-1}$)	BioF	Bioavailable Copper Concentration ($\mu g\ l^{-1}$)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc ($\mu g\ l^{-1}$)	BioF	Bioavailable Zinc Concentration ($\mu g\ l^{-1}$)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese ($\mu g\ l^{-1}$)	BioF	Bioavailable Manganese Concentration ($\mu g\ l^{-1}$)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel ($\mu g\ l^{-1}$)	BioF	Bioavailable Nickel Concentration ($\mu g\ l^{-1}$)	Risk Characterisation Ratio
1	Stream							7.9	4743.3	120000	22.33	0.04			82.28	0.13			266.45	0.46			31.09	0.13		
3	Tufa							7.575	3590	126000	52.47	0.02			71.02	0.15			499.87	0.25			36.97	0.11		
5	Spring A							7.86	3350	120000	26.63	0.04			80.89	0.13			287.90	0.43			31.91	0.13		
7	Spring B							7.535	3660	109000	54.98	0.02			69.63	0.16			540.11	0.23			37.57	0.11		

Pb Screening Tool 1.0

Back

Calculate

Clear Data

INPUT DATA						RESULTS (Pb)			
ID	Location	Waterbody	Date	Measured Pb Concentration (dissolved) ($\mu g\ l^{-1}$)	DOC	Site Specific PNEC Dissolved Pb ($\mu g\ l^{-1}$)	BioF	Available Pb ($\mu g\ l^{-1}$)	Risk Characterisation Ratio
2	Stream				4.74	5.69	0.21	0.00	
4	Tufa Spring				3.59	4.31	0.28	0.00	
6	Spring A				3.35	4.02	0.30	0.00	
8	Spring B				3.66	4.39	0.27	0.00	

Appendix F.2

LABORATORY CERTIFICATES

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: Fiona Marks

CERTIFICATE OF ANALYSIS

Date:	02 February 2018
Customer:	H_WSP_BRI
Sample Delivery Group (SDG):	180125-57
Your Reference:	70037512
Location:	Warren Crescent
Report No:	442662

We received 9 samples on Thursday January 25, 2018 and 8 of these samples were scheduled for analysis which was completed on Friday February 02, 2018. 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).

Approved By:

Sonia McWhan
Operations Manager

ALS Environmental is part of 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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16931137	BH101	EW	0.00 - 0.00	23/01/2018
16931124	BH102	EW	0.00 - 0.00	23/01/2018
16931093	BH103	EW	0.00 - 0.00	23/01/2018
16931080	BH104	EW	0.00 - 0.00	23/01/2018
16931061	BH105	EW	0.00 - 0.00	23/01/2018
16931107	BH106	EW	0.00 - 0.00	23/01/2018
16931152	Downstream Stream	EW	0.00 - 0.00	23/01/2018
16931177	No Id			
16931165	Upstream Stream	EW	0.00 - 0.00	23/01/2018

Maximum Sample/Coolbox Temperature (°C) : **8.4**

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

Validated

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)								16931137						16931124						16931093		16931080
Customer Sample Reference								BH101						BH102						BH103		BH104
AGS Reference								EW						EW						EW		EW
Depth (m)								0.00 - 0.00						0.00 - 0.00						0.00 - 0.00		0.00 - 0.00
Container			1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6			X						X						X					
Anions by ion Chromatography	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Anions by Kone (w)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6				X						X						X				
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6	X						X						X						X	
Dissolved Tin by ICPMS	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6				X						X						X				
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2																				

16931152	Downstream Stream	EW	0.00 - 0.00	HNO3 Filtered (ALE204)	SW									X				X		
				H2SO4 (ALE244)	SW			X												
				500ml Plastic (ALE208)	SW	X				X		X								
				1000ml glass bottle (ALE220)	SW											X				X
16931107	BH106	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW															
				HNO3 Filtered (ALE204)	GW										X				X	
				H2SO4 (ALE244)	GW				X											
				500ml Plastic (ALE208)	GW		X				X		X							
				1000ml glass bottle (ALE220)	GW												X			
16931061	BH105	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW															
				HNO3 Filtered (ALE204)	GW										X				X	
				H2SO4 (ALE244)	GW				X											
				500ml Plastic (ALE208)	GW		X				X		X							
				1000ml glass bottle (ALE220)	GW												X			
16931080	BH104	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW															
				HNO3 Filtered (ALE204)	GW										X				X	
				H2SO4 (ALE244)	GW				X											

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)								16931137						16931124						16931093		16931080
Customer Sample Reference								BH101						BH102						BH103		BH104
AGS Reference								EW						EW						EW		EW
Depth (m)								0.00 - 0.00						0.00 - 0.00						0.00 - 0.00		0.00 - 0.00
Container			1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 6	X						X						X						X	
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6	X						X						X						X	
Fluoride	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
GRO by GC-FID (W)	All	NDPs: 0 Tests: 6					X						X						X			
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Mercury Dissolved	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6				X						X						X				
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6				X						X						X				
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2																				

16931152	Downstream Stream	EW	0.00 - 0.00	HNO3 Filtered (ALE204)	SW									X		X				
				H2SO4 (ALE244)	SW															
				500ml Plastic (ALE208)	SW				X			X						X		
				1000ml glass bottle (ALE220)	SW		X													X
16931107	BH106	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW						X									
				HNO3 Filtered (ALE204)	GW										X		X			
				H2SO4 (ALE244)	GW															
				500ml Plastic (ALE208)	GW					X			X						X	
				1000ml glass bottle (ALE220)	GW	X		X												
16931061	BH105	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW						X									
				HNO3 Filtered (ALE204)	GW										X		X			
				H2SO4 (ALE244)	GW															
				500ml Plastic (ALE208)	GW					X			X						X	
				1000ml glass bottle (ALE220)	GW	X		X												
16931080	BH104	EW	0.00 - 0.00	ZnAc (ALE246)	GW															
				Vial (ALE297)	GW						X									
				HNO3 Filtered (ALE204)	GW										X		X			
				H2SO4 (ALE244)	GW															

CERTIFICATE OF ANALYSIS

Validated

SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	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)			16931137						16931124						16931093						16931080	
Customer Sample Reference			BH101						BH102						BH103						BH104	
AGS Reference			EW						EW						EW						EW	
Depth (m)			0.00 - 0.00						0.00 - 0.00						0.00 - 0.00						0.00 - 0.00	
Container			1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 6	X						X						X						X	
pH Value	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6			X						X						X					
Sulphide	All	NDPs: 0 Tests: 6						X						X						X		
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 3	X						X												X	
Total Metals by ICP-MS	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
Total Nitrogen	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6		X						X						X						X
TPH CWG (W)	All	NDPs: 0 Tests: 2																				
		NDPs: 0 Tests: 6	X						X						X						X	
VOC MS (W)	All	NDPs: 0 Tests: 6					X						X						X			

16931152	Downstream Stream	EW	0.00 - 0.00	HNO3 Filtered (ALE204)	SW															
				H2SO4 (ALE244)	SW				X											
				500ml Plastic (ALE208)	SW		X							X		X				
				1000ml glass bottle (ALE220)	SW							X						X		
16931107	BH106	EW	0.00 - 0.00	ZnAc (ALE246)	GW						X									
				Vial (ALE297)	GW															X
				HNO3 Filtered (ALE204)	GW															
				H2SO4 (ALE244)	GW					X										
				500ml Plastic (ALE208)	GW			X							X		X			
				1000ml glass bottle (ALE220)	GW	X													X	
16931061	BH105	EW	0.00 - 0.00	ZnAc (ALE246)	GW						X									
				Vial (ALE297)	GW															X
				HNO3 Filtered (ALE204)	GW															
				H2SO4 (ALE244)	GW					X										
				500ml Plastic (ALE208)	GW			X							X		X			
				1000ml glass bottle (ALE220)	GW	X													X	
16931080	BH104	EW	0.00 - 0.00	ZnAc (ALE246)	GW						X									
				Vial (ALE297)	GW															X
				HNO3 Filtered (ALE204)	GW															
				H2SO4 (ALE244)	GW					X										

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)				16931152						16931165
Customer Sample Reference				Downstream Stream						Upstream Stream
AGS Reference				EW						EW
Depth (m)				0.00 - 0.00						0.00 - 0.00
Container			Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2				X				
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2					X			
Anions by ion Chromatography	All	NDPs: 0 Tests: 2				X				
Anions by Kone (w)	All	NDPs: 0 Tests: 2				X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2						X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2			X					
Dissolved Tin by ICPMS	All	NDPs: 0 Tests: 2						X		
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2			X					
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2			X					
Fluoride	All	NDPs: 0 Tests: 2				X				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2	X						X	
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2				X				
Mercury Dissolved	All	NDPs: 0 Tests: 2						X		
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2						X		
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2				X				

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)			16931152						16931165	
Customer Sample Reference			Downstream Stream						Upstream Stream	
AGS Reference			EW						EW	
Depth (m)			0.00 - 0.00						0.00 - 0.00	
Container			Vial (ALE297)	ZnAc (ALE246)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2			X					
pH Value	All	NDPs: 0 Tests: 2				X				
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2					X			
Sulphide	All	NDPs: 0 Tests: 2		X						X
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2			X					
Total Metals by ICP-MS	All	NDPs: 0 Tests: 2				X				
Total Nitrogen	All	NDPs: 0 Tests: 2				X				
TPH CWG (W)	All	NDPs: 0 Tests: 2			X					
VOC MS (W)	All	NDPs: 0 Tests: 2	X						X	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH103	BH104	BH105	BH106
Customer Sample Ref.			BH101	BH102	BH103	BH104	BH105	BH106
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Sampled Time			.	.	.	.	.	.
Date Received			25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
SDG Ref			180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
Lab Sample No.(s)			16931137	16931124	16931093	16931080	16931061	16931107
AGS Reference			EW	EW	EW	EW	EW	EW
Alkalinity, Bicarbonate as CaCO3	<2000 µg/l	TM043	315000	315000	325000	320000	290000	265000
Carbon, Organic (diss.filt)	<3000 µg/l	TM090	8810	<3000	22600	<3000	<3000	<3000
Ammoniacal Nitrogen as N	<200 µg/l	TM099	<200 #	<200 #	<200 #	<200 #	<200 #	<200 #
Sulphide	<10 µg/l	TM101	<10 #	<10 #	<10 #	<10 #	<10 #	<10 #
Fluoride	<500 µg/l	TM104	<500 #	<500 #	<500 #	<500 #	<500 #	<500 #
Aluminium (diss.filt)	<2 µg/l	TM152	6.64 #	4.22 #	5.48 #	4.42 #	18.3 #	<2 #
Antimony (diss.filt)	<0.1 µg/l	TM152	0.198	0.24	0.15	0.118	<0.6	0.112
Arsenic (diss.filt)	<0.5 µg/l	TM152	0.536 #	<0.5 #	<0.5 #	<0.5 #	<3 #	<0.5 #
Barium (diss.filt)	<0.2 µg/l	TM152	21.6 #	29.7 #	25.3 #	33 #	19.3 #	16.7 #
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.6 #	<0.1 #
Boron (diss.filt)	<5 µg/l	TM152	98.6 #	94 #	184 #	207 #	128 #	107 #
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	0.198 #	<0.08 #	<0.48 #	<0.08 #
Chromium (diss.filt)	<1 µg/l	TM152	4.16 #	17.7 #	<1 #	<1 #	<6 #	<1 #
Copper (diss.filt)	<0.3 µg/l	TM152	1.95 #	0.633 #	7.93 #	0.428 #	<1.8 #	<0.3 #
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<1.2 #	<0.2 #
Manganese (diss.filt)	<1 µg/l	TM152	144 #	100 #	170 #	3.81 #	26.5 #	116 #
Nickel (diss.filt)	<0.4 µg/l	TM152	8.7 #	1.79 #	11.2 #	2.04 #	<2.4 #	3.78 #
Selenium (diss.filt)	<0.5 µg/l	TM152	<0.5 #	1.83 #	1.06 #	<0.5 #	<3 #	2.03 #
Vanadium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<6 #	<1 #
Zinc (diss.filt)	<1 µg/l	TM152	5.35 #	8.8 #	6.24 #	3.79 #	<6 #	<1 #
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 #	<0.01 #	0.0104 #	<0.01 #	<0.01 #	<0.01 #
Nitrite as N	<15.2 µg/l	TM184	<15.2 2 #	55.1 2 #	<15.2 2 #	<15.2 2 #	18.6 2 #	84 2 #
Nitrate as N	<67.7 µg/l	TM184	4360	8430	7610	11100	8680	6470
Phosphorus (tot.unfilt)	<20 µg/l	TM191	151 2	140 2	275 2	<20 2	<20 2	<20 2
Nitrogen, Total	<1000 µg/l	TM212	4710 #	9240 #	8090 #	12300 #	9580 #	7160 #
Chloride	<80 µg/l	TM226	52100 #	39700 #	76400 #	20900 #	26600 #	69700 #
Phospate (ortho) as PO4	<140 µg/l	TM226	<140 #	<140 #	<140 #	<140 #	<140 #	<140 #
Sulphate	<100 µg/l	TM226	51800 #	50400 #	41800 #	38700 #	37400 #	62900 #
Phosphate as P	<46 µg/l	TM226	<46 #	<46 #	<46 #	<46 #	<46 #	<46 #
Calcium (diss.filt)	<12 µg/l	TM228	114000	118000	124000	166000	112000	126000
Sodium (diss.filt)	<76 µg/l	TM228	35100	32700	40500	21800	24900	27600
Magnesium (diss.filt)	<36 µg/l	TM228	2600	3350	2400	4920	3760	2560

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH102	BH103	BH104	BH105	BH106
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Sampled Time			.	.	.	.	.	.
Date Received			25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
SDG Ref			180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
Lab Sample No.(s)			16931137	16931124	16931093	16931080	16931061	16931107
AGS Reference			EW	EW	EW	EW	EW	EW
Component	**LOD/Units**	**Method**						
Potassium (diss.filt)	<1000 µg/l	TM228	2050	2730	1500	5120	4300	1980
Iron (diss.filt)	<19 µg/l	TM228	<19	<19	<19	<19	<19	<19
Hardness, Total as CaCO3	<1000 µg/l	TM228	296000	309000	320000	435000	295000	326000
Chromium, Hexavalent	<30 µg/l	TM241	<30 #	<30 #	<30 #	<30 #	<30 #	<30 #
pH	<1 pH Units	TM256	7.49 #	7.29 #	7.28 #	7.29 #	7.41 #	7.47 #
Phenol	<2 µg/l	TM259	<2 #	<2 #	<2 #	<2 #	<2 #	<2 #
Tin(diss.filt)	<0.36 µg/l	TM283	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			Downstream Stre am	Upstream Stream				
Depth (m)			0.00 - 0.00	0.00 - 0.00				
Sample Type			Surface Water (SW)	Surface Water (SW)				
Date Sampled			23/01/2018	23/01/2018				
Sampled Time			.	.				
Date Received			25/01/2018	25/01/2018				
SDG Ref			180125-57	180125-57				
Lab Sample No.(s)			16931152	16931165				
AGS Reference			EW	EW				
Component	**LOD/Units**	**Method**						
Alkalinity, Bicarbonate as CaCO3	<2000 µg/l	TM043	225000	235000				
Carbon, Organic (diss.filt)	<3000 µg/l	TM090	4880	5190				
Ammoniacal Nitrogen as N	<200 µg/l	TM099	<200 #	<200 #				
Sulphide	<10 µg/l	TM101	<10	<10				
Fluoride	<500 µg/l	TM104	<500	<500				
Aluminium (diss.filt)	<2 µg/l	TM152	5.54	5.92				
Antimony (diss.filt)	<0.1 µg/l	TM152	0.572	0.845				
Arsenic (diss.filt)	<0.5 µg/l	TM152	0.789	0.849				
Barium (diss.filt)	<0.2 µg/l	TM152	28.8	30.3				
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1	<0.1				
Boron (diss.filt)	<5 µg/l	TM152	82.4	69.4				
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08				
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1				
Copper (diss.filt)	<0.3 µg/l	TM152	1.6	1.6				
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	<0.2				
Manganese (diss.filt)	<1 µg/l	TM152	17	17.1				
Nickel (diss.filt)	<0.4 µg/l	TM152	1.91	1.5				
Selenium (diss.filt)	<0.5 µg/l	TM152	1.01	<0.5				
Vanadium (diss.filt)	<1 µg/l	TM152	<1	<1				
Zinc (diss.filt)	<1 µg/l	TM152	5.71	4.38				
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01				
Nitrite as N	<15.2 µg/l	TM184	32 2 #	44.7 2 #				
Nitrate as N	<67.7 µg/l	TM184	4830	5330				
Phosphorus (tot.unfilt)	<20 µg/l	TM191	184 2 #	222 2 #				
Nitrogen, Total	<1000 µg/l	TM212	5490 #	5890 #				
Chloride	<80 µg/l	TM226	97800 #	115000 #				
Phospate (ortho) as PO4	<140 µg/l	TM226	<140 #	733 #				
Sulphate	<100 µg/l	TM226	96200 #	113000 #				
Phosphate as P	<46 µg/l	TM226	<46 #	239 #				
Calcium (diss.filt)	<12 µg/l	TM228	122000 #	118000 #				
Sodium (diss.filt)	<76 µg/l	TM228	42500 #	43900 #				
Magnesium (diss.filt)	<36 µg/l	TM228	6410 #	6840 #				

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Downstream Stre am	Upstream Stream				
		Depth (m)	0.00 - 0.00	0.00 - 0.00				
		Sample Type	Surface Water (SW)	Surface Water (SW)				
		Date Sampled	23/01/2018	23/01/2018				
		Sampled Time	.	.				
		Date Received	25/01/2018	25/01/2018				
		SDG Ref	180125-57	180125-57				
		Lab Sample No.(s)	16931152	16931165				
		AGS Reference	EW	EW				
Potassium (diss.filt)	<1000 µg/l	TM228	3410 #	3450 #				
Iron (diss.filt)	<19 µg/l	TM228	37.5 #	23.7 #				
Hardness, Total as CaCO3	<1000 µg/l	TM228	331000 #	323000 #				
Chromium, Hexavalent	<30 µg/l	TM241	<30	<30				
pH	<1 pH Units	TM256	7.94 #	7.87 #				
Phenol	<2 µg/l	TM259	<2	<2				
Tin(diss.filt)	<0.36 µg/l	TM283	<0.36	<0.36				

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	BH106
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
		Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
		Date Sampled	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
		Sampled Time	.	.	.	.	.	.
		Date Received	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
		SDG Ref	180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
		Lab Sample No.(s)	16931137	16931124	16931093	16931080	16931061	16931107
		AGS Reference	EW	EW	EW	EW	EW	EW
Component	**LOD/Units**	**Method**						
Naphthalene (aq)	<0.01 µg/l	TM178	0.0171	<0.01	0.0178	<0.01	0.0117	0.0352
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.00655	<0.005	<0.005	0.0159
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	0.0606	0.00975	<0.005	<0.005	<0.005
Anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.005	0.00788	0.00874	<0.005	<0.005	0.0144
Fluorene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.00654	<0.005	<0.005	0.00801
Chrysene (aq)	<0.005 µg/l	TM178	<0.005	0.0196	0.00776	<0.005	<0.005	<0.005
Pyrene (aq)	<0.005 µg/l	TM178	0.0131	0.074	0.0136	0.00899	<0.005	0.0107
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005	0.0211	0.00516	<0.005	<0.005	<0.005
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	0.0195	0.00604	<0.005	<0.005	<0.005
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	0.00774	0.00714	<0.005	<0.005	<0.005
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002	0.00892	0.00558	<0.002	<0.002	<0.002
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005	0.0208	<0.005	<0.005	<0.005	<0.005
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005	0.0106	<0.005	<0.005	<0.005	<0.005
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082	0.251	0.0946	<0.082	<0.082	0.0843

CERTIFICATE OF ANALYSIS

SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method						
		Customer Sample Ref.	Downstream Stream	Upstream Stream				
		Depth (m)	0.00 - 0.00	0.00 - 0.00				
		Sample Type	Surface Water (SW)	Surface Water (SW)				
		Date Sampled	23/01/2018	23/01/2018				
		Sampled Time	.	.				
		Date Received	25/01/2018	25/01/2018				
		SDG Ref	180125-57	180125-57				
		Lab Sample No.(s)	16931152	16931165				
		AGS Reference	EW	EW				
Naphthalene (aq)	<0.01 µg/l	TM178	0.0112	0.0136				
Acenaphthene (aq)	<0.005 µg/l	TM178	0.00579	0.00681				
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Fluoranthene (aq)	<0.005 µg/l	TM178	0.0479	0.0637				
Anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Phenanthrene (aq)	<0.005 µg/l	TM178	0.0215	0.034				
Fluorene (aq)	<0.005 µg/l	TM178	0.0051	0.00718				
Chrysene (aq)	<0.005 µg/l	TM178	0.0215	0.0165				
Pyrene (aq)	<0.005 µg/l	TM178	0.0492	0.0644				
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	0.0265	0.015				
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	0.0218	0.014				
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	0.00737	<0.005				
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	0.00793	0.00538				
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	0.0202	0.0132				
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	0.00992	<0.005				
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	0.256	0.254				

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

- # ISO17025 accredited.
- M *m*CERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted test.
- ** % 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
- 1-5&♦§@ Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH104	Downstream Stre am	Upstream Stream	
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	
		Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)	
		Date Sampled	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	
		Sampled Time	.	.	.	.	.	
		Date Received	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	
		SDG Ref	180125-57	180125-57	180125-57	180125-57	180125-57	
		Lab Sample No.(s)	16931137	16931124	16931080	16931152	16931165	
		AGS Reference	EW	EW	EW	EW	EW	
Component	**LOD/Units**	**Method**						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Chlorophenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Methylphenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Nitroaniline (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
2-Nitrophenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
3-Nitroaniline (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Chloroaniline (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1	
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Methylphenol (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Nitroaniline (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
4-Nitrophenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1	
Azobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
Acenaphthylene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
Acenaphthene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
Anthracene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2 #	<2 #	<2 #	<2 #	<2 #	
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #	

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH104	Downstream Stream	Upstream Stream
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
		Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)
		Date Sampled	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
		Sampled Time	.	.	.	.	.
		Date Received	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
		SDG Ref	180125-57	180125-57	180125-57	180125-57	180125-57
		Lab Sample No.(s)	16931137	16931124	16931080	16931152	16931165
		AGS Reference	EW	EW	EW	EW	EW
Component	**LOD/Units**	**Method**					
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Benzo(a)pyrene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Carbazole (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Chrysene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Dibenzofuran (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Diethyl phthalate (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Dimethyl phthalate (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<5 #	<5 #	<5 #	<5 #	<5 #
Fluoranthene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Fluorene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Pentachlorophenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
Phenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachloroethane (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Nitrobenzene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Isophorone (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
Phenanthrene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #
Pyrene (aq)	<1 µg/l	TM176	<1 #	<1 #	<1 #	<1 #	<1 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH103	BH104	BH105	BH106
Customer Sample Ref.			BH101	BH102	BH103	BH104	BH105	BH106
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Sampled Time			.	.	.	.	.	.
Date Received			25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
SDG Ref			180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
Lab Sample No.(s)			16931137	16931124	16931093	16931080	16931061	16931107
AGS Reference			EW	EW	EW	EW	EW	EW
GRO Surrogate % recovery**	%	TM245	94	99	95	95	91	92
GRO >C5-C12	<50 µg/l	TM245	<50 #	<50 #	<50 #	<50 #	<50 #	<50 #
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	11	<10	<10	<10	<10	<10
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	22	<10	30	<10	100	<10
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	33	<10	30	<10	100	<10
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	33	<10	30	<10	100	<10
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	33	<10	30	<10	100	<10
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10	<10	<10	<10

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Downstream Stream	Upstream Stream				
Customer Sample Ref.			Downstream Stre am	Upstream Stream				
Depth (m)			0.00 - 0.00	0.00 - 0.00				
Sample Type			Surface Water (SW)	Surface Water (SW)				
Date Sampled			23/01/2018	23/01/2018				
Sampled Time			.	.				
Date Received			25/01/2018	25/01/2018				
SDG Ref			180125-57	180125-57				
Lab Sample No.(s)			16931152	16931165				
AGS Reference			EW	EW				
GRO Surrogate % recovery**	%	TM245	95	94				
GRO >C5-C12	<50 µg/l	TM245	<50 #	<50 #				
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10				
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10				
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10				
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10				
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10				
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	<10				
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	21	22				
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	21	22				
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10				
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10				
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10				
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10				
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10				
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10				
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10				
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	21	22				
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	21	22				
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174	<10	<10				

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	BH106
Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Sampled Time	.	.	.	.	.	.
Date Received	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
SDG Ref	180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
Lab Sample No.(s)	16931137	16931124	16931093	16931080	16931061	16931107
AGS Reference	EW	EW	EW	EW	EW	EW

Component	LOD/Units	Method	BH101	BH102	BH103	BH104	BH105	BH106
Dibromofluoromethane**	%	TM208	120	117		118		
Toluene-d8**	%	TM208	101	101		102		
4-Bromofluorobenzene**	%	TM208	103	103		103		
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Chloromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Bromomethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Chloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #		<3 #		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1		<1		
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Chloroform	<1 µg/l	TM208	<1 #	<1 #		1.23 #		
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Benzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Toluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		

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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

		Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	BH106
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
		Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
		Date Sampled	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
		Sampled Time	.	.	.	.	.	.
		Date Received	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
		SDG Ref	180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
		Lab Sample No.(s)	16931137	16931124	16931093	16931080	16931061	16931107
		AGS Reference	EW	EW	EW	EW	EW	EW
Component	**LOD/Units**	**Method**						
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Chlorobenzene	<1 µg/l	TM208	7.89 #	<1 #		<1 #		
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Styrene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Bromoform	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1		<1		
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208	<1 #	<1 #		<1 #		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH102	BH103	BH104	BH105	BH106
Customer Sample Ref.			BH101	BH102	BH103	BH104	BH105	BH106
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Sampled Time			.	.	.	.	.	.
Date Received			25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018	25/01/2018
SDG Ref			180125-57	180125-57	180125-57	180125-57	180125-57	180125-57
Lab Sample No.(s)			16931137	16931124	16931093	16931080	16931061	16931107
AGS Reference			EW	EW	EW	EW	EW	EW
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #		<1 #		
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	<1		<1		
Sum of detected Xylenes	<2 µg/l	TM208	<2	<2	<2	<2	<2	<2

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Customer Sample Ref.	Downstream Stream	Upstream Stream
Depth (m)	0.00 - 0.00	0.00 - 0.00
Sample Type	Surface Water (SW)	Surface Water (SW)
Date Sampled	23/01/2018	23/01/2018
Sampled Time	.	.
Date Received	25/01/2018	25/01/2018
SDG Ref	180125-57	180125-57
Lab Sample No.(s)	16931152	16931165
AGS Reference	EW	EW

Component	LOD/Units	Method	Downstream Stream	Upstream Stream
Dibromofluoromethane**	%	TM208	116	118
Toluene-d8**	%	TM208	101	102
4-Bromofluorobenzene**	%	TM208	103	103
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #
Chloromethane	<1 µg/l	TM208	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #
Bromomethane	<1 µg/l	TM208	<1 #	<1 #
Chloroethane	<1 µg/l	TM208	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #
Chloroform	<1 µg/l	TM208	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #
Benzene	<1 µg/l	TM208	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
Toluene	<1 µg/l	TM208	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

			Downstream Stream	Upstream Stream
		Customer Sample Ref.	Downstream Stre am	Upstream Stream
		Depth (m)	0.00 - 0.00	0.00 - 0.00
		Sample Type	Surface Water (SW)	Surface Water (SW)
		Date Sampled	23/01/2018	23/01/2018
		Sampled Time	.	.
		Date Received	25/01/2018	25/01/2018
		SDG Ref	180125-57	180125-57
		Lab Sample No.(s)	16931152	16931165
		AGS Reference	EW	EW
Component	**LOD/Units**	**Method**		
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #
o-Xylene	<1 µg/l	TM208	<1 #	<1 #
Styrene	<1 µg/l	TM208	<1 #	<1 #
Bromoform	<1 µg/l	TM208	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #
Naphthalene	<1 µg/l	TM208	<1 #	<1 #

CERTIFICATE OF ANALYSIS

Validated

SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

		Customer Sample Ref.	Downstream Stre am	Upstream Stream				
		Depth (m)	0.00 - 0.00	0.00 - 0.00				
		Sample Type	Surface Water (SW)	Surface Water (SW)				
		Date Sampled	23/01/2018	23/01/2018				
		Sampled Time	.	.				
		Date Received	25/01/2018	25/01/2018				
		SDG Ref	180125-57	180125-57				
		Lab Sample No.(s)	16931152	16931165				
		AGS Reference	EW	EW				
Component	**LOD/Units**	**Method**						
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #				
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	<1				
Sum of detected Xylenes	<2 µg/l	TM208	<2	<2				

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride 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
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
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
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM226	In-House Method	Determination of Anions in Waters using Ion Chromatography
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
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
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
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM283		Determination of Dissolved Niobium, Tungsten, and Zirconium in Water Matrices by ICP-MS

NA = not applicable.

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

Test Completion Dates

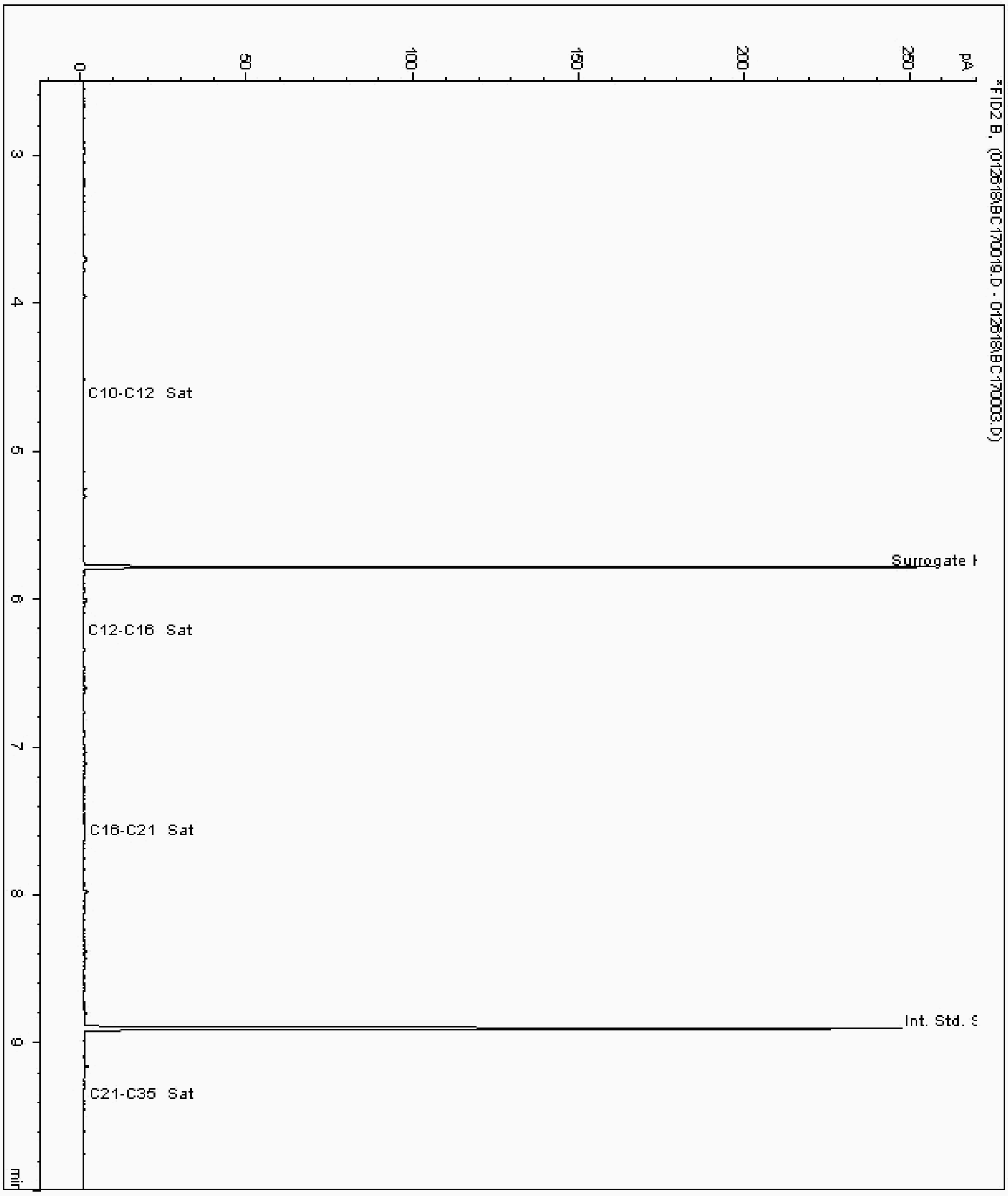
Lab Sample No(s)	16931137	16931124	16931093	16931080	16931061	16931107	16931152	16931165
Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	BH106	Downstream Stre am	Upstream Stream
AGS Ref.	EW	EW	EW	EW	EW	EW	EW	EW
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water
Alkalinity as CaCO3	01-Feb-2018	01-Feb-2018	01-Feb-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018
Ammoniacal Nitrogen	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	31-Jan-2018	01-Feb-2018	01-Feb-2018
Anions by ion Chromatography	02-Feb-2018	02-Feb-2018	02-Feb-2018	02-Feb-2018	02-Feb-2018	02-Feb-2018	02-Feb-2018	02-Feb-2018
Anions by Kone (w)	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018
Dissolved Metals by ICP-MS	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018
Dissolved Organic/Inorganic Carbon	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018
Dissolved Tin by ICPMS	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018
EPH CWG (Aliphatic) Aqueous GC (W)	29-Jan-2018	29-Jan-2018	30-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
EPH CWG (Aromatic) Aqueous GC (W)	29-Jan-2018	29-Jan-2018	30-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
Fluoride	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018
GRO by GC-FID (W)	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018
Hexavalent Chromium (w)	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018	31-Jan-2018
Mercury Dissolved	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
Metals by iCap-OES Dissolved (W)	30-Jan-2018	30-Jan-2018	30-Jan-2018	01-Feb-2018	30-Jan-2018	30-Jan-2018	30-Jan-2018	30-Jan-2018
Nitrite by Kone (w)	27-Jan-2018	29-Jan-2018	27-Jan-2018	27-Jan-2018	27-Jan-2018	27-Jan-2018	27-Jan-2018	27-Jan-2018
PAH Spec MS - Aqueous (W)	29-Jan-2018	29-Jan-2018	26-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
pH Value	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018	26-Jan-2018
Phenols by HPLC (W)	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
Sulphide	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018
SVOC MS (W) - Aqueous	01-Feb-2018	01-Feb-2018		01-Feb-2018			01-Feb-2018	01-Feb-2018
Total Metals by ICP-MS	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	01-Feb-2018	31-Jan-2018	01-Feb-2018	01-Feb-2018
Total Nitrogen	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
TPH CWG (W)	29-Jan-2018	29-Jan-2018	30-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018	29-Jan-2018
VOC MS (W)	25-Jan-2018	25-Jan-2018	25-Jan-2018	25-Jan-2018	25-Jan-2018	25-Jan-2018	25-Jan-2018	25-Jan-2018

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 16935624 **Sample ID :** BH102 **Depth :** 0.00 - 0.00

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity: 15892918-
Date Acquired  :  26/01/2018 22:07:25 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



CERTIFICATE OF ANALYSIS

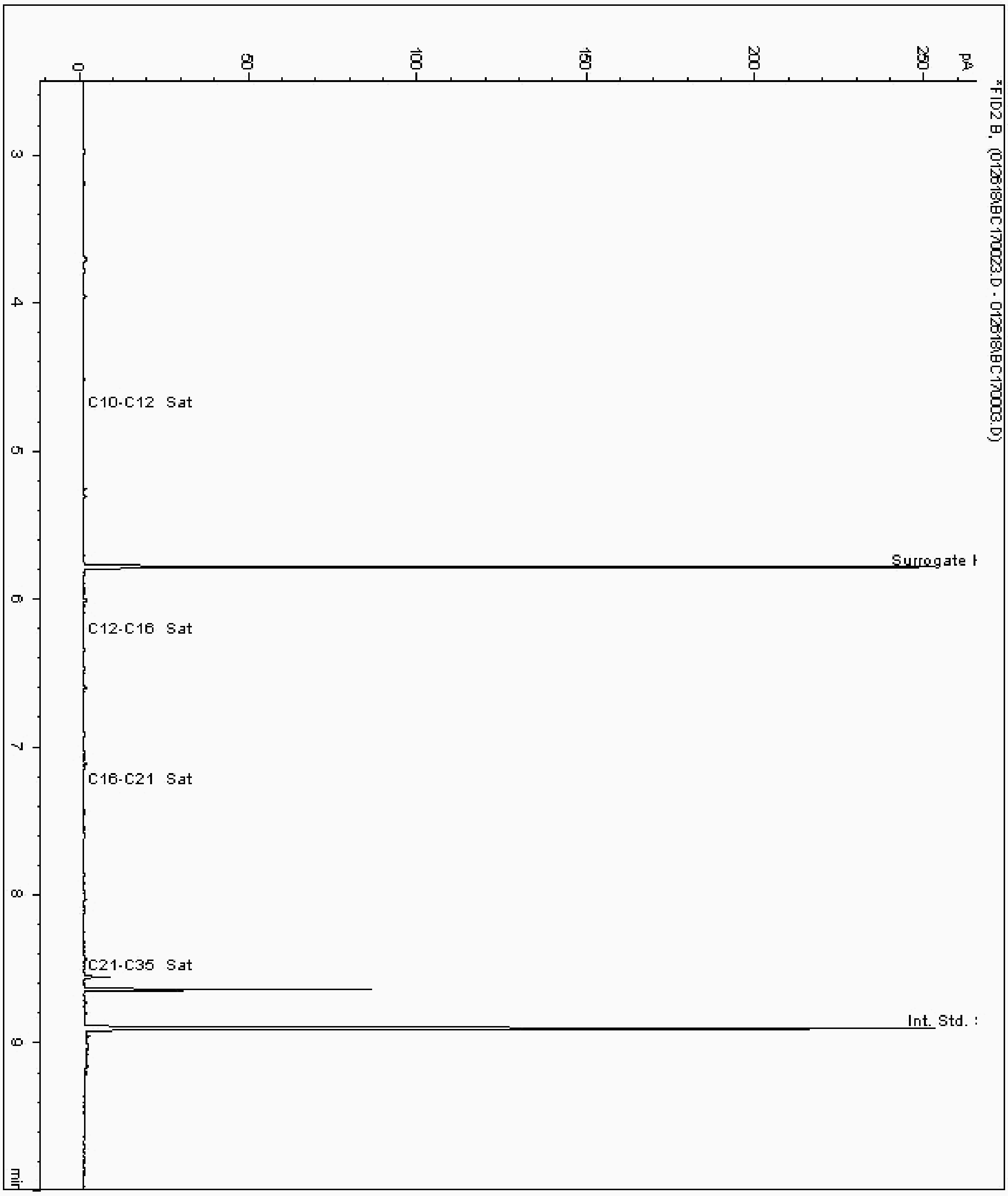
SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 16935705 **Sample ID :** BH105 **Depth :** 0.00 - 0.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15892797-
Date Acquired : 26/01/2018 23:43:58 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



Validated

CERTIFICATE OF ANALYSIS

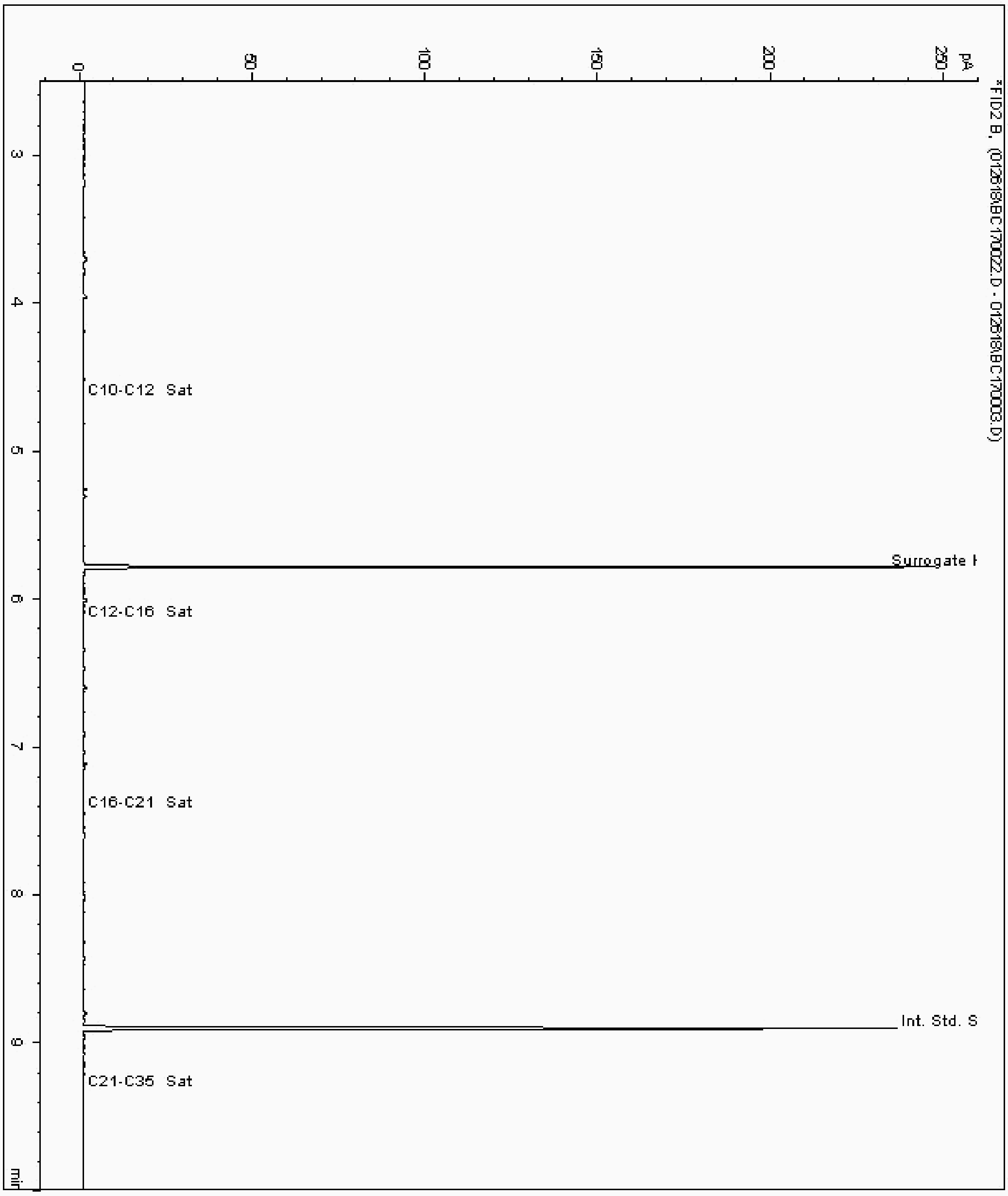
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 16935713 **Depth :** 0.00 - 0.00
Sample ID : BH104

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15892834-
Date Acquired : 26/01/2018 23:19:49 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



CERTIFICATE OF ANALYSIS

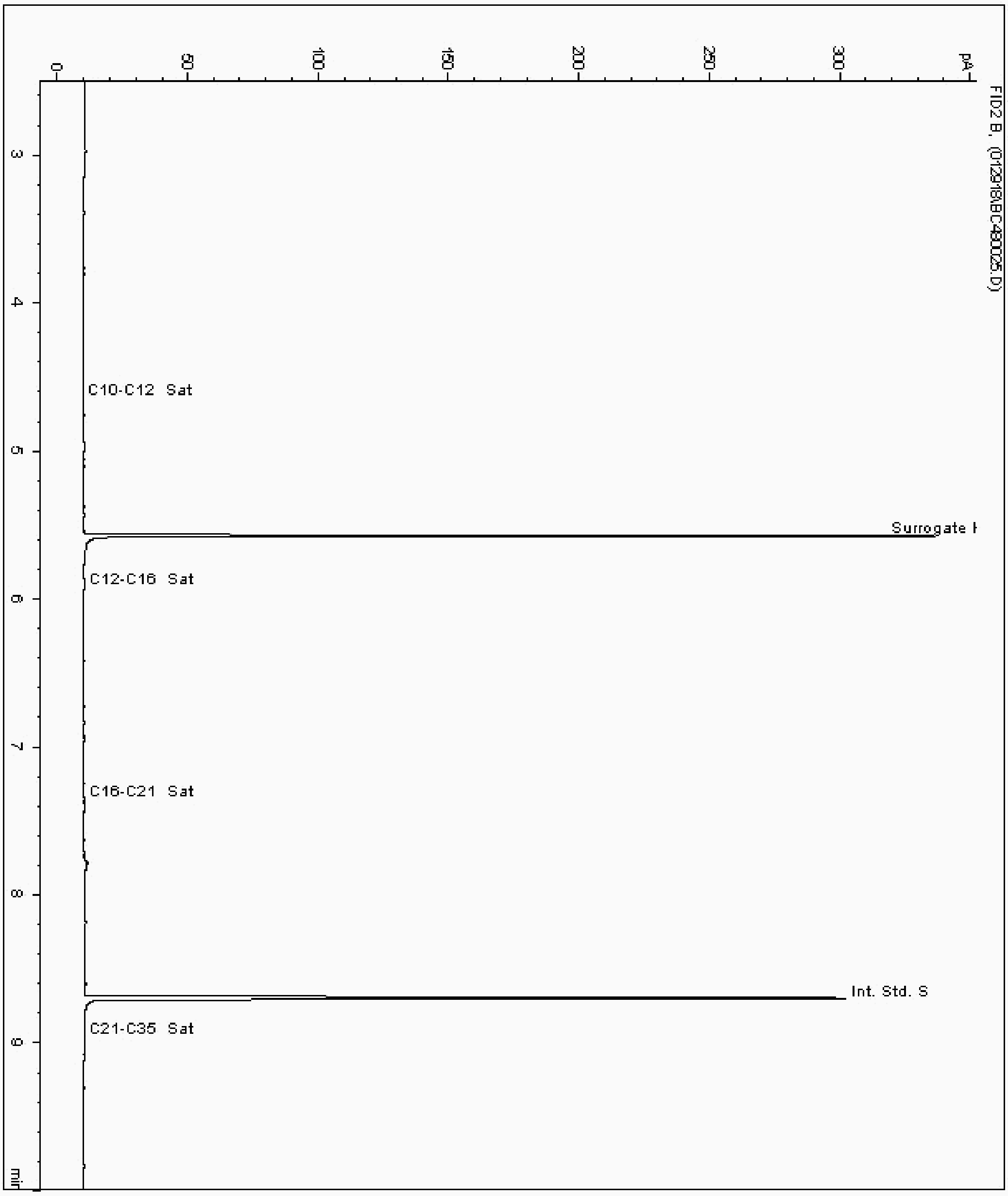
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 16935721 **Depth :** 0.00 - 0.00
Sample ID : BH103

```
Alcontrol/Geochem Analytical Services
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892861-
Date Acquired  :  29/01/2018 23:54:17 PM
Units          :  ppb
Dilution       :  SE BH103[0.00 - 0.00]     ->
CF             :  1
Multiplier     :  0.025
```



Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

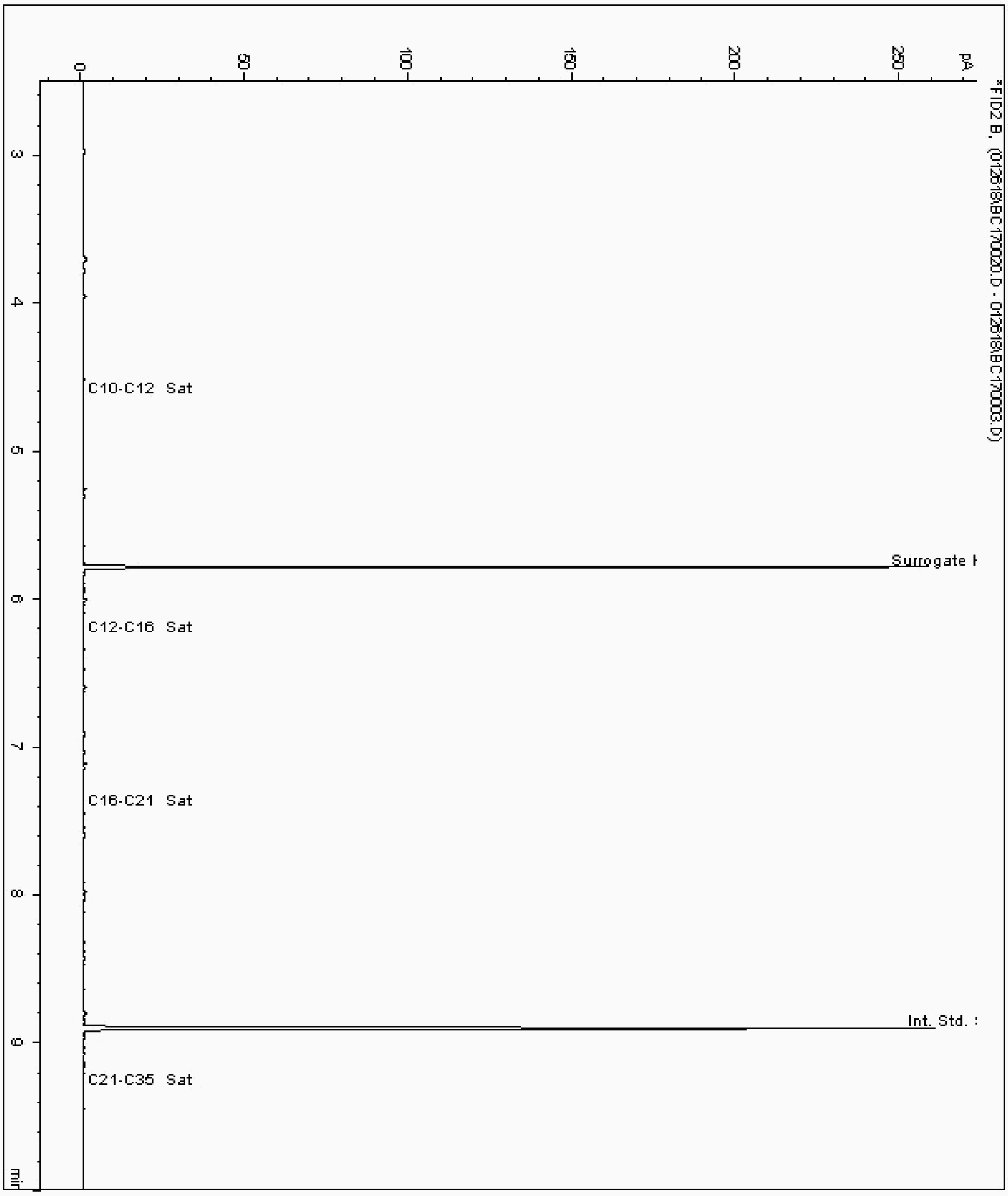
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 16935757
Sample ID : BH106

Depth : 0.00 - 0.00

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892889-
Date Acquired  :  26/01/2018 22:31:31 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



Chromatogram

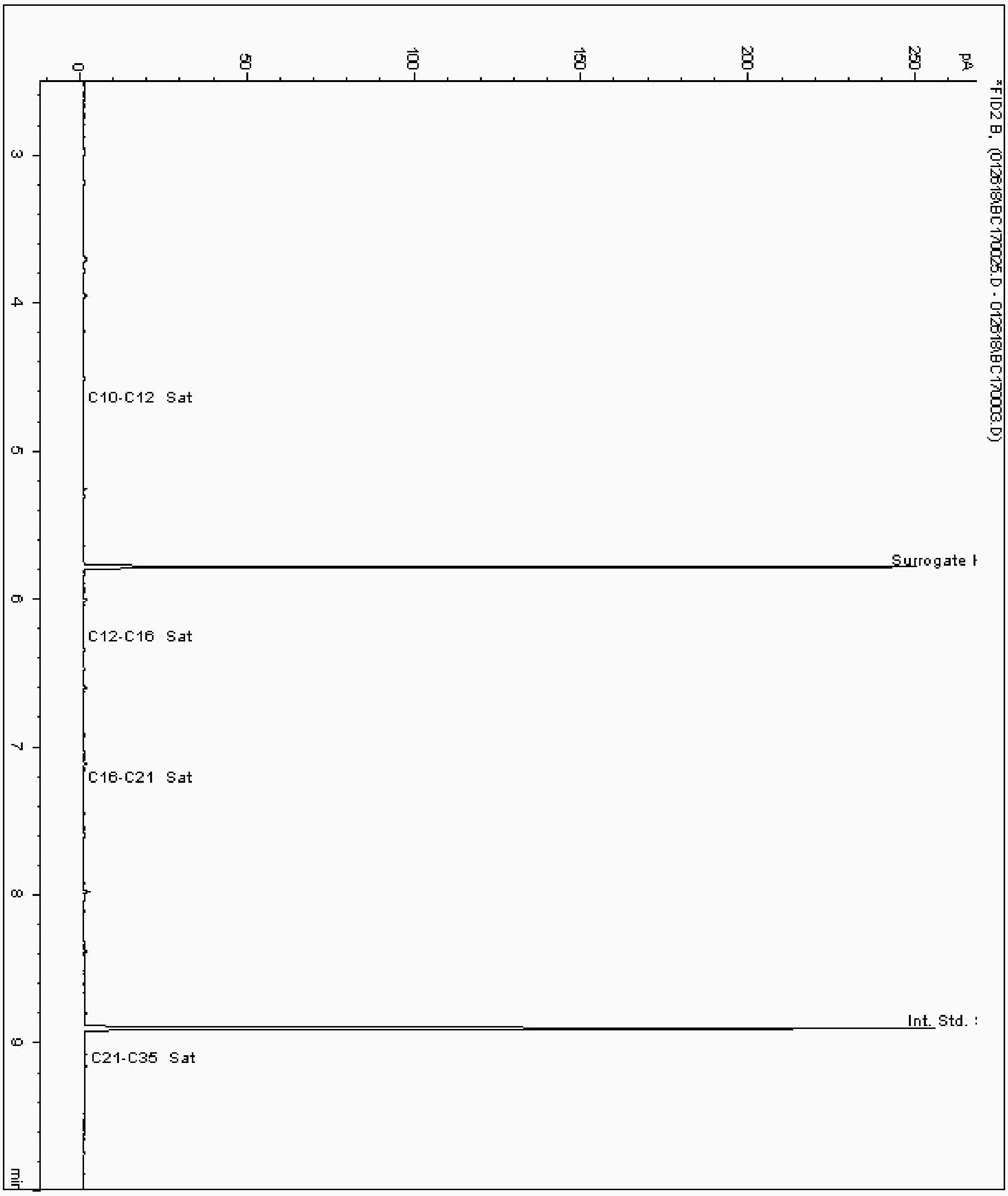
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 16935760
Sample ID : Upstream Stream

Depth : 0.00 - 0.00

Speciated TPH - SATS (C12 - C40)

Sample Identity:		15893023-
Date Acquired	:	27/01/2018 00:32:19 PM
Units	:	ppb
Dilution	:	
CF	:	1
Multiplier	:	0.025



Validated

CERTIFICATE OF ANALYSIS

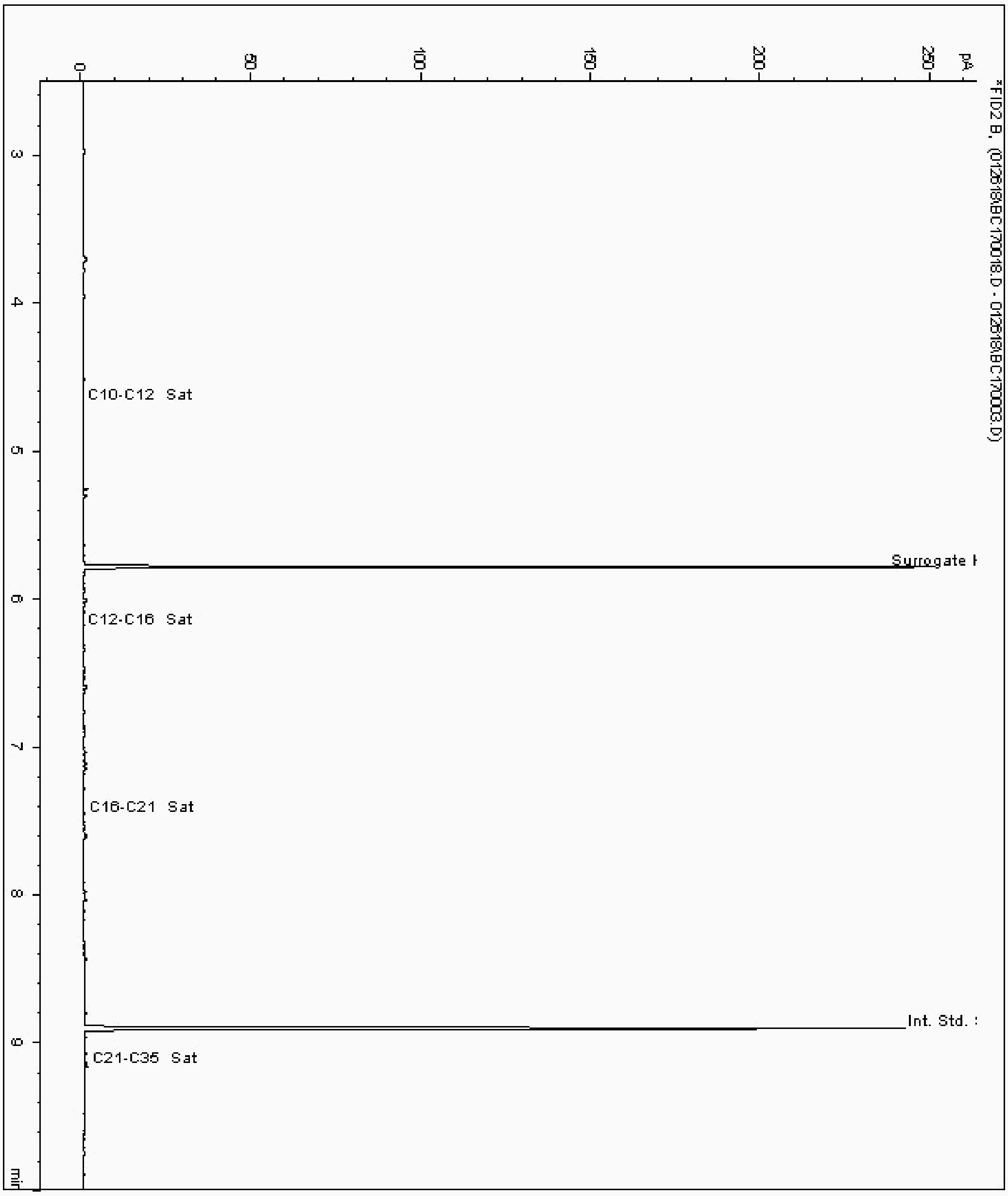
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aliphatic) Aqueous GC (W)	**Sample No :**	16935764	**Depth :**	0.00 - 0.00
		Sample ID :	Downstream Stream		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892979-
Date Acquired  :  26/01/2018 21:43:16 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```

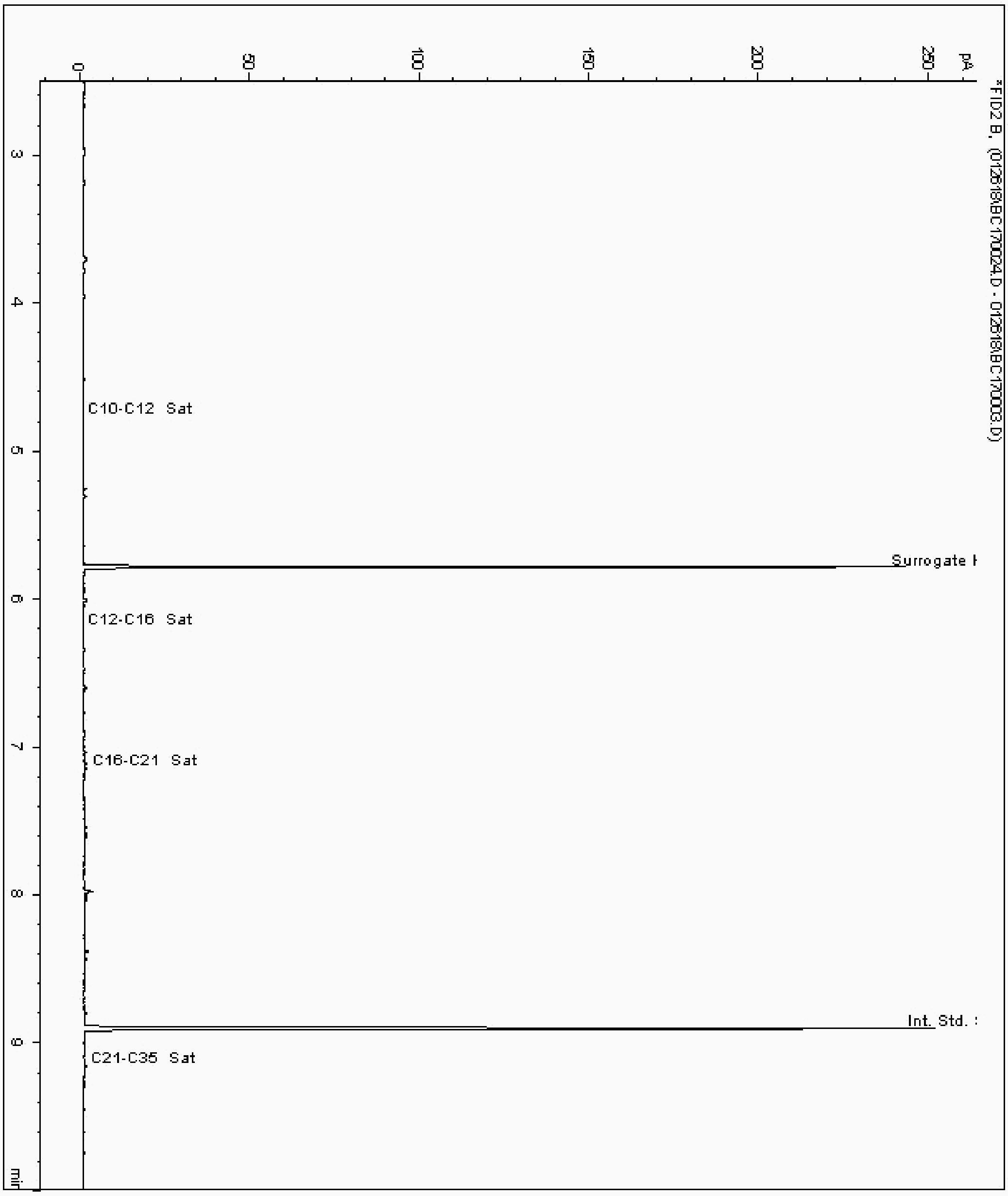


Chromatogram

Analysis:	EPH CWG (Aliphatic) Aqueous GC (W)	**Sample No :**	16935769	**Depth :**	0.00 - 0.00
		Sample ID :	BH101		

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15892950-
Date Acquired : 27/01/2018 00:07:59 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025



Validated

CERTIFICATE OF ANALYSIS

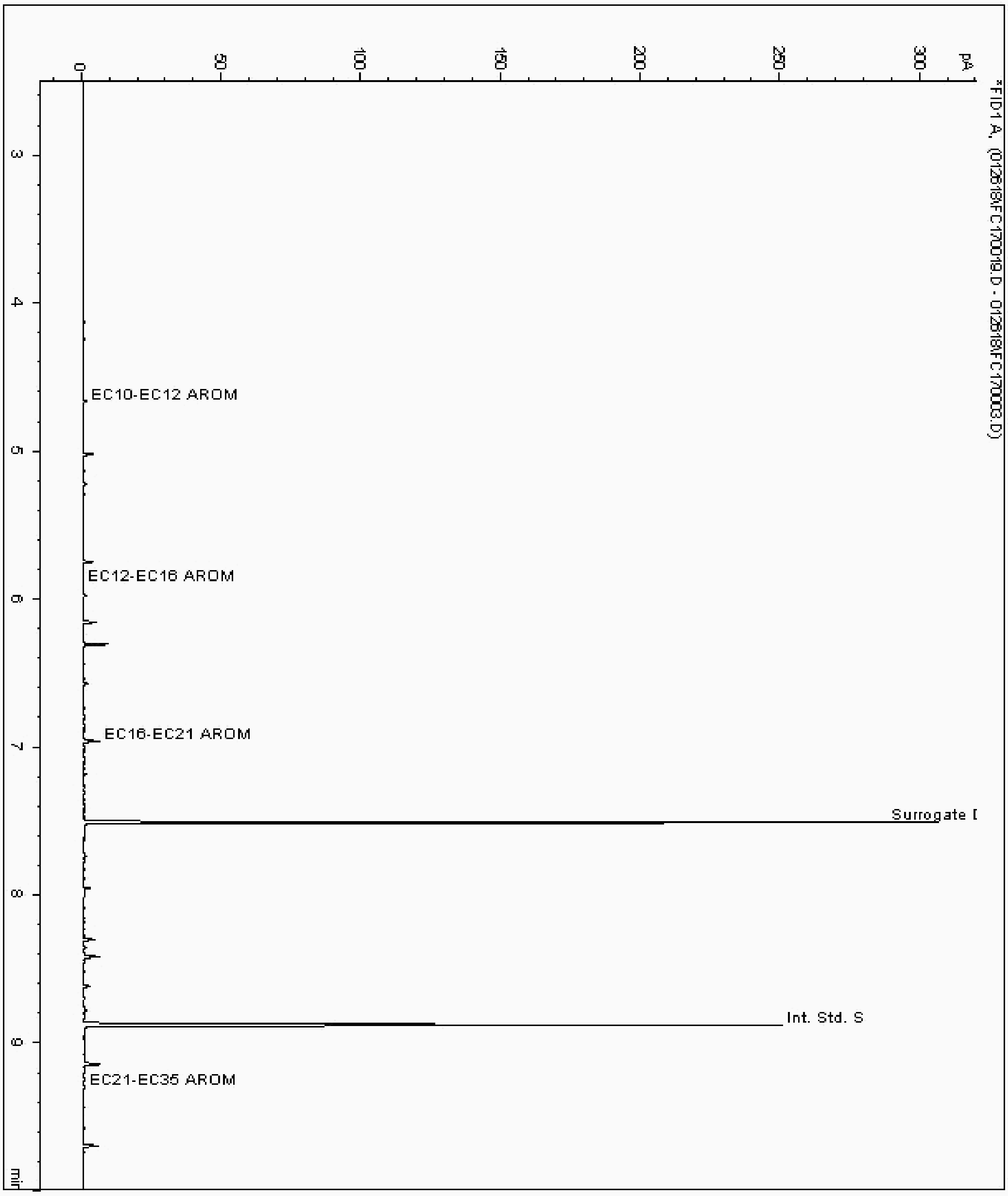
SDG:	180125-57	Client Reference:	70037512	Report Number:	442662
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16935624 **Depth :** 0.00 - 0.00
Sample ID : BH102

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892919-
Date Acquired  :  26/01/2018 22:07:26 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



CERTIFICATE OF ANALYSIS

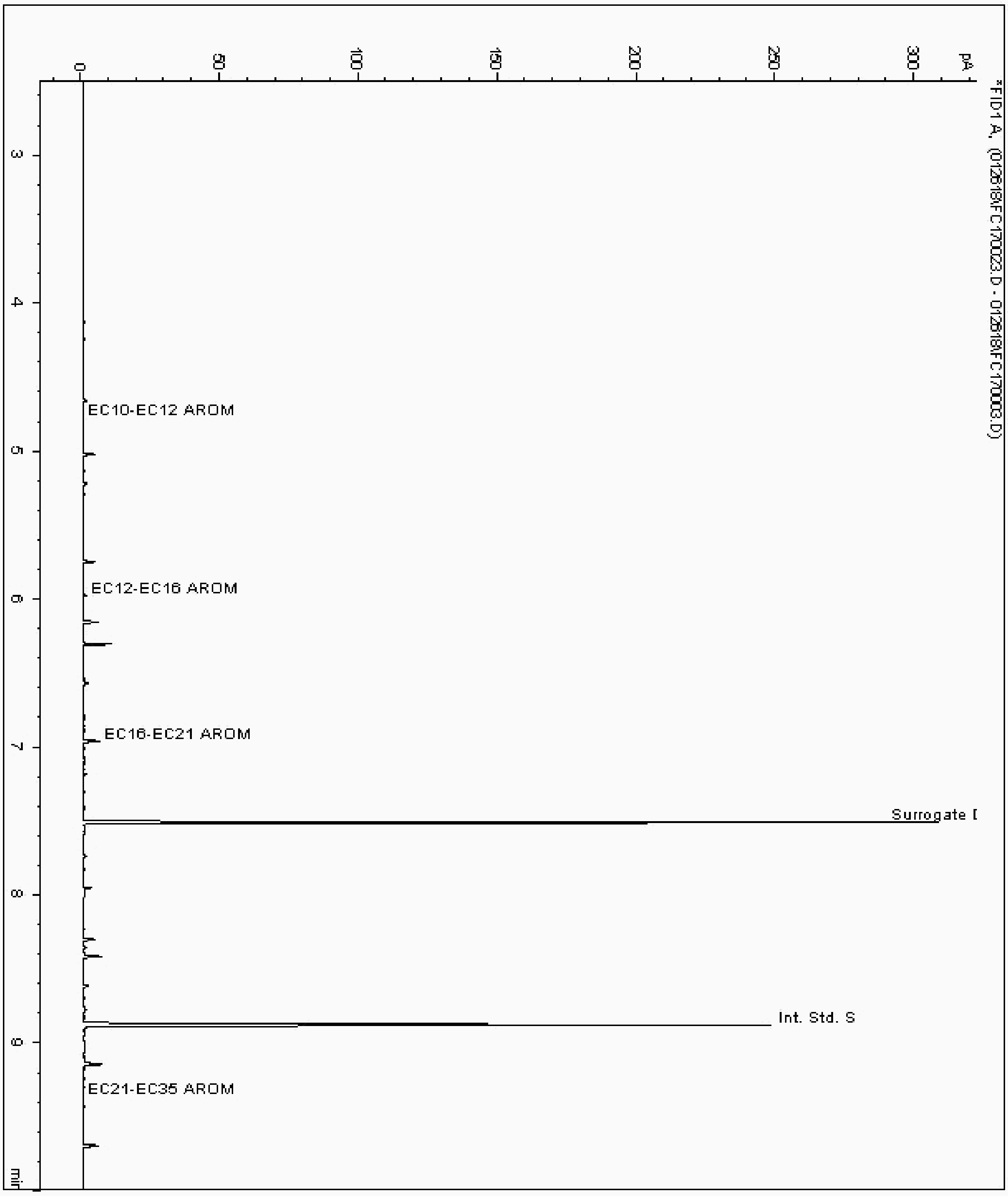
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	EPH CWG (Aromatic) Aqueous GC (W)	**Sample No :**	16935705	**Depth :**	0.00 - 0.00
		Sample ID :	BH105		

Speciated TPH - SATS (C12 - C40)

```
Sample Identity:  15892798-
Date Acquired  :  26/01/2018 23:43:58 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

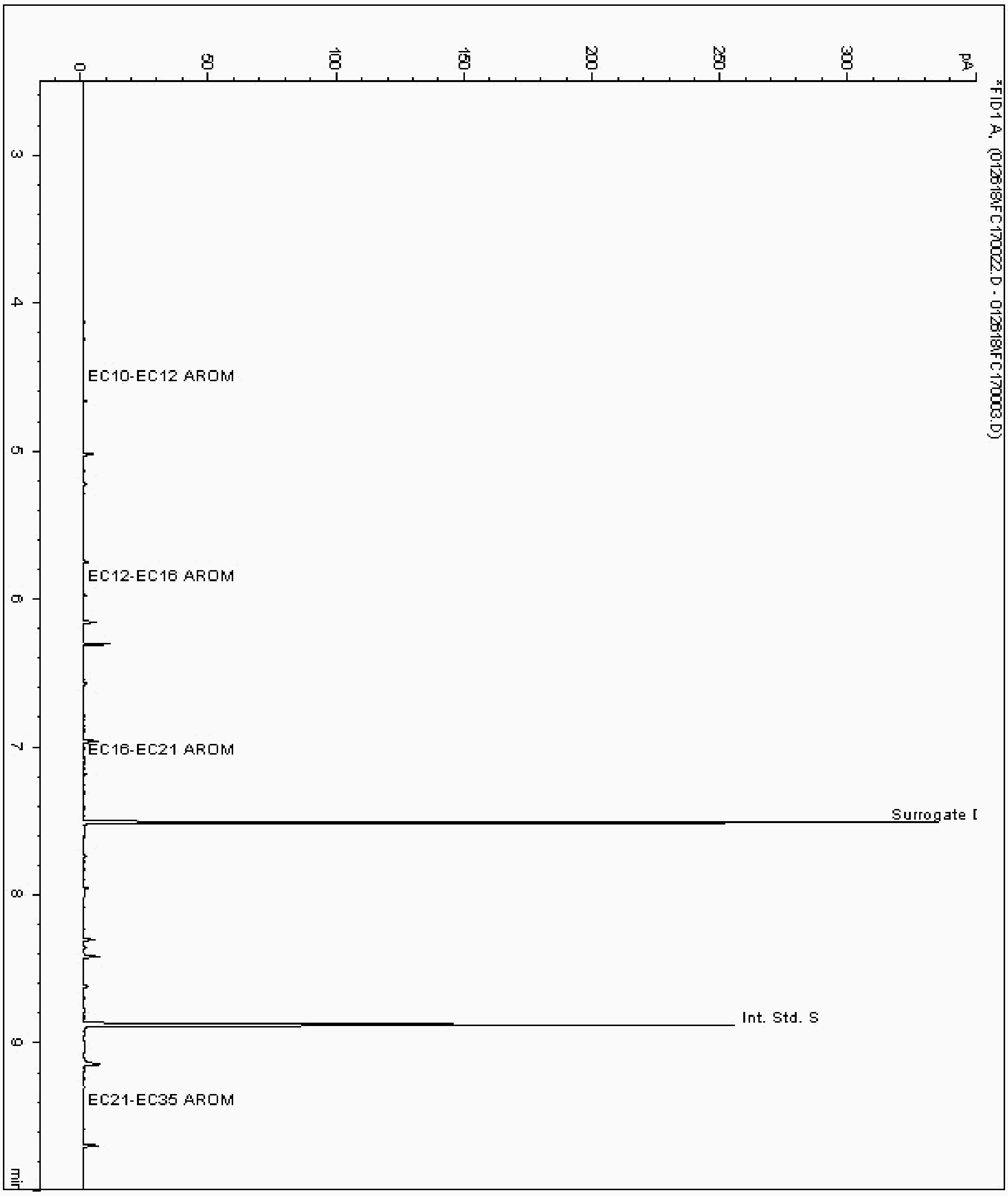
Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16935713 **Depth :** 0.00 - 0.00

Sample ID : BH104

Speciated TPH - SATS (C12 - C40)

```
Sample Identity:  15892835-
Date Acquired  :  26/01/2018 23:19:49 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```

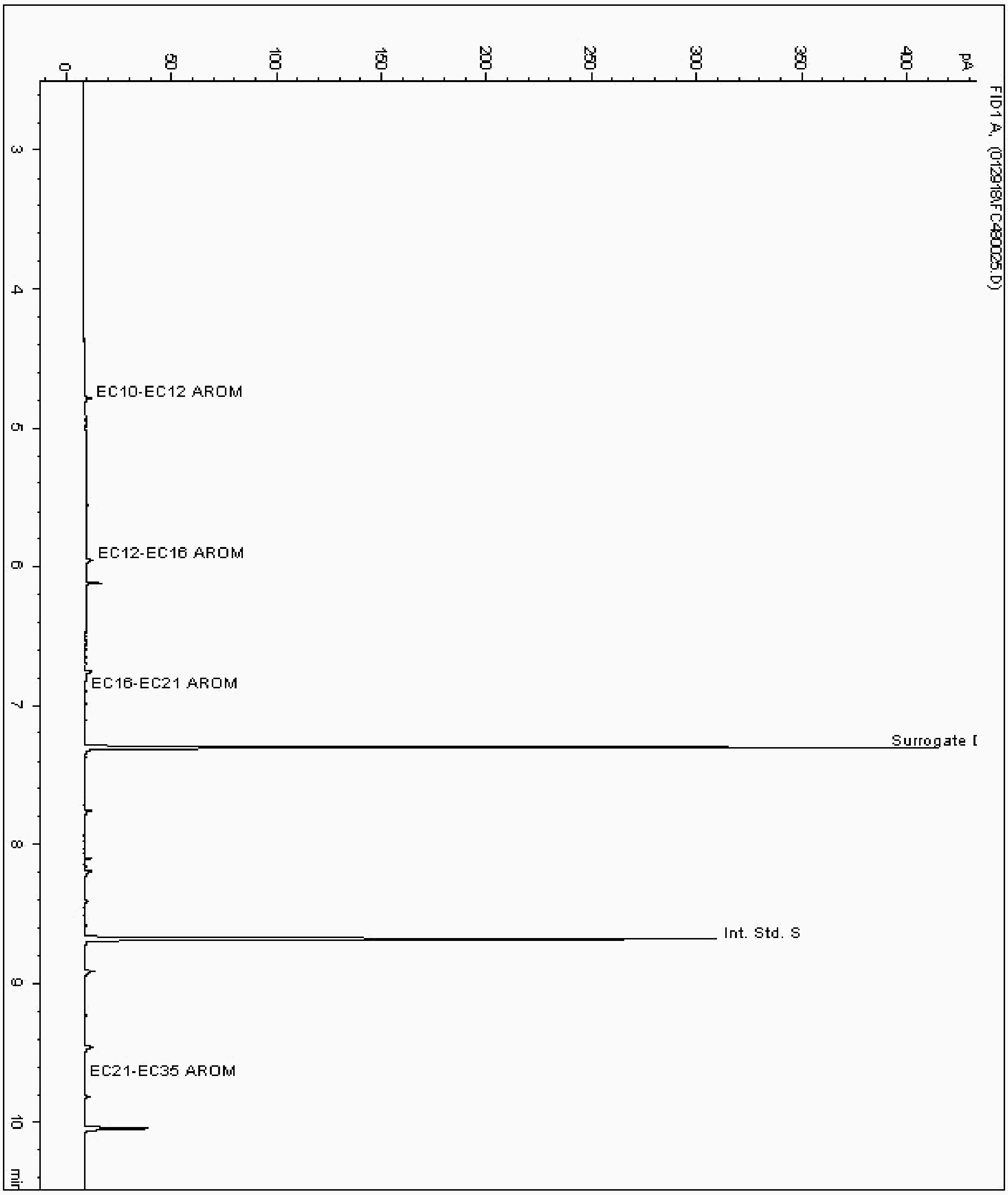


Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16935721 **Depth :** 0.00 - 0.00
Sample ID : BH103

```
Alcontrol/Geochem Analytical Services
Speciated TPH - AROM ( C12 - C40 )

Sample Identity:  15892862-
Date Acquired  :  29/01/2018 23:54:17 PM
Units          :  ppb
Dilution       :  SE BH103[0.00 - 0.00]     ->
CF             :  1
Multiplier     :  0.025
```



CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

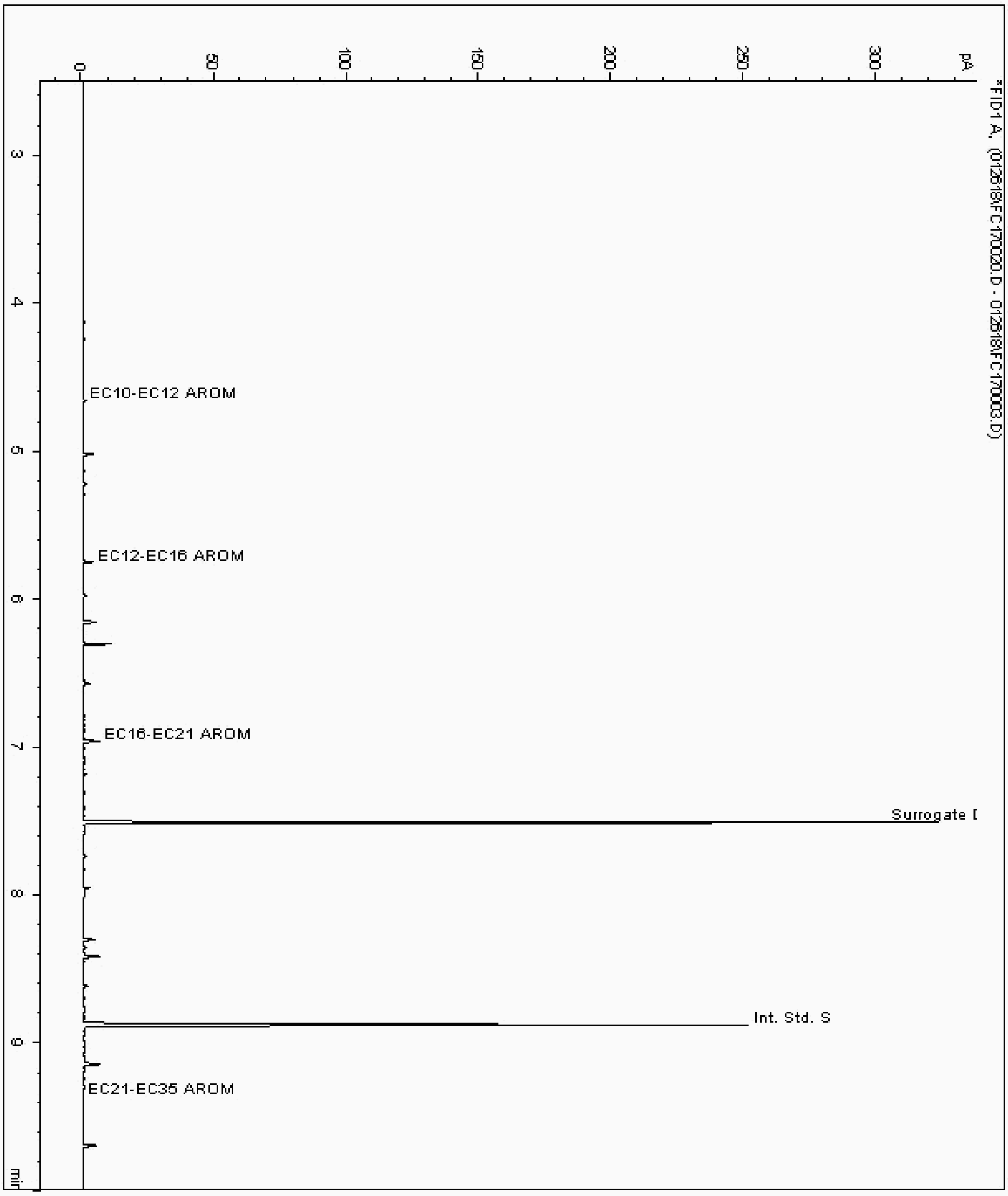
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 16935757
Sample ID : BH106

Depth : 0.00 - 0.00

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892890-
Date Acquired  :  26/01/2018 22:31:32 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



CERTIFICATE OF ANALYSIS

Validated

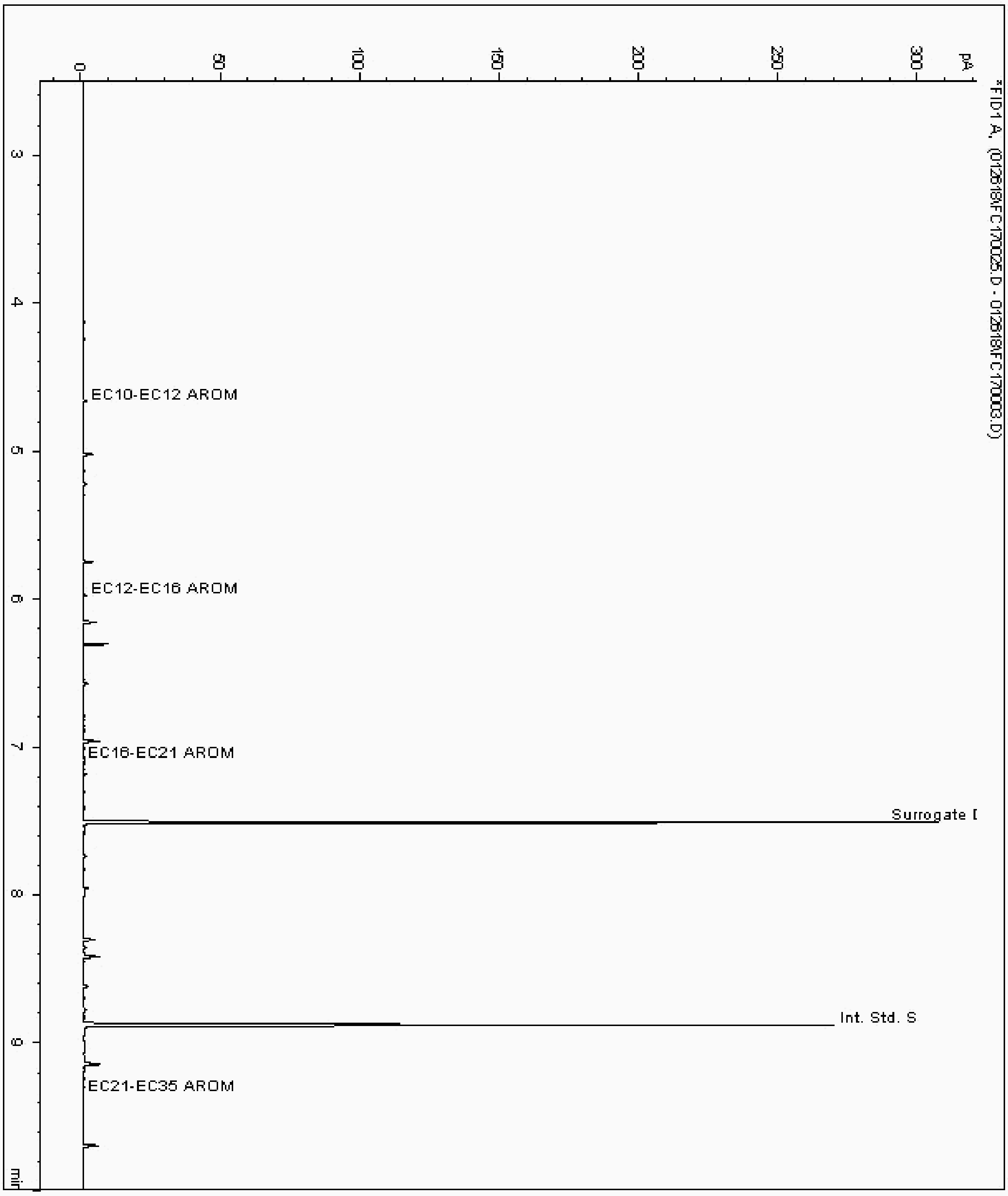
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16935760 **Depth :** 0.00 - 0.00
Sample ID : Upstream Stream

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15893024-
Date Acquired   :  27/01/2018 00:32:19 PM
Units           :  ppb
Dilution        :
CF              :  1
Multiplier      :  0.025
```

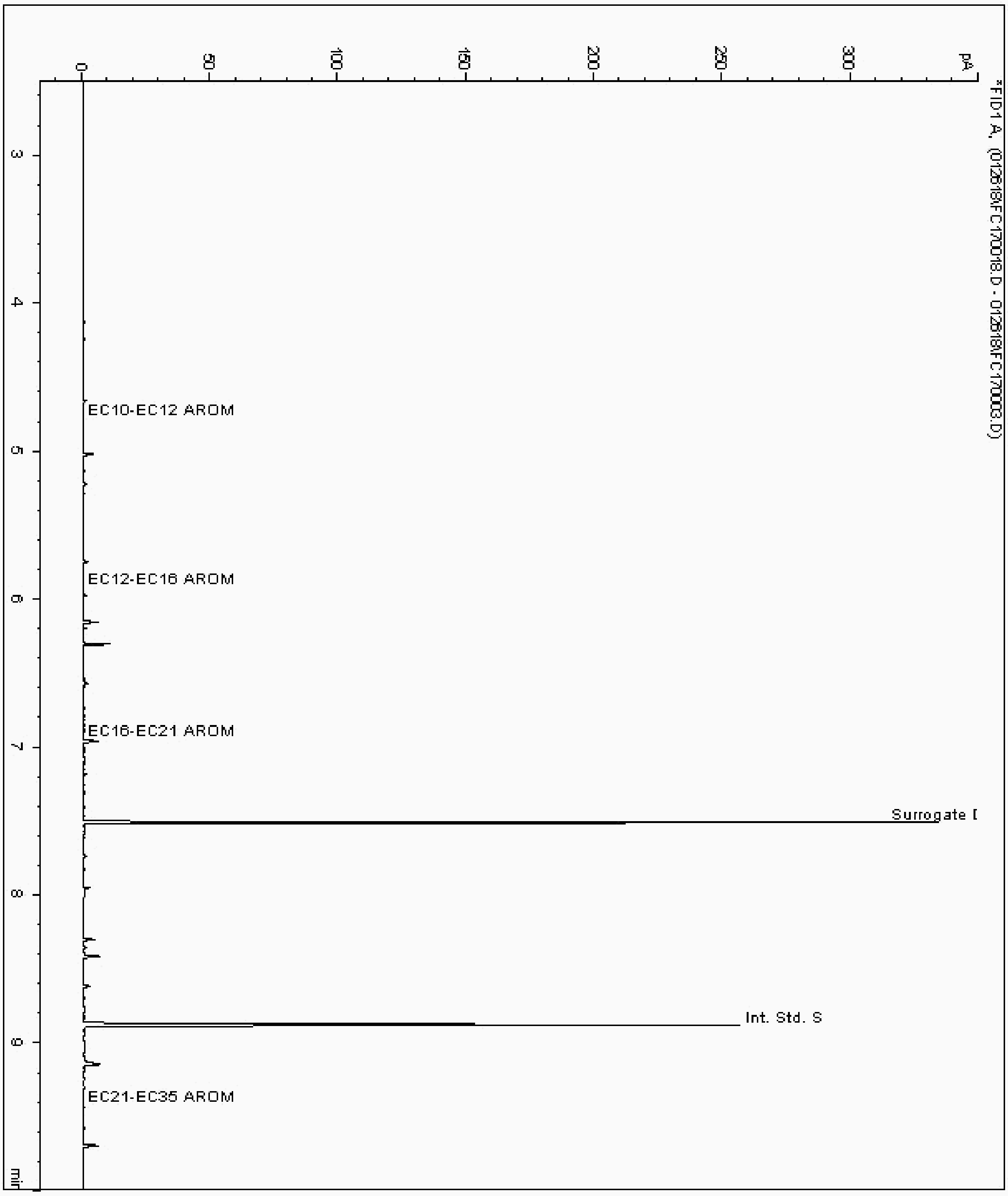


Chromatogram

Analysis:	EPH CWG (Aromatic) Aqueous GC (W)	**Sample No :**	16935764	**Depth :**	0.00 - 0.00
		Sample ID :	Downstream Stream		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15892980-
Date Acquired  :  26/01/2018 21:43:17 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



Chromatogram

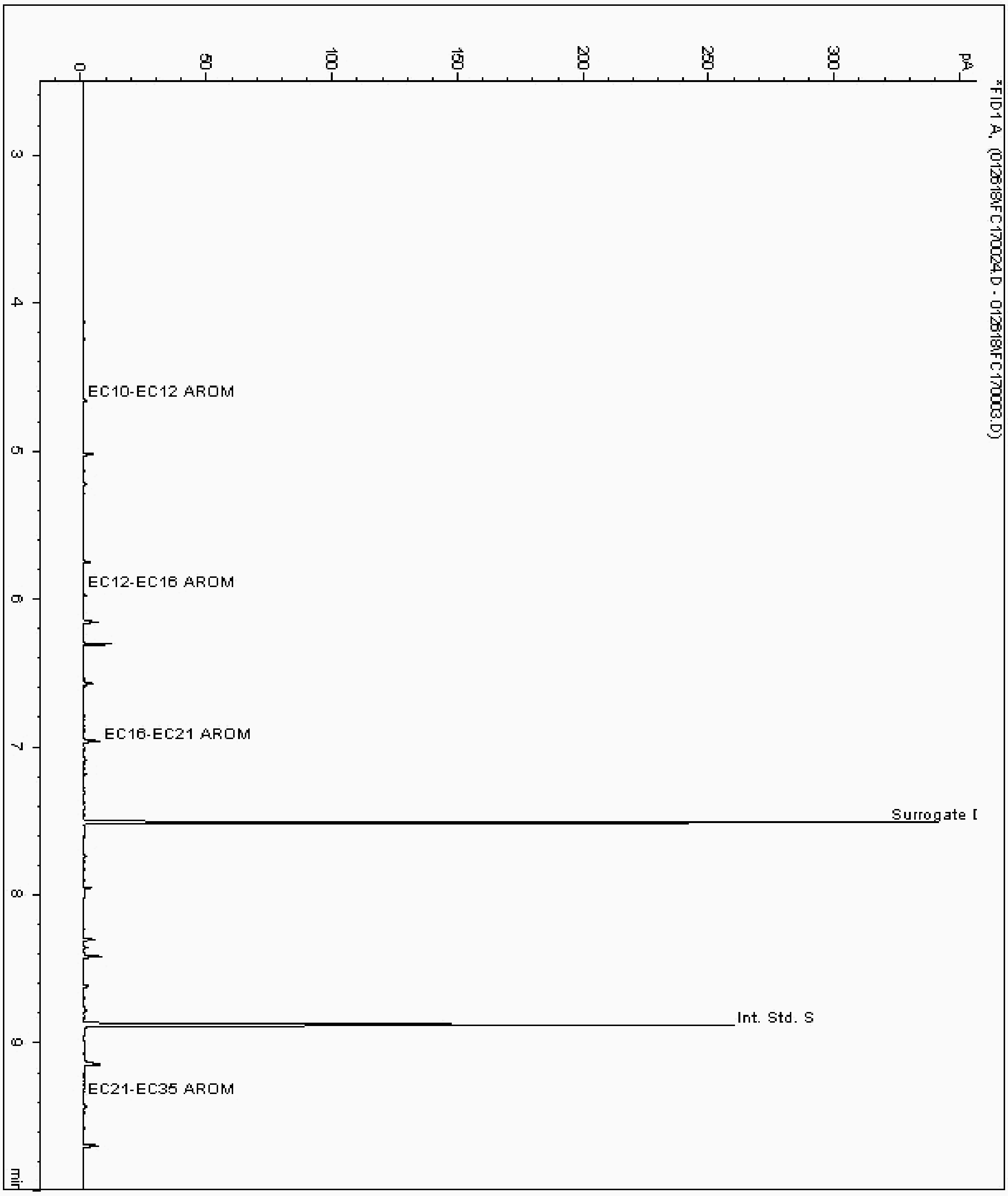
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 16935769
Sample ID : BH101

Depth : 0.00 - 0.00

```
         Speciated TPH - SATS ( C12 - C40 )

       Sample Identity:  15892951-
       Date Acquired  :  27/01/2018 00:07:59 PM
       Units          :  ppb
       Dilution       :
       CF             :  1
       Multiplier     :  0.025
```



Validated

CERTIFICATE OF ANALYSIS

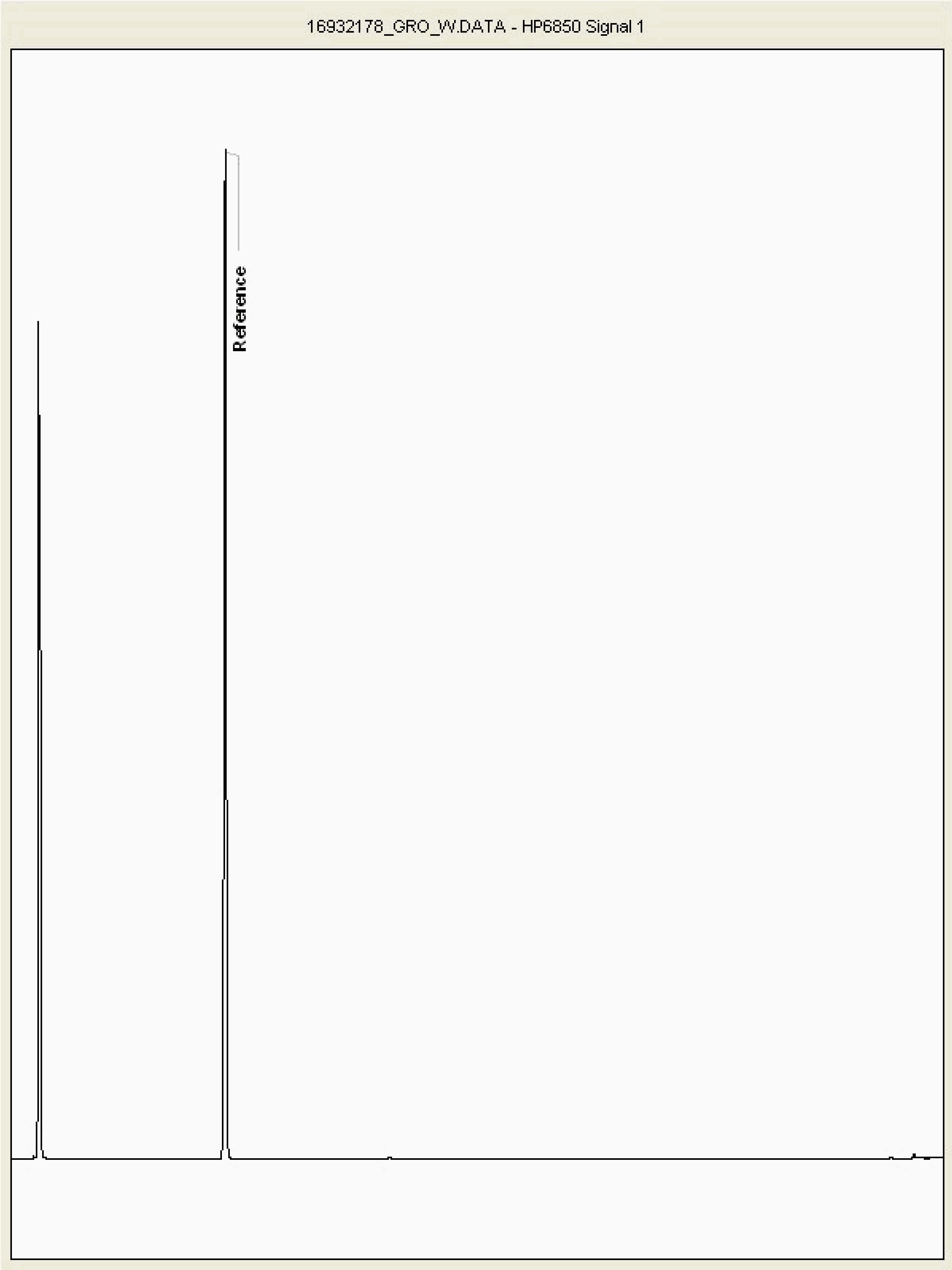
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 16932178
Sample ID : Upstream Stream

Depth : 0.00 - 0.00



Validated

CERTIFICATE OF ANALYSIS

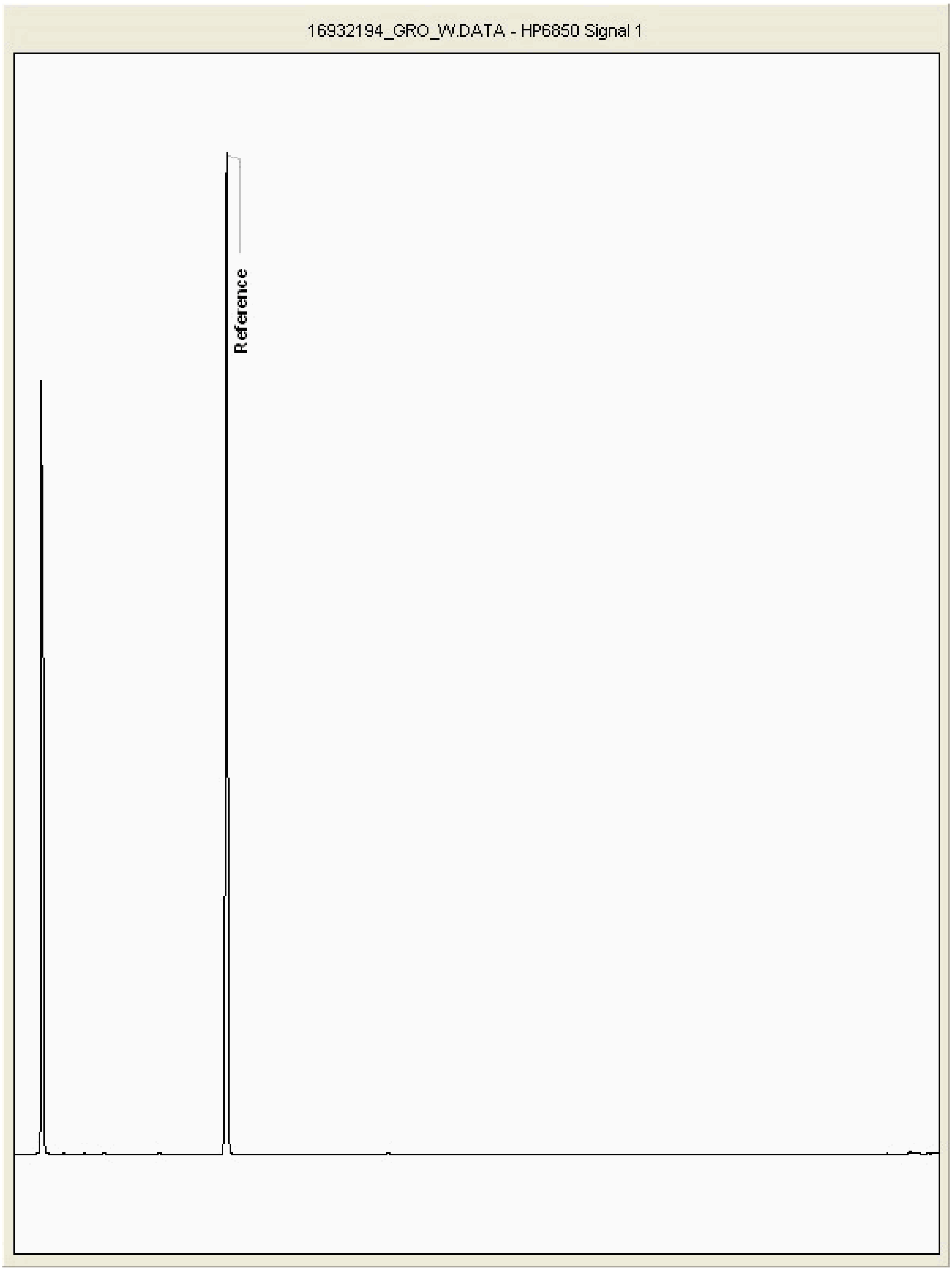
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 16932194
Sample ID : BH102

Depth : 0.00 - 0.00



Validated

CERTIFICATE OF ANALYSIS

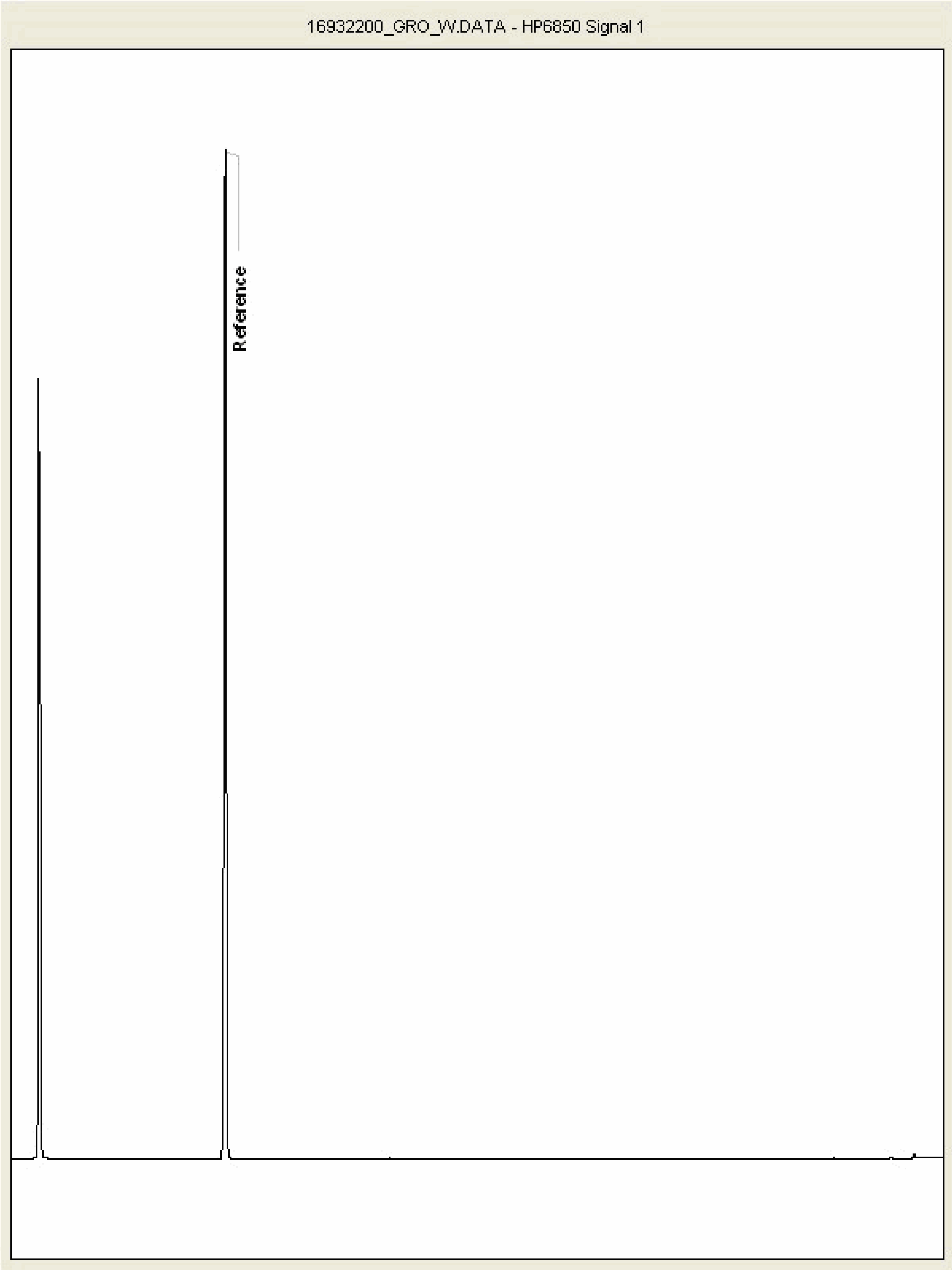
SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 16932200
Sample ID : BH103

Depth : 0.00 - 0.00



Validated

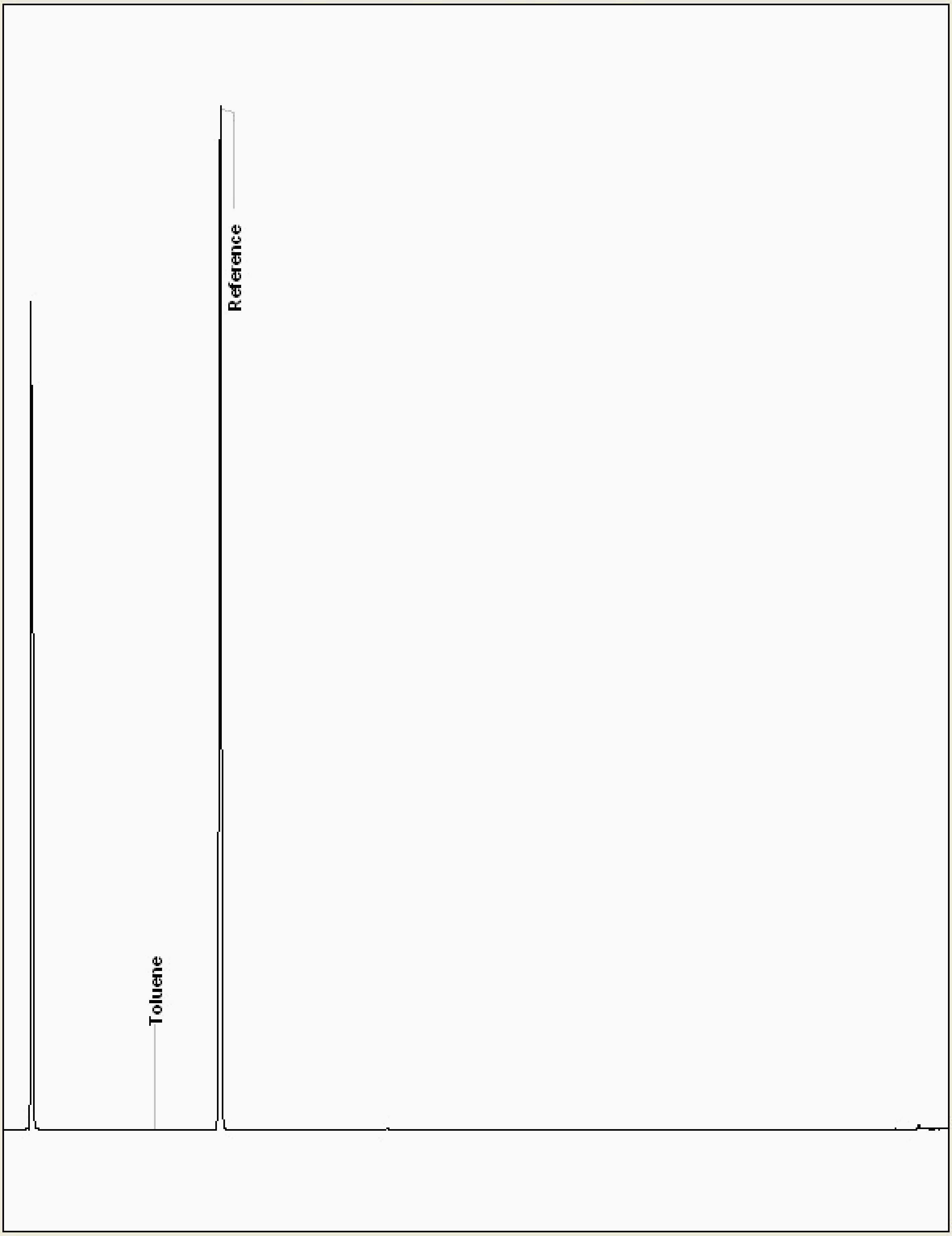
CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16932221	**Depth :**	0.00 - 0.00
		Sample ID :	BH106		

16932221_GRO_W.DATA - HP6850 Signal 1

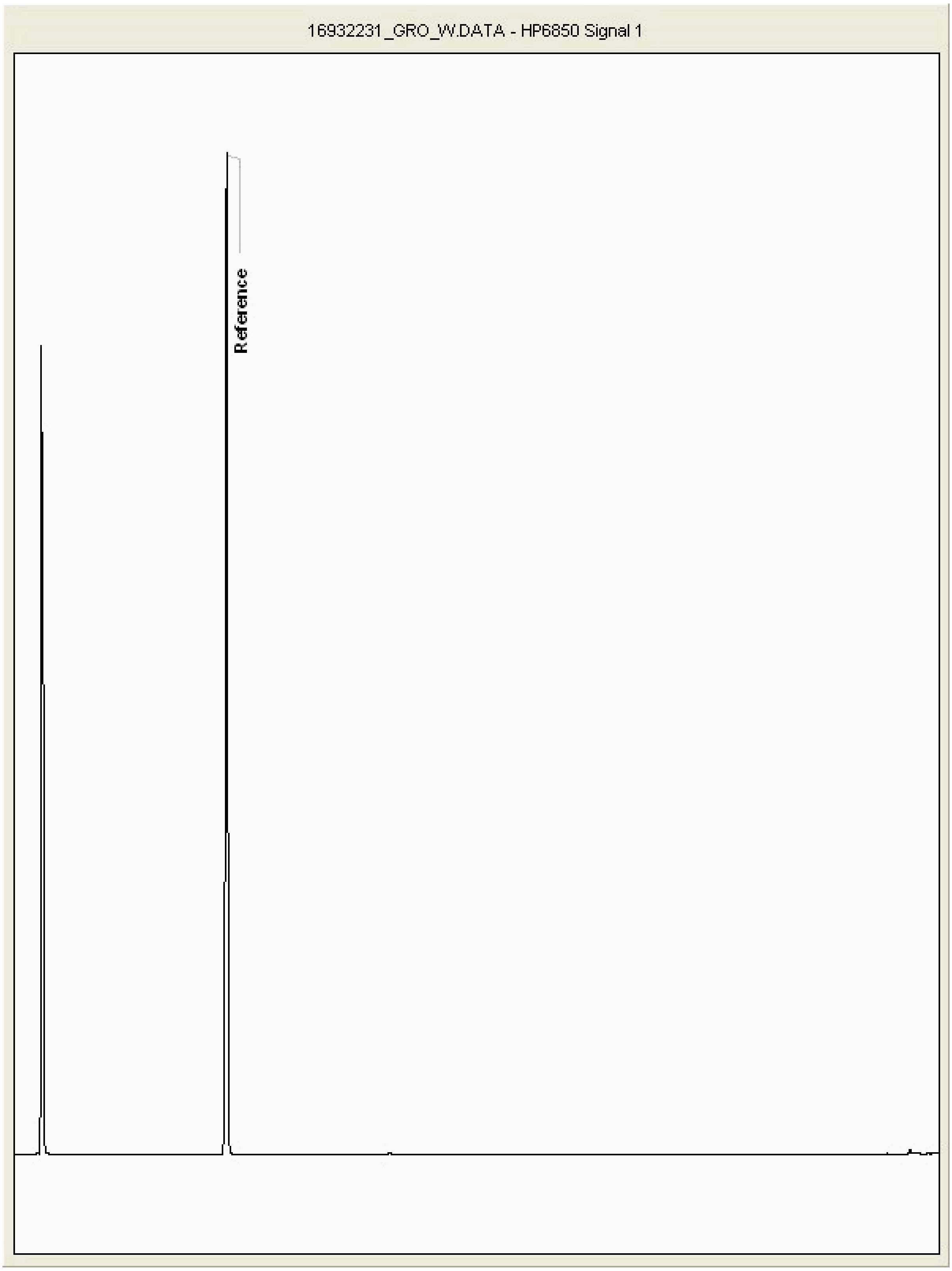


CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16932231	**Depth :**	0.00 - 0.00
		Sample ID :	BH101		

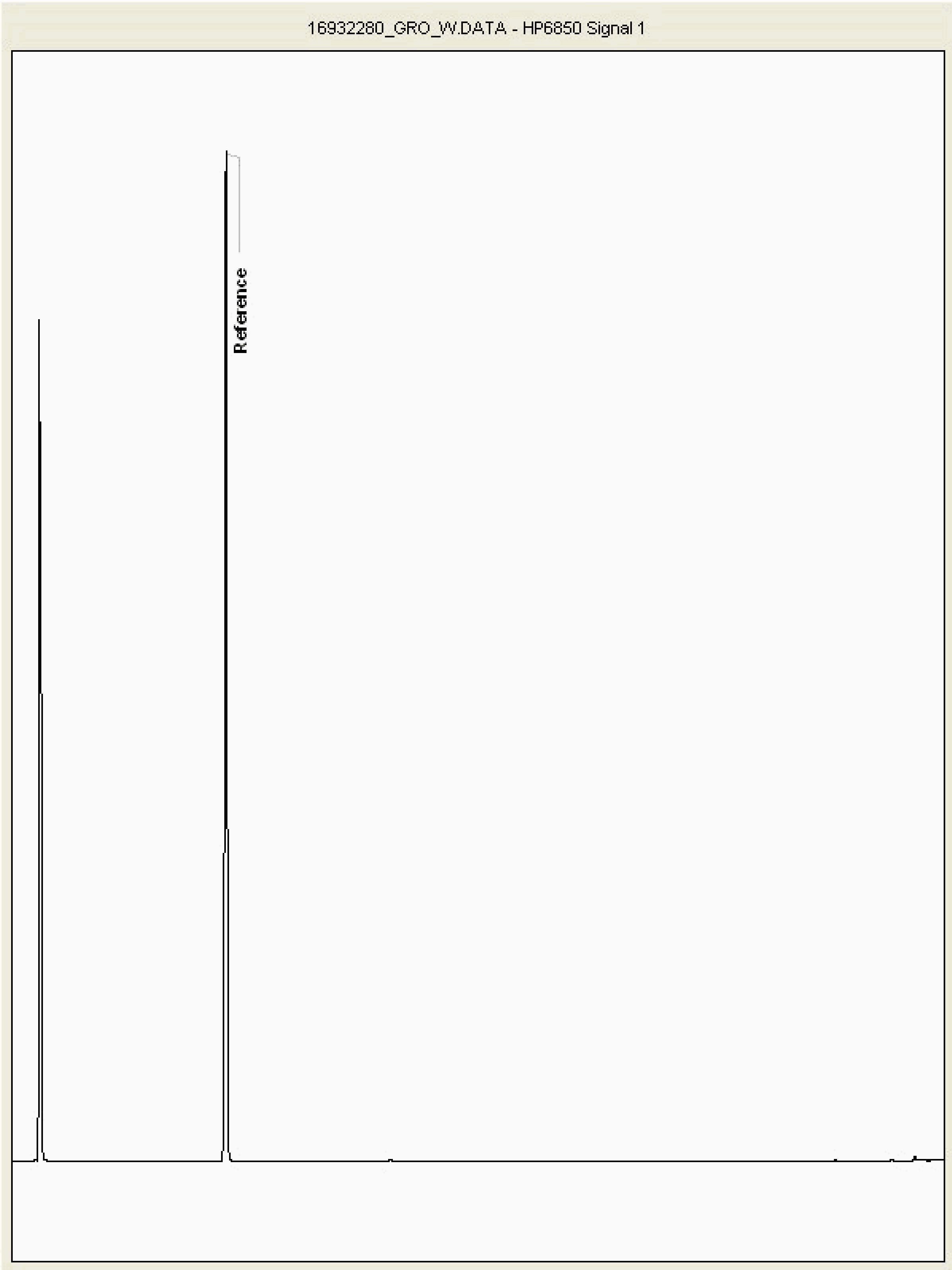


CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16932280	**Depth :**	0.00 - 0.00
		Sample ID :	Downstream Stream		



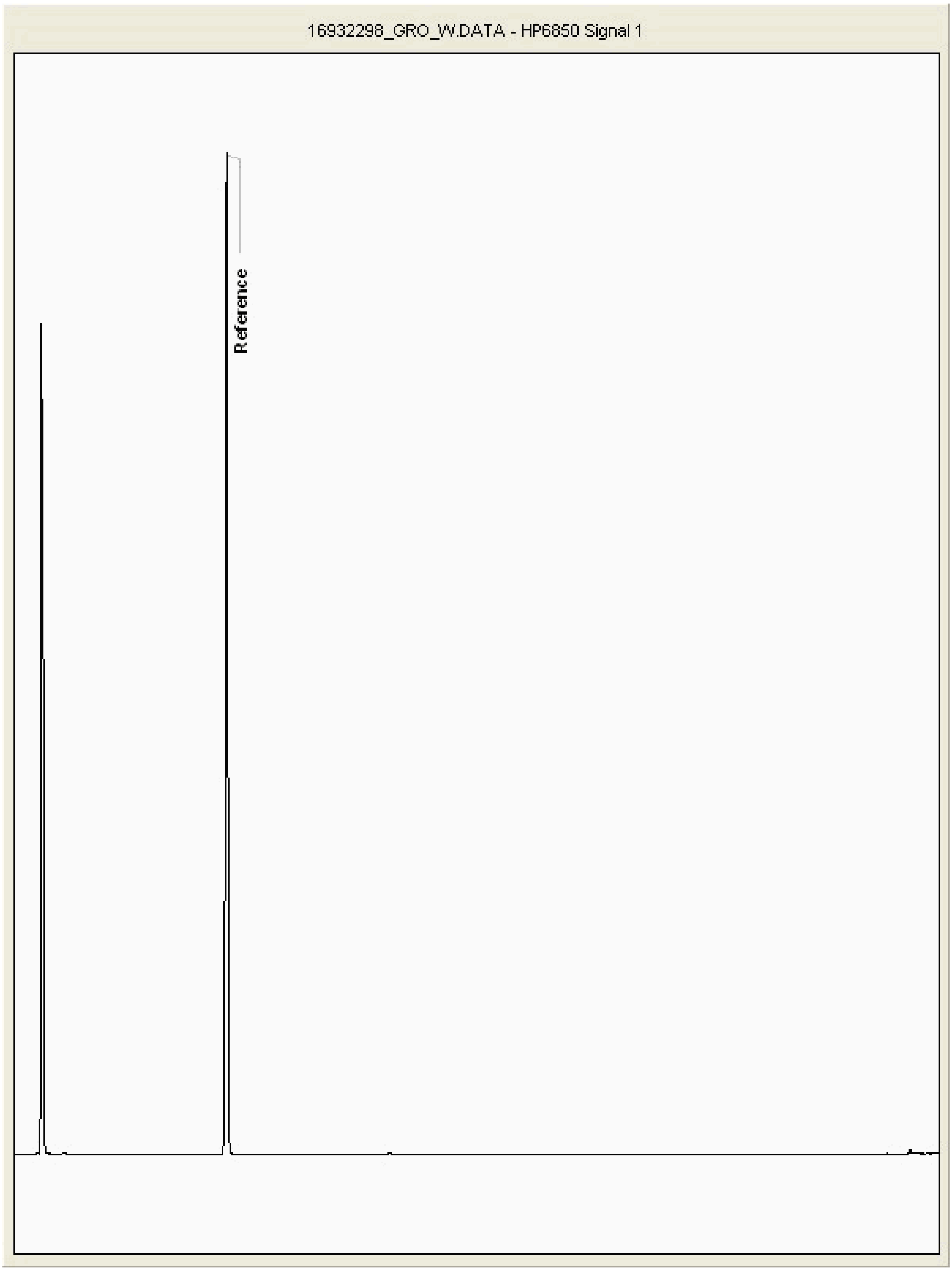
Validated

CERTIFICATE OF ANALYSIS

SDG:	180125-57	**Client Reference:**	70037512	**Report Number:**	442662
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

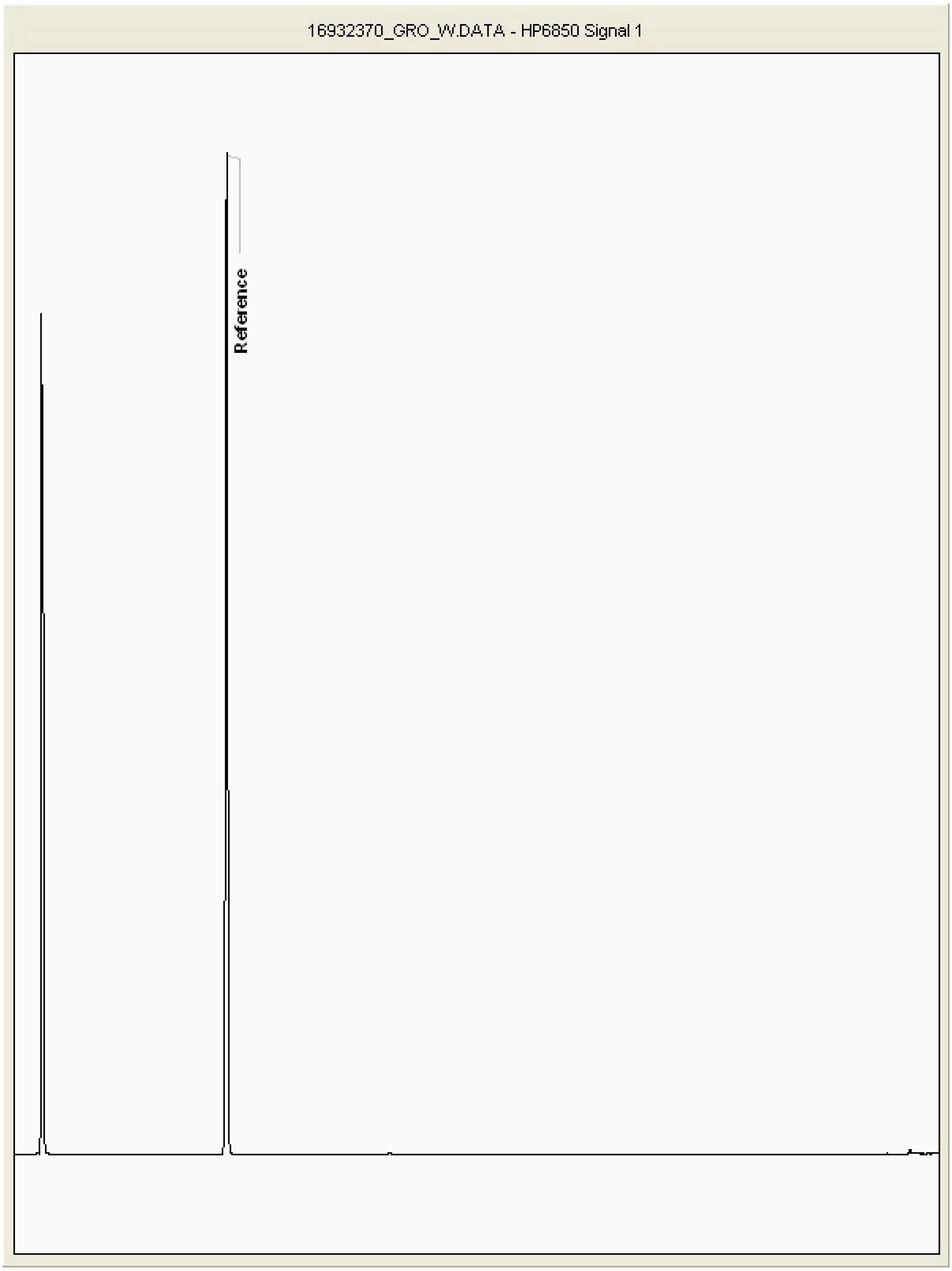
Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16932298	**Depth :**	0.00 - 0.00
		Sample ID :	BH104		



Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16932370	**Depth :**	0.00 - 0.00
		Sample ID :	BH105		



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. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 asbestos present is not determined unless specifically requested.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

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

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

21. 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.

22. 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.

23. 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.

24. **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.

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**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

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.

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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Website: www.alsenvironmental.co.uk

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

Attention: Fiona Marks

CERTIFICATE OF ANALYSIS

Date:	12 February 2018
Customer:	H_WSP_BRI
Sample Delivery Group (SDG):	180203-14
Your Reference:	70037512
Location:	Warren Crescent
Report No:	443943

We received 3 samples on Saturday February 03, 2018 and 3 of these samples were scheduled for analysis which was completed on Monday February 12, 2018. 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).

Approved By:

Sonia McWhan
Operations Manager

ilac-MRA
UKAS TESTING 1291

ALS Environmental is part of 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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16985183	Spring A	EW	0.00 - 0.00	31/01/2018
16985189	Spring B	EW	0.00 - 0.00	31/01/2018
16985195	Tufa Spring	EW	0.00 - 0.00	31/01/2018

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:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)			16985183			16985189			16985195		
Customer Sample Reference			Spring A			Spring B			Tufa Spring		
AGS Reference			EW			EW			EW		
Depth (m)			0.00 - 0.00			0.00 - 0.00			0.00 - 0.00		
Container			1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)	1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)	1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3	X			X			X		
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		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3	X			X			X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 3	X			X			X		
Dissolved Tin by ICPMS	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		
Ferrous Iron	All	NDPs: 0 Tests: 3	X			X			X		
Fluoride	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		
Manganese II	All	NDPs: 0 Tests: 3	X			X			X		
Mercury Dissolved	All	NDPs: 0 Tests: 3	X			X			X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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)			16985183			16985189			16985195		
Customer Sample Reference			Spring A			Spring B			Tufa Spring		
AGS Reference			EW			EW			EW		
Depth (m)			0.00 - 0.00			0.00 - 0.00			0.00 - 0.00		
Container			1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)	1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)	1000ml glass bottle (ALE220)	H2SO4 (ALE244)	Vial (ALE297)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 3	X			X			X		
Nitrite by Kone (w)	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		
Phenols by HPLC (W)	All	NDPs: 0 Tests: 3		X			X			X	
Phosphate by Kone (w)	All	NDPs: 0 Tests: 3	X			X			X		
Total Metals by ICP-MS	All	NDPs: 0 Tests: 3	X			X			X		
Total Nitrogen	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

CERTIFICATE OF ANALYSIS

Validated

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Spring A	Spring B	Tufa Spring			
		Customer Sample Ref.	Spring A	Spring B	Tufa Spring			
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
		Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
		Date Sampled	31/01/2018	31/01/2018	31/01/2018			
		Sampled Time	.	.	.			
		Date Received	03/02/2018	03/02/2018	03/02/2018			
		SDG Ref	180203-14	180203-14	180203-14			
		Lab Sample No.(s)	16985183	16985189	16985195			
		AGS Reference	EW	EW	EW			
Manganese II	<200 µg/l	TM005	<200 2	<200 2	<200 2			
Alkalinity, Bicarbonate as CaCO3	<2000 µg/l	TM043	340000	760000	830000			
Carbon, Organic (diss.filt)	<3000 µg/l	TM090	3350	3660	3380			
Ammoniacal Nitrogen as N	<200 µg/l	TM099	<200 #	<200 #	<200 #			
Fluoride	<500 µg/l	TM104	<500	<500	<500			
Iron, Ferrous	<100 µg/l	TM125	<100 2 #	<100 2 #	<100 2 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5	<0.5	0.546			
Barium (diss.filt)	<0.2 µg/l	TM152	13.6	10.5	26.3			
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1	<0.1	<0.1			
Boron (diss.filt)	<5 µg/l	TM152	129	114	122			
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08			
Chromium (diss.filt)	<1 µg/l	TM152	4.74	<1	<1			
Copper (diss.filt)	<0.3 µg/l	TM152	0.722	<0.3	<0.3			
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	<0.2	<0.2			
Nickel (diss.filt)	<0.4 µg/l	TM152	0.93	0.761	1.06			
Phosphorus (diss.filt)	<10 µg/l	TM152	<10	<10	<10			
Selenium (diss.filt)	<0.5 µg/l	TM152	0.843	0.731	1.03			
Vanadium (diss.filt)	<1 µg/l	TM152	<1	<1	<1			
Zinc (diss.filt)	<1 µg/l	TM152	1.55	1.47	3.29			
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 2	<0.01 2	<0.01 2			
Phosphate (Ortho as PO4)	<50 µg/l	TM184	<50 #	<50 #	<50 #			
Sulphate	<2000 µg/l	TM184	40100 #	48900 #	43300 #			
Chloride	<2000 µg/l	TM184	22600 #	25700 #	51400 #			
Nitrite as N	<15.2 µg/l	TM184	<15.2 2 #	20.1 2 #	33.8 2 #			
Phosphate (Ortho as P)	<20 µg/l	TM184	<20 #	<20 #	<20 #			
Nitrate as N	<67.7 µg/l	TM184	7370	5910	4230			
Aluminium (tot.unfilt)	<50 µg/l	TM191	648 #	884 #	71700 #			
Boron (tot.unfilt)	<135 µg/l	TM191	168 #	143 #	257 #			
Antimony (tot.unfilt)	<4 µg/l	TM191	<4	<4	<4			
Nitrogen, Total	<1000 µg/l	TM212	7460 #	5940 #	4490 #			
Chloride	<80 µg/l	TM226	20900 #	23600 #	48800 #			
Sulphate	<100 µg/l	TM226	38000 #	47700 #	43000 #			

CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Spring A	Spring B	Tufa Spring			
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled			31/01/2018	31/01/2018	31/01/2018			
Sampled Time			.	.	.			
Date Received			03/02/2018	03/02/2018	03/02/2018			
SDG Ref			180203-14	180203-14	180203-14			
Lab Sample No.(s)			16985183	16985189	16985195			
AGS Reference			EW	EW	EW			
Calcium (diss.filt)	<12 µg/l	TM228	120000 2 #	109000 2 #	126000 2 #			
Sodium (diss.filt)	<76 µg/l	TM228	18000 2 #	23700 2 #	28200 2 #			
Magnesium (diss.filt)	<36 µg/l	TM228	2280 2 #	1600 2 #	1950 2 #			
Potassium (diss.filt)	<1000 µg/l	TM228	1400 2 #	1360 2 #	3480 2 #			
Hardness, Total as CaCO3	<1000 µg/l	TM228	309000 #	279000 #	323000 #			
Chromium, Hexavalent	<30 µg/l	TM241	<30	<30	<30			
pH	<1 pH Units	TM256	7.87 #	7.61 #	7.3 #			
Phenol	<2 µg/l	TM259	<2	<2	<2			
Tin(diss.filt)	<0.36 µg/l	TM283	<0.36	<0.36	<0.36			

CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Spring A	Spring B	Tufa Spring			
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled			31/01/2018	31/01/2018	31/01/2018			
Sampled Time			.	.	.			
Date Received			03/02/2018	03/02/2018	03/02/2018			
SDG Ref			180203-14	180203-14	180203-14			
Lab Sample No.(s)			16985183	16985189	16985195			
AGS Reference			EW	EW	EW			
Naphthalene (aq)	<0.01 µg/l	TM178	0.0186	0.0105	0.188			
Acenaphthene (aq)	<0.005 µg/l	TM178	0.00533	<0.005	0.0751			
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0485			
Fluoranthene (aq)	<0.005 µg/l	TM178	0.0282	0.122	1.52			
Anthracene (aq)	<0.005 µg/l	TM178	0.00626	<0.005	0.0999			
Phenanthrene (aq)	<0.005 µg/l	TM178	0.0551	0.0462	0.673			
Fluorene (aq)	<0.005 µg/l	TM178	0.0165	<0.005	0.227			
Chrysene (aq)	<0.005 µg/l	TM178	0.0251	0.0854	0.7			
Pyrene (aq)	<0.005 µg/l	TM178	0.0537	0.113	1.64			
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	0.0252	0.0627	0.883			
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	0.033	0.0825	1.27			
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	0.0108	0.0433	0.55			
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	0.0132	0.0449	0.933			
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0971			
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005	0.0688	0.648			
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005	0.0303	0.876			
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	0.291	0.71	10.4			

Validated

CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Spring A	Spring B	Tufa Spring			
Customer Sample Ref.			Spring A	Spring B	Tufa Spring			
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled			31/01/2018	31/01/2018	31/01/2018			
Sampled Time			.	.	.			
Date Received			03/02/2018	03/02/2018	03/02/2018			
SDG Ref			180203-14	180203-14	180203-14			
Lab Sample No.(s)			16985183	16985189	16985195			
AGS Reference			EW	EW	EW			
GRO Surrogate % recovery**	%	TM245	100	91	98			
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	43			
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	<10	55			
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<10	<10	101			
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<10	<10	199			
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	63			
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10	73			
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10	176			
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10	312			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	<10	<10	511			
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	<10	<10	156			
Aromatics >EC16-EC35 (aq)	<10 µg/l	TM174	<10	<10	249			

08:49:19 12/02/2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Customer Sample Ref.	Spring A	Spring B	Tufa Spring			
Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled	31/01/2018	31/01/2018	31/01/2018			
Sampled Time	.	.	.			
Date Received	03/02/2018	03/02/2018	03/02/2018			
SDG Ref	180203-14	180203-14	180203-14			
Lab Sample No.(s)	16985183	16985189	16985195			
AGS Reference	EW	EW	EW			

Component	LOD/Units	Method	Spring A	Spring B	Tufa Spring			
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
TM005	.	Manganese II by spectrophotometer
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM125	DIN 38405 D17	Determination of Total/Ferrous Iron
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
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM226	In-House Method	Determination of Anions in Waters using Ion Chromatography
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
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
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
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM283		Determination of Dissolved Niobium, Tungsten, and Zirconium in Water Matrices by ICP-MS

NA = not applicable.

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

Test Completion Dates

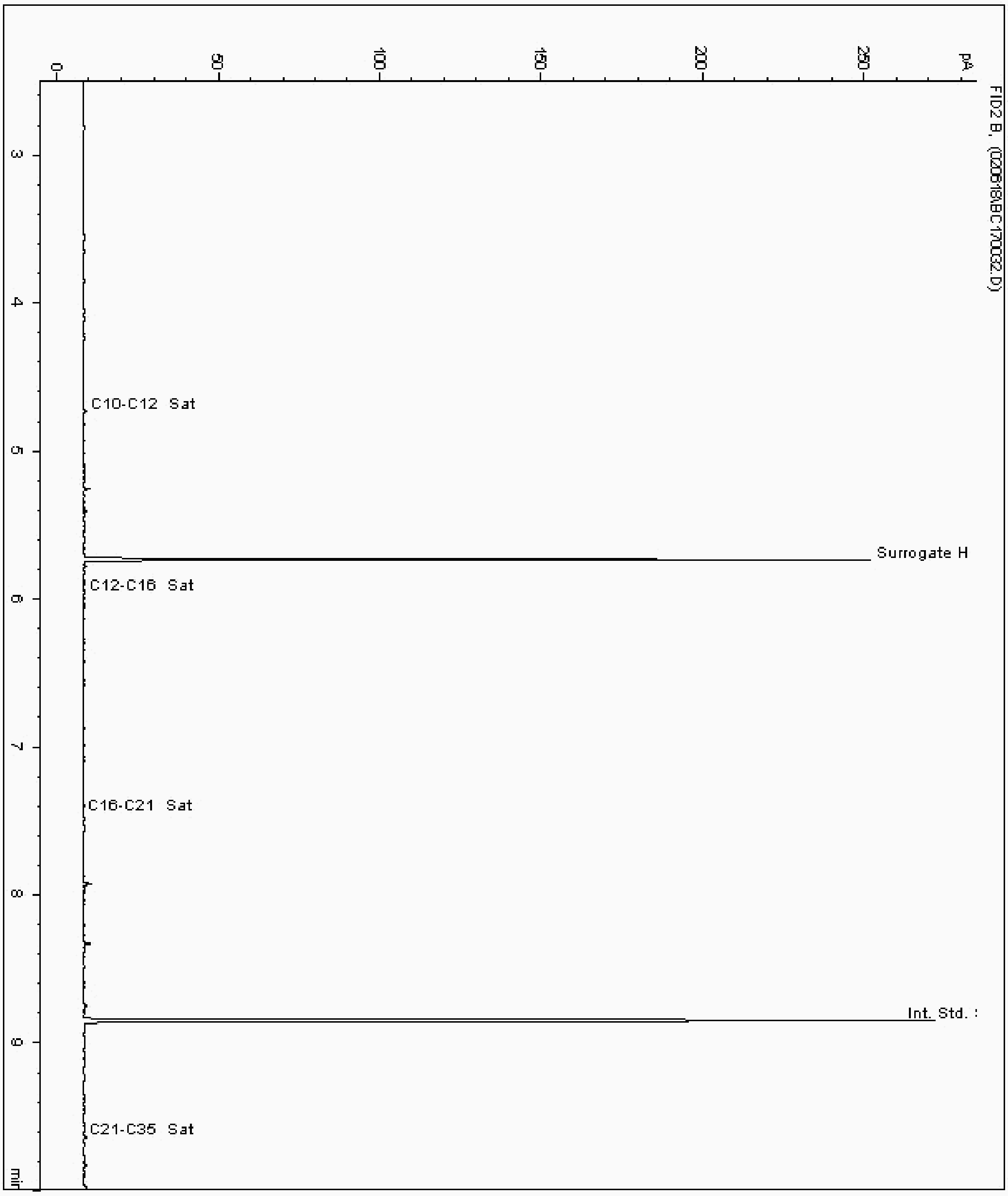
Lab Sample No(s)	16985183	16985189	16985195
Customer Sample Ref.	Spring A	Spring B	Tufa Spring
AGS Ref.	EW	EW	EW
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water
Alkalinity as CaCO3	09-Feb-2018	09-Feb-2018	09-Feb-2018
Ammoniacal Nitrogen	08-Feb-2018	08-Feb-2018	08-Feb-2018
Anions by ion Chromatography	06-Feb-2018	06-Feb-2018	05-Feb-2018
Anions by Kone (w)	09-Feb-2018	09-Feb-2018	09-Feb-2018
Dissolved Metals by ICP-MS	08-Feb-2018	08-Feb-2018	08-Feb-2018
Dissolved Organic/Inorganic Carbon	06-Feb-2018	06-Feb-2018	06-Feb-2018
Dissolved Tin by ICPMS	06-Feb-2018	06-Feb-2018	06-Feb-2018
EPH CWG (Aliphatic) Aqueous GC (W)	08-Feb-2018	07-Feb-2018	08-Feb-2018
EPH CWG (Aromatic) Aqueous GC (W)	08-Feb-2018	07-Feb-2018	08-Feb-2018
Ferrous Iron	06-Feb-2018	06-Feb-2018	06-Feb-2018
Fluoride	09-Feb-2018	09-Feb-2018	09-Feb-2018
GRO by GC-FID (W)	07-Feb-2018	07-Feb-2018	07-Feb-2018
Hexavalent Chromium (w)	09-Feb-2018	09-Feb-2018	09-Feb-2018
Manganese II	12-Feb-2018	12-Feb-2018	12-Feb-2018
Mercury Dissolved	06-Feb-2018	06-Feb-2018	06-Feb-2018
Metals by iCap-OES Dissolved (W)	11-Feb-2018	11-Feb-2018	11-Feb-2018
Nitrite by Kone (w)	07-Feb-2018	07-Feb-2018	07-Feb-2018
PAH Spec MS - Aqueous (W)	07-Feb-2018	06-Feb-2018	07-Feb-2018
pH Value	05-Feb-2018	05-Feb-2018	05-Feb-2018
Phenols by HPLC (W)	07-Feb-2018	07-Feb-2018	07-Feb-2018
Phosphate by Kone (w)	07-Feb-2018	07-Feb-2018	07-Feb-2018
Total Metals by ICP-MS	07-Feb-2018	07-Feb-2018	09-Feb-2018
Total Nitrogen	07-Feb-2018	07-Feb-2018	07-Feb-2018
TPH CWG (W)	08-Feb-2018	07-Feb-2018	08-Feb-2018
VOC MS (W)	06-Feb-2018	06-Feb-2018	06-Feb-2018

Chromatogram

Analysis:	EPH CWG (Aliphatic) Aqueous GC (W)	**Sample No :**	16985621	**Depth :**	0.00 - 0.00
		Sample ID :	Spring B		

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15940477-
Date Acquired  :  07/02/2018 03:07:18 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

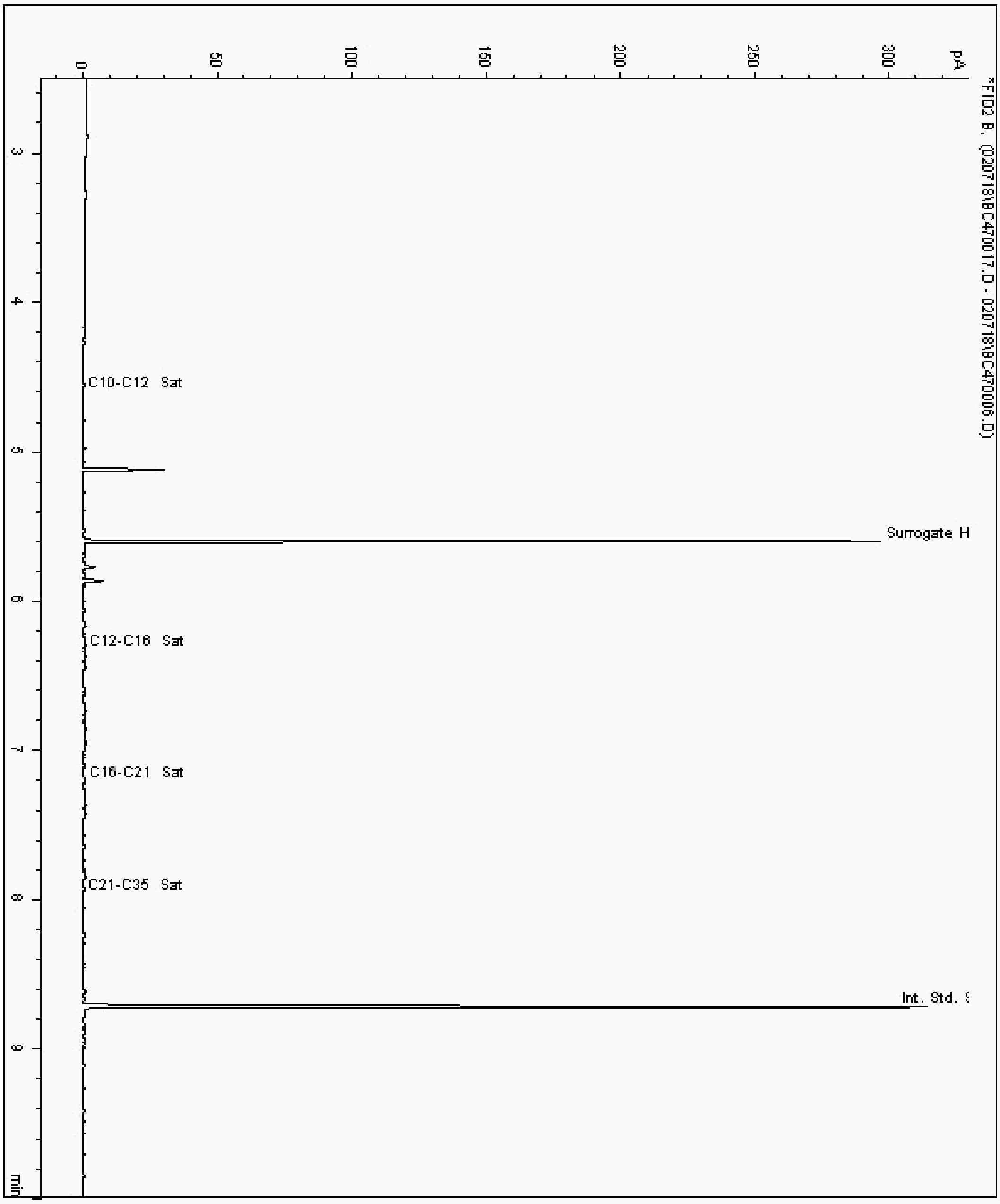
Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

Sample No : 16986065
Sample ID : Spring A

Depth : 0.00 - 0.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15940426-
Date Acquired : 07/02/18 20:15:48 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025

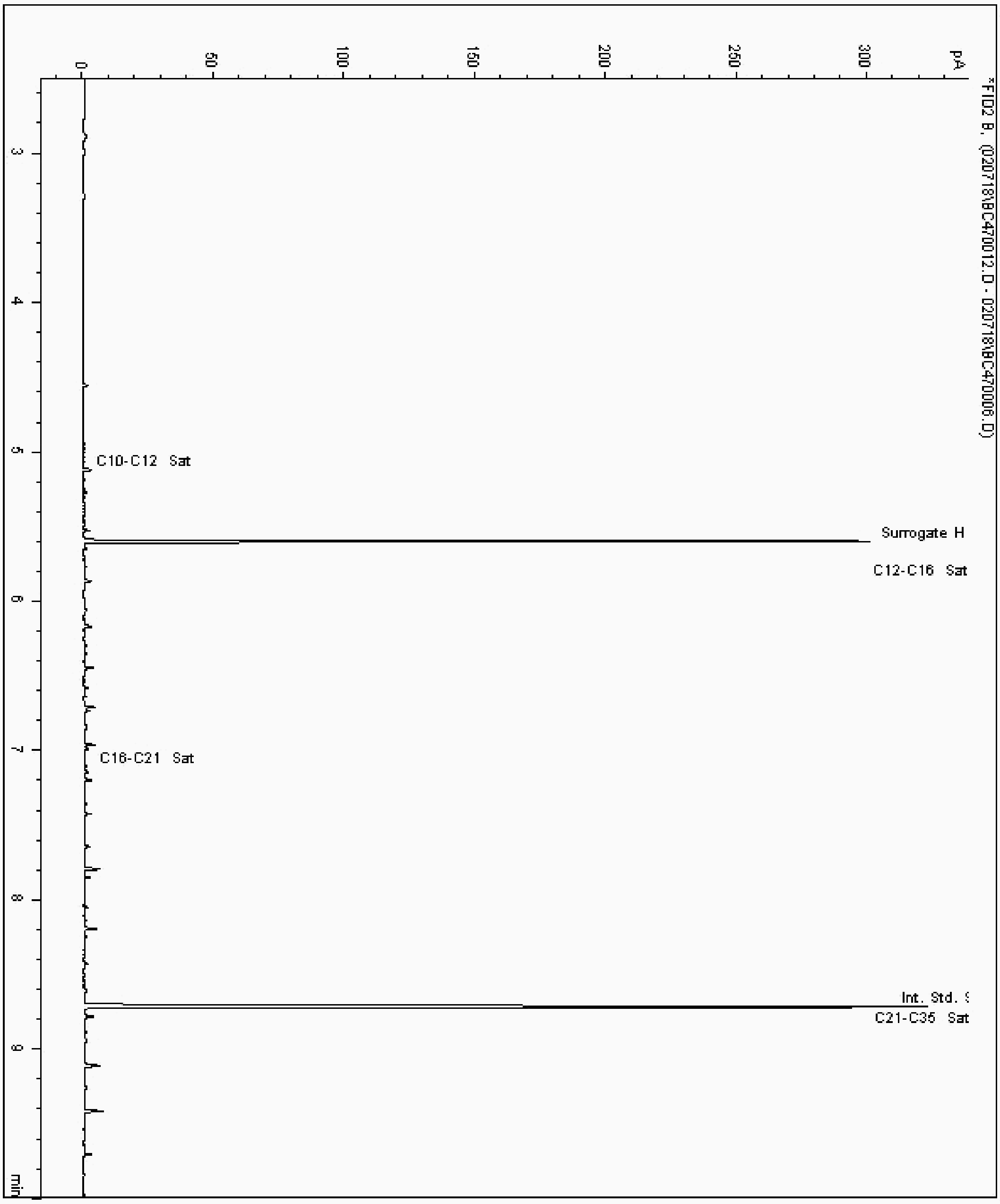


Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W) **Sample No :** 16986140 **Depth :** 0.00 - 0.00
Sample ID : Tufa Spring

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity:  15940532-
Date Acquired  :  07/02/18 18:46:38 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



Validated

CERTIFICATE OF ANALYSIS

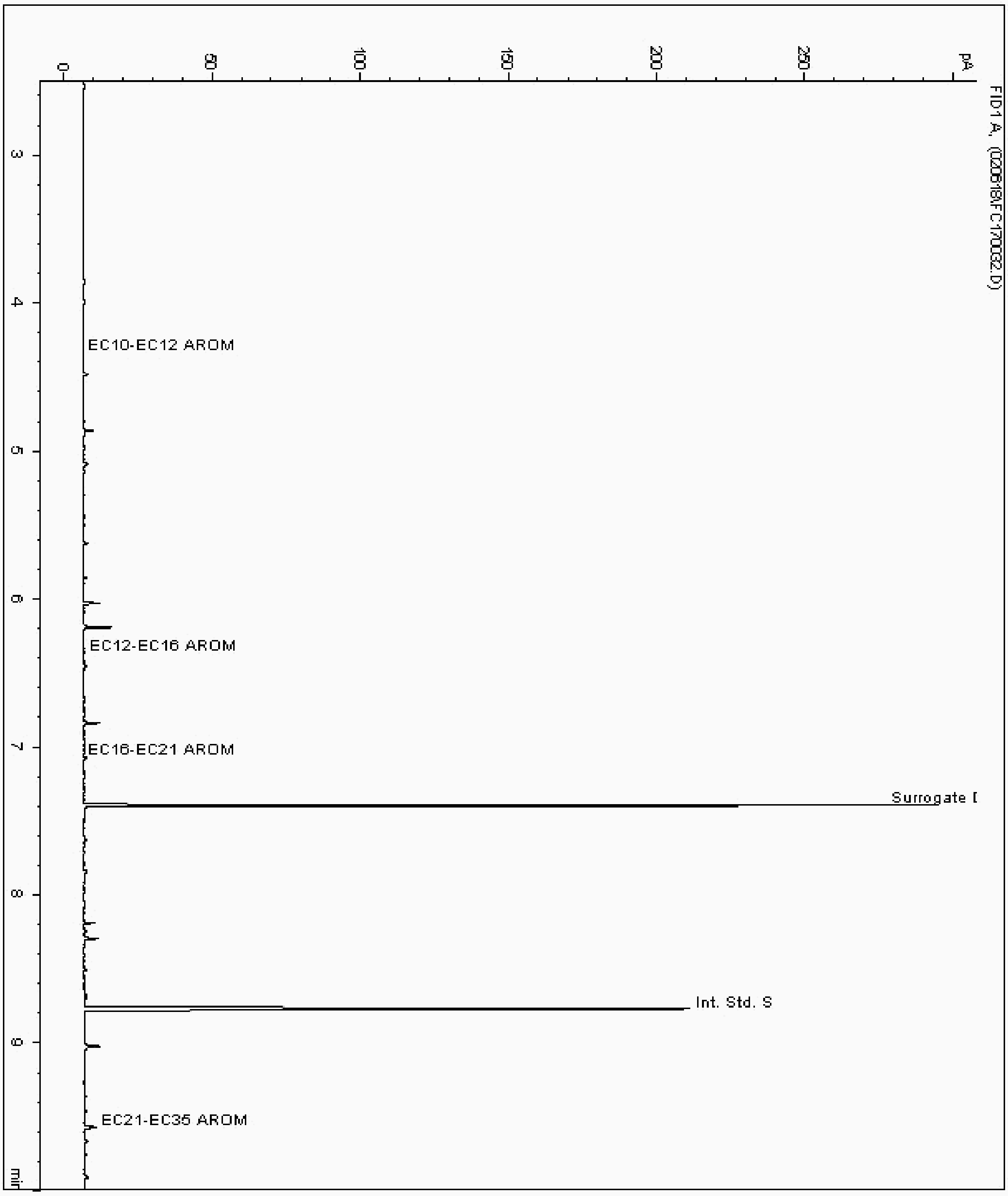
SDG:	180203-14	Client Reference:	70037512	Report Number:	443943
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16985621 **Depth :** 0.00 - 0.00
Sample ID : Spring B

```
Speciated TPH - SATS ( C12 - C40 )

Sample Identity: 15940478-
Date Acquired  :  07/02/2018 03:07:18 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```

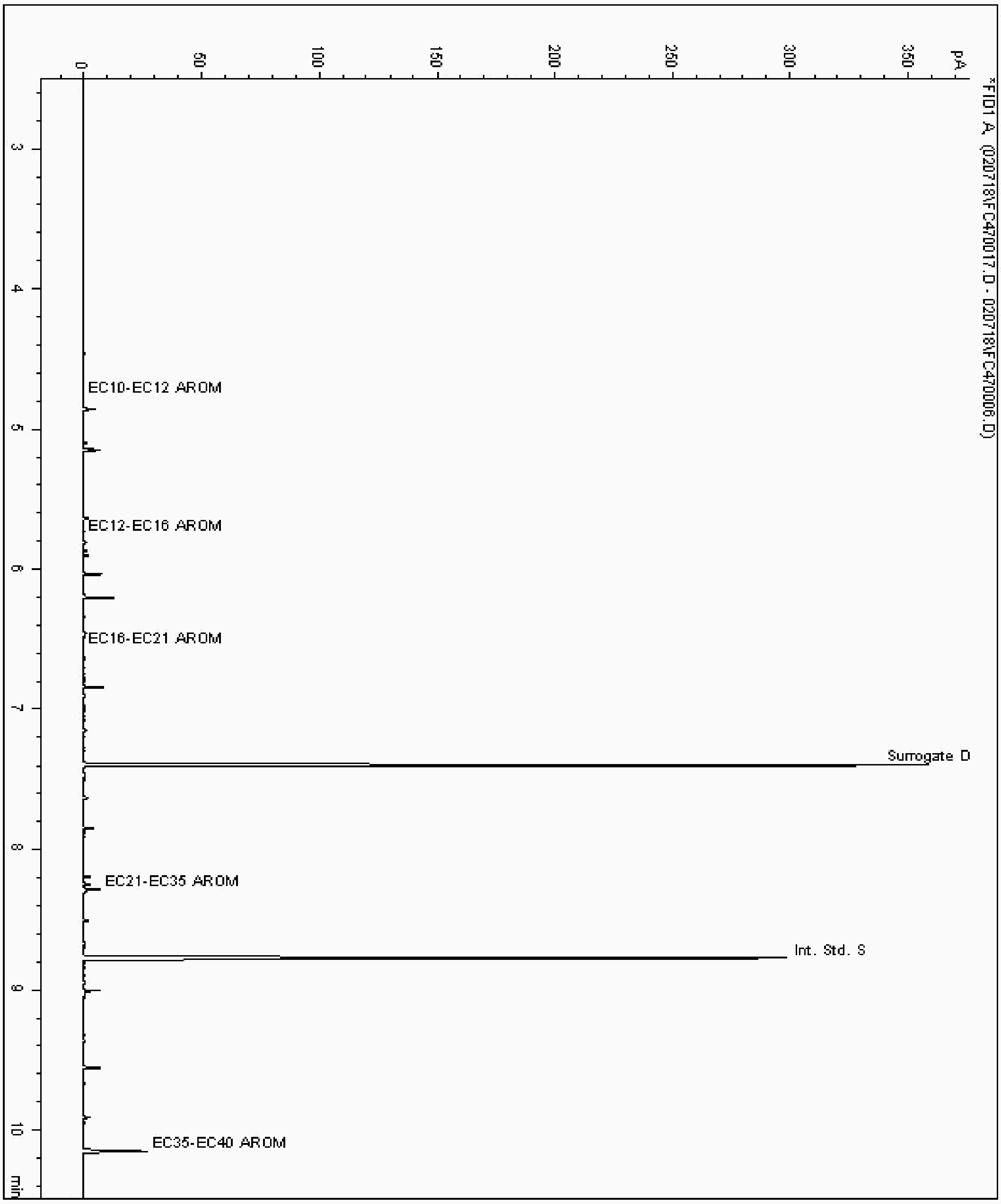


Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W) **Sample No :** 16986065 **Depth :** 0.00 - 0.00
Sample ID : Spring A

```
Speciated TPH - AROM ( C12 - C40 )

Sample Identity:  15940427-
Date Acquired  :  07/02/18 20:15:48 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```



Validated

CERTIFICATE OF ANALYSIS

SDG:	180203-14	Client Reference:	70037512	Report Number:	443943
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W)

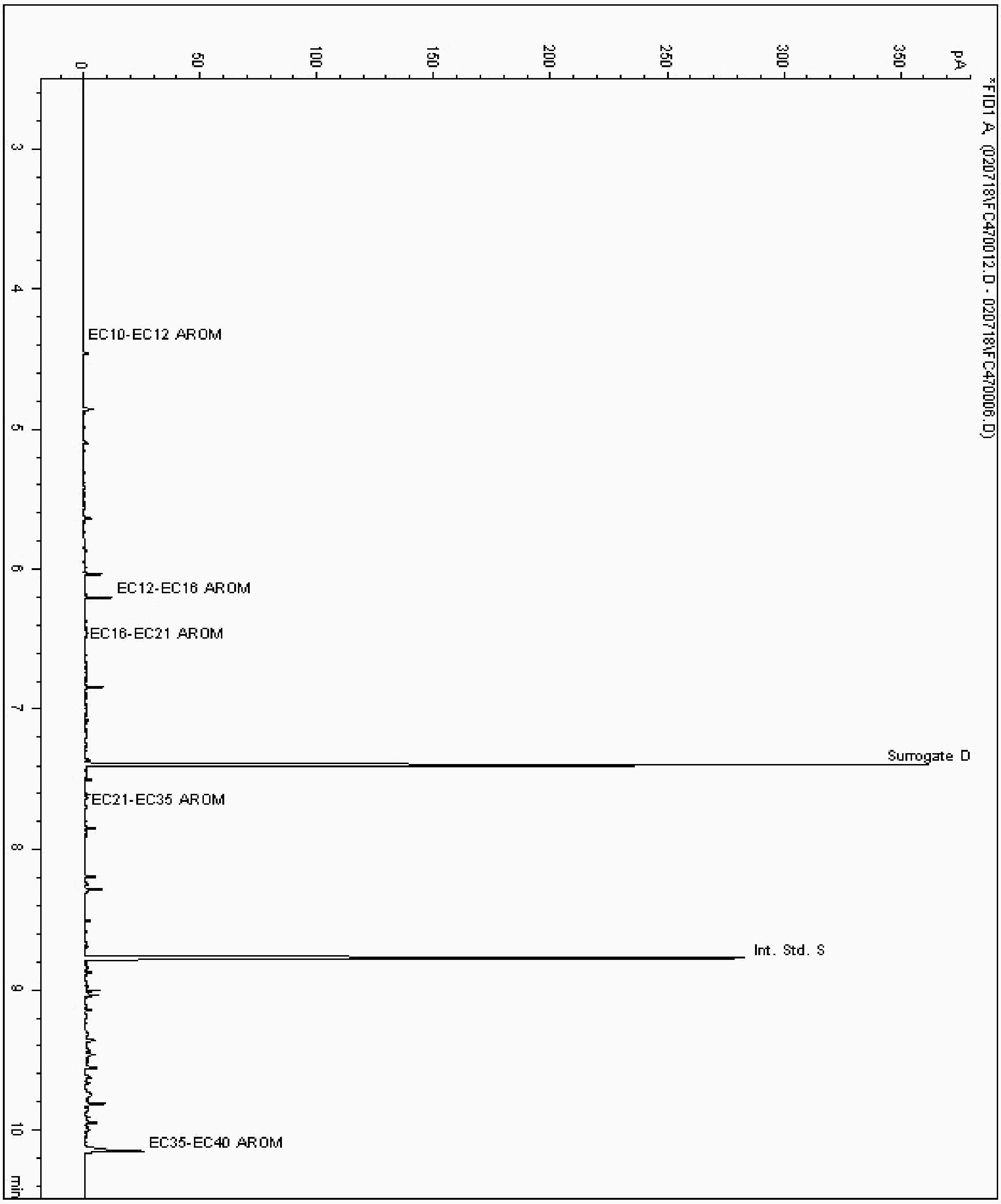
Sample No : 16986140

Sample ID : Tufa Spring

Depth : 0.00 - 0.00

Speciated TPH - AROM (C12 - C40)

```
Sample Identity:  15940533-
Date Acquired  :  07/02/18 18:46:38 PM
Units          :  ppb
Dilution       :
CF             :  1
Multiplier     :  0.025
```

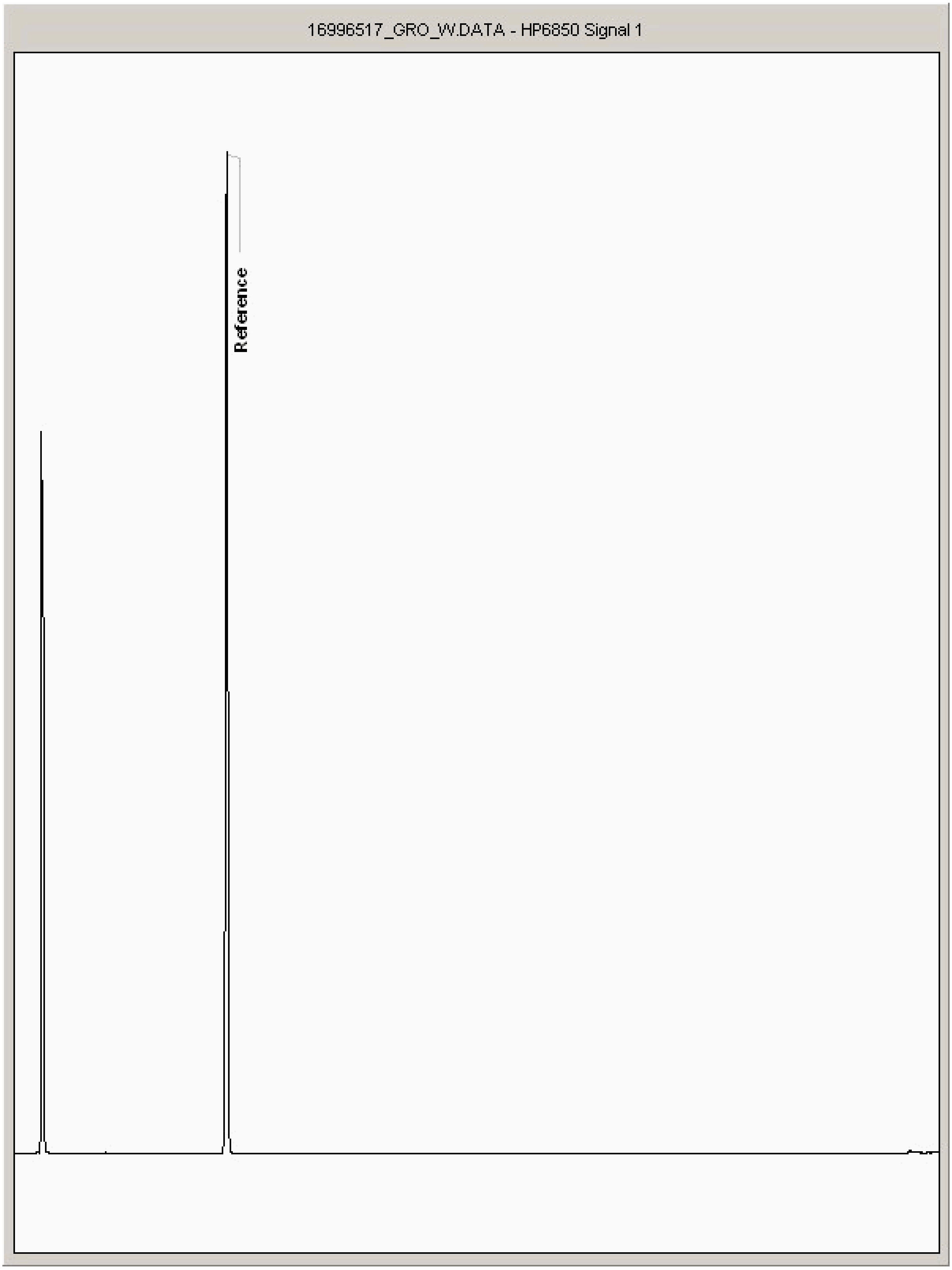


Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 16996517
Sample ID : Spring A

Depth : 0.00 - 0.00

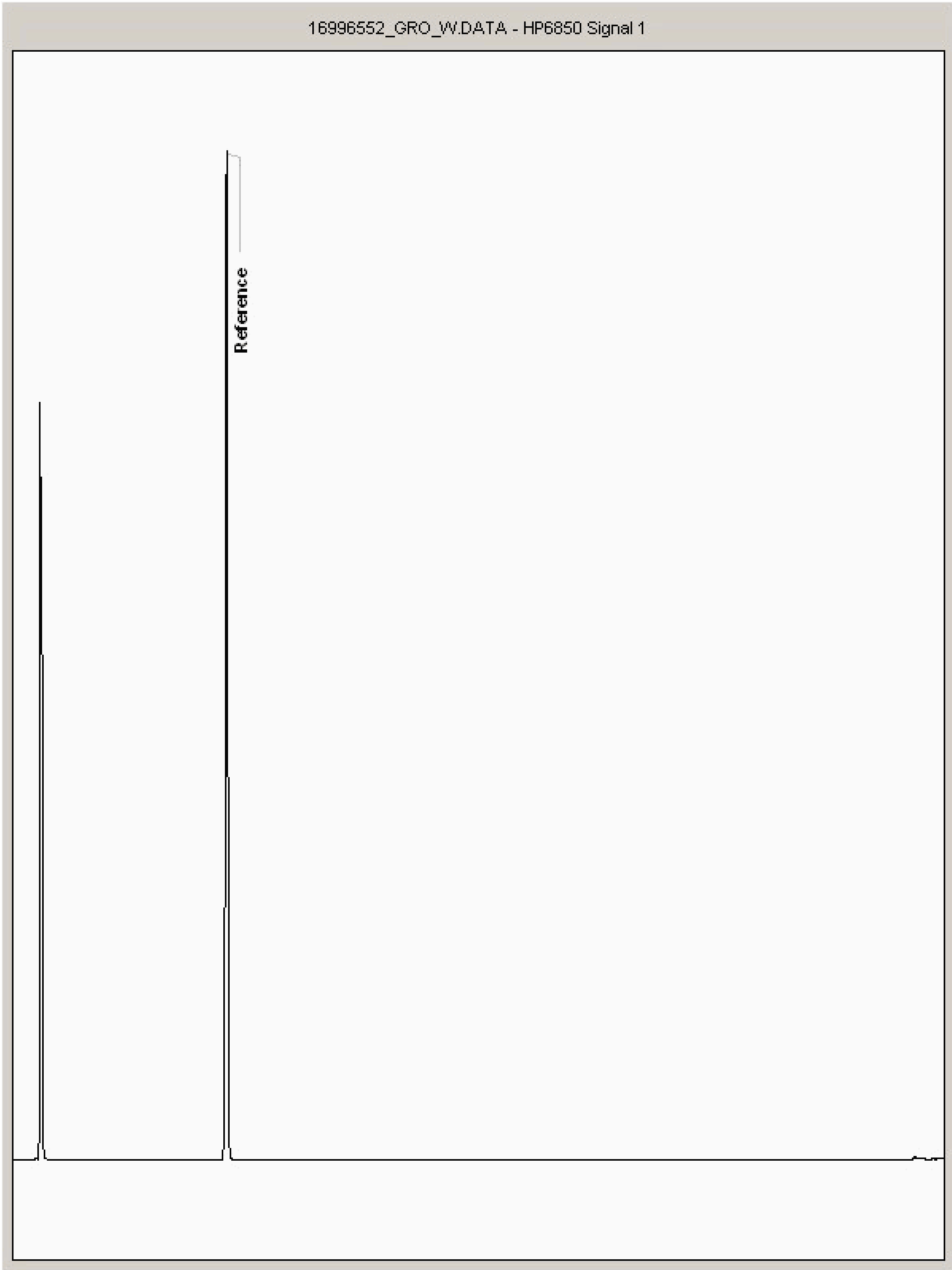


CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16996552	**Depth :**	0.00 - 0.00
		Sample ID :	Tufa Spring		



Validated

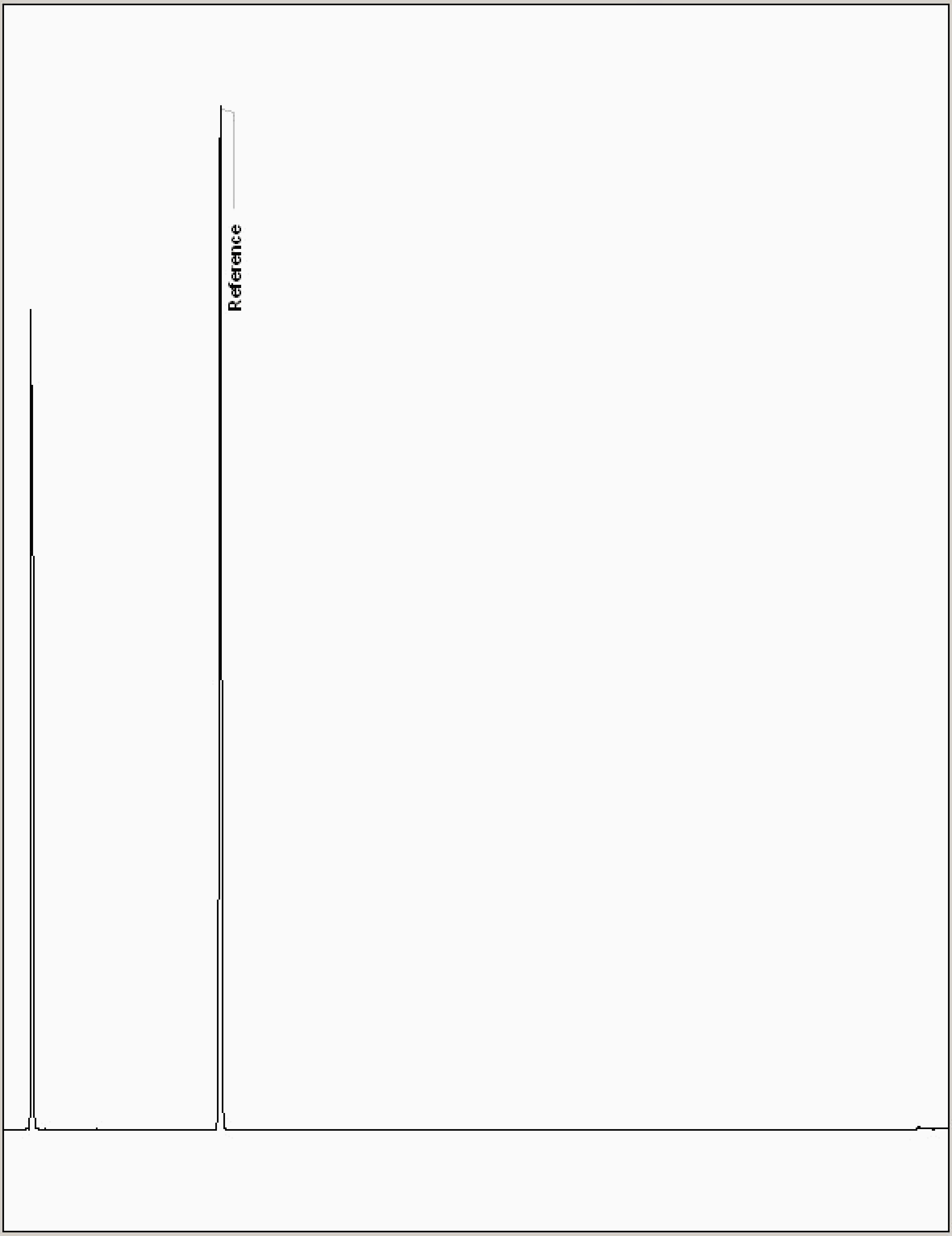
CERTIFICATE OF ANALYSIS

SDG:	180203-14	**Client Reference:**	70037512	**Report Number:**	443943
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	

Chromatogram

Analysis:	GRO by GC-FID (W)	**Sample No :**	16996598	**Depth :**	0.00 - 0.00
		Sample ID :	Spring B		

16996598_GRO_W.DATA - HP6850 Signal 1



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. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 asbestos present is not determined unless specifically requested.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

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

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

21. 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.

22. 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.

23. 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.

24. **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.

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**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

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.

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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Hawarden
Deeside
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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: Fiona Marks

CERTIFICATE OF ANALYSIS

Date:	06 April 2018
Customer:	H_WSP_BRI
Sample Delivery Group (SDG):	180323-103
Your Reference:	70037512
Location:	Warren Crescent
Report No:	450637

This report has been revised and directly supersedes 450612 in its entirety.

We received 11 samples on Friday March 23, 2018 and 10 of these samples were scheduled for analysis which was completed on Friday April 06, 2018. 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).

Approved By:

Sonia McWhan
Operations Manager

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17261597	BH101	EW	0.00 - 0.00	22/03/2018
17261606	BH102	EW	0.00 - 0.00	22/03/2018
17261612	BH103	EW	0.00 - 0.00	22/03/2018
17261620	BH104	EW	0.00 - 0.00	21/03/2018
17261635	BH105	EW	0.00 - 0.00	21/03/2018
17261660	Downstream	EW	0.00 - 0.00	21/03/2018
17261669	NO ID			
17261652	Spring 2/A	EW	0.00 - 0.00	21/03/2018
17261657	Spring 3/B	EW	0.00 - 0.00	21/03/2018
17261646	Tufa Spring 1	EW	0.00 - 0.00	21/03/2018
17283626	Upstream	EW		21/03/2018

Maximum Sample/Coolbox Temperature (°C) : **6.2**

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.

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

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)							17261597					17261606				17261612					17261620
Customer Sample Reference							BH101					BH102				BH103					BH104
AGS Reference							EW					EW				EW					EW
Depth (m)							0.00 - 0.00					0.00 - 0.00				0.00 - 0.00					0.00 - 0.00
Container			500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	0.5l glass bottle (ALE227)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	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	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 4																			
		NDPs: 0 Tests: 5	X						X				X				X				
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4																			
		NDPs: 0 Tests: 5		X						X				X				X			
Anions by ion Chromatography	All	NDPs: 0 Tests: 5	X						X				X				X				
Anions by Kone (w)	All	NDPs: 0 Tests: 5	X						X				X				X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5			X						X				X				X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2																			
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 4																			
		NDPs: 0 Tests: 5	X						X				X				X				
Mercury Dissolved	All	NDPs: 0 Tests: 5			X						X				X				X		
Nitrite by Kone (w)	All	NDPs: 0 Tests: 5				X						X				X				X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 2						X													
pH Value	All	NDPs: 0 Tests: 5	X						X				X				X				

12:24:20 06/04/2018

17283626	Upstream	EW		NaOH (ALE245)	SW												X			
				HNO3 Filtered (ALE204)	SW							X				X				
				500ml Plastic (ALE208)	SW					X	X									X
17261646	Tufa Spring 1	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW	X				X	X	X		X		X	X			X
				0.5l glass bottle (ALE227)	SW			X					X					X		
17261657	Spring 3/B	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW	X				X	X	X		X		X	X			X
				0.5l glass bottle (ALE227)	SW			X												
17261652	Spring 2/A	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW	X				X	X	X		X		X	X			X
				0.5l glass bottle (ALE227)	SW			X												
17261660	Downstream	EW	0.00 - 0.00	NaOH (ALE245)	SW												X			
				HNO3 Filtered (ALE204)	SW							X				X				
				H2SO4 (ALE244)	SW			X												
				500ml Plastic (ALE208)	SW	X				X	X			X						X
				0.5l glass bottle (ALE227)	SW								X							
17261635	BH105	EW	0.00 - 0.00	NaOH (ALE245)	GW												X			
				HNO3 Filtered (ALE204)	GW							X				X				
				H2SO4 (ALE244)	GW				X											
				500ml Plastic (ALE208)	GW		X			X	X				X					X
				0.5l glass bottle (ALE227)	GW														X	

Validated

CERTIFICATE OF ANALYSIS

SDG: 180323-103	**Client Reference:** 70037512	**Report Number:** 450637	
Location: Warren Crescent	**Order Number:** 70037512-012	**Superseded Report:** 450612	

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)							17261597					17261606				17261612					17261620
Customer Sample Reference							BH101					BH102				BH103					BH104
AGS Reference							EW					EW				EW					EW
Depth (m)							0.00 - 0.00					0.00 - 0.00				0.00 - 0.00					0.00 - 0.00
Container			500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	0.5l glass bottle (ALE227)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	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	GW
Sulphide	All	NDPs: 0 Tests: 4																			
		NDPs: 0 Tests: 5	X						X				X				X				
Total Metals by ICP-MS	All	NDPs: 0 Tests: 4																			
		NDPs: 0 Tests: 5	X						X				X				X				
VOC MS (W)	All	NDPs: 0 Tests: 2					X														X

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17283626	Upstream	EW		NaOH (ALE245)	SW										
				HNO3 Filtered (ALE204)	SW										
				500ml Plastic (ALE208)	SW										
17261646	Tufa Spring 1	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW		X				X				
				0.5l glass bottle (ALE227)	SW										
17261657	Spring 3/B	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW		X				X				
				0.5l glass bottle (ALE227)	SW										
17261652	Spring 2/A	EW	0.00 - 0.00	500ml Plastic (ALE208)	SW		X				X				
				0.5l glass bottle (ALE227)	SW										
17261660	Downstream	EW	0.00 - 0.00	NaOH (ALE245)	SW										
				HNO3 Filtered (ALE204)	SW										
				H2SO4 (ALE244)	SW										
				500ml Plastic (ALE208)	SW		X				X				
				0.5l glass bottle (ALE227)	SW										
17261635	BH105	EW	0.00 - 0.00	NaOH (ALE245)	GW										
				HNO3 Filtered (ALE204)	GW										
				H2SO4 (ALE244)	GW										
				500ml Plastic (ALE208)	GW				X				X		
				0.5l glass bottle (ALE227)	GW										

Validated

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	Downstream
Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled	22/03/2018	22/03/2018	22/03/2018	21/03/2018	21/03/2018	21/03/2018
Sample Time	.	.	.	.	.	.
Date Received	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
SDG Ref	180323-103	180323-103	180323-103	180323-103	180323-103	180323-103
Lab Sample No.(s)	17261597	17261606	17261612	17261620	17261635	17261660
AGS Reference	EW	EW	EW	EW	EW	EW

Component	LOD/Units	Method	BH101	BH102	BH103	BH104	BH105	Downstream
Alkalinity, Bicarbonate as CaCO3	<2000 µg/l	TM043	270000	355000	280000	335000	310000	305000
Carbon, Organic (diss.filt)	<3000 µg/l	TM090						4160
Ammoniacal Nitrogen as N	<200 µg/l	TM099	<200 #	<200 #	<200 #	<200 #	<200 #	<200 #
Sulphide	<10 µg/l	TM101	22.7 2 #	20.7 2 #	13.1 2 #	47.2 2 #	38.4 2 #	21.5 2
Aluminium (diss.filt)	<10 µg/l	TM152	24.9 #	38.8 #	<10 #	105 #	<10 #	588 #
Antimony (diss.filt)	<1 µg/l	TM152	<1	<1	<1	<1	<1	<1
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	2.07 #
Barium (diss.filt)	<0.2 µg/l	TM152	9.7 #	18.5 #	10.2 #	16.3 #	12.6 #	54.9 #
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
Boron (diss.filt)	<10 µg/l	TM152	112 #	73.7 #	219 #	197 #	166 #	90.9 #
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #	0.159 #
Chromium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<1 #	2.7 #
Copper (diss.filt)	<0.3 µg/l	TM152	1.28 #	0.563 #	2.55 #	1.02 #	0.58 #	17.9 #
Manganese (tot.unfilt)	<1 µg/l	TM152	23.7 2 #	6.98 2 #	12.5 #	32.3 2 #	2.58 2 #	148 2 #
Lead (diss.filt)	<0.2 µg/l	TM152	0.225 #	0.45 #	0.235 #	0.881 #	<0.2 #	27.6 #
Nickel (diss.filt)	<0.4 µg/l	TM152	1.72 #	0.896 #	1.86 #	1.07 #	0.818 #	4.28 #
Phosphorus (diss.filt)	<10 µg/l	TM152	27 #	<10 #	51 #	33.7 #	<10 #	476 #
Selenium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vanadium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<1 #	3.6 #
Zinc (diss.filt)	<1 µg/l	TM152	1.84 #	1.24 #	6.14 #	3.39 #	2.47 #	96.9 #
Sodium (Dis.Filt)	<76 µg/l	TM152	37100 #	20400 #	29800 #	17900 #	19600 #	44300 #
Magnesium (Dis.Filt)	<36 µg/l	TM152	2390 #	2580 #	2090 #	3900 #	4580 #	7070 #
Potassium (Dis.Filt)	<200 µg/l	TM152	976 #	748 #	656 #	4360 #	4620 #	3320 #
Calcium (Dis.Filt)	<200 µg/l	TM152	108000 #	138000 #	141000 #	134000 #	134000 #	166000 #
Mercury (diss.filt)	<0.01 µg/l	TM183	0.0553 #	0.0907 #	0.207 #	0.21 #	0.192 #	0.0429
Nitrite as N	<15.2 µg/l	TM184	<15.2 #	<15.2 #	<15.2 #	<15.2 #	<15.2 #	29.5 #
Nitrate as N	<67.7 µg/l	TM184	5950	10400	9960	10300	8920	3950
Chloride	<80 µg/l	TM226	57700 #	22400 #	78000 #	15600 #	23500 #	89500 #
Sulphate	<100 µg/l	TM226	50800 #	34800 #	36100 #	34400 #	35600 #	86700 #
Phosphate as P	<46 µg/l	TM226	<46 #	<46 #	<46 #	<46 #	99.2 #	<46 #
Chromium, Hexavalent	<30 µg/l	TM241	<30 #	<30 #	<30 #	<30 #	<30 #	<30
pH	<1 pH Units	TM256	7.5 #	7.3 #	7.5 #	7.24 #	7.24 #	7.89 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	180323-103	Client Reference:	70037512	Report Number:	450637
Location:	Warren Crescent	Order Number:	70037512-012	Superseded Report:	450612

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			Spring 2/A	Spring 3/B	Tufa Spring 1	Upstream		
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	.		
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
Date Sampled			21/03/2018	21/03/2018	21/03/2018	21/03/2018		
Sample Time			.	.	.	.		
Date Received			23/03/2018	23/03/2018	23/03/2018	23/03/2018		
SDG Ref			180323-103	180323-103	180323-103	180323-103		
Lab Sample No.(s)			17261652	17261657	17261646	17283626		
AGS Reference			EW	EW	EW	EW		
Component	**LOD/Units**	**Method**						
Alkalinity, Bicarbonate as CaCO3	<2000 µg/l	TM043	570000	1600000	335000			
Carbon, Organic (diss.filt)	<3000 µg/l	TM090			3800			
Ammoniacal Nitrogen as N	<200 µg/l	TM099	<200 2 #	<200 2 #	<200 2 #			
Sulphide	<10 µg/l	TM101	67.6 2	1110 2	35 2			
Aluminium (diss.filt)	<10 µg/l	TM152	<10 #	<10 #	<10 #			
Antimony (diss.filt)	<1 µg/l	TM152	<1	<1	<1			
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5 #	<0.5 #	<0.5 #	0.697 #		
Barium (diss.filt)	<0.2 µg/l	TM152	13.1 #	12 #	20.2 #	26.5 #		
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1 #	<0.1 #	<0.1 #	<0.1 #		
Boron (diss.filt)	<10 µg/l	TM152	136 #	128 #	122 #	66.4 #		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	<0.08 #	0.0959 #		
Chromium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #		
Copper (diss.filt)	<0.3 µg/l	TM152	0.405 #	1.73 #	0.639 #	1.62 #		
Manganese (tot.unfilt)	<1 µg/l	TM152	1060 2 #	13800 2 #	456 2 #			
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2 #	<0.2 #	<0.2 #	0.477 #		
Nickel (diss.filt)	<0.4 µg/l	TM152	1.01 #	0.806 #	0.746 #	1.21 #		
Phosphorus (diss.filt)	<10 µg/l	TM152	<10 #	<10 #	<10 #			
Selenium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #		
Vanadium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	1.14 #		
Zinc (diss.filt)	<1 µg/l	TM152	2.39 #	2.3 #	1.49 #	9.63 #		
Sodium (Dis.Filt)	<76 µg/l	TM152	16900 #	22500 #	26800 #			
Magnesium (Dis.Filt)	<36 µg/l	TM152	2430 #	1540 #	2090 #			
Potassium (Dis.Filt)	<200 µg/l	TM152	1230 #	1570 #	2310 #			
Calcium (Dis.Filt)	<200 µg/l	TM152	108000 #	105000 #	120000 #			
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 2	<0.01 2	<0.01 2	<0.01		
Nitrite as N	<15.2 µg/l	TM184	<15.2 2 #	135 2 #	<15.2 2 #	45 #		
Nitrate as N	<67.7 µg/l	TM184	7950	3720	5800	4660		
Chloride	<80 µg/l	TM226	19700 #	25900 #	53300 #			
Sulphate	<100 µg/l	TM226	35200 #	52500 #	39600 #			
Phosphate as P	<46 µg/l	TM226	74.7 #	<46 #	<46 #	388 #		
Chromium, Hexavalent	<30 µg/l	TM241	<30	<30	<30			
pH	<1 pH Units	TM256	7.85 #	7.46 #	7.85 #	7.93 #		

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CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

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 test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH102	BH105	Tufa Spring 1			
Customer Sample Ref.			BH102	BH105	Tufa Spring 1			
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type			Ground Water (GW)	Ground Water (GW)	Surface Water (SW)			
Date Sampled			22/03/2018	21/03/2018	21/03/2018			
Sample Time			.	.	.			
Date Received			23/03/2018	23/03/2018	23/03/2018			
SDG Ref			180323-103	180323-103	180323-103			
Lab Sample No.(s)			17261606	17261635	17261646			
AGS Reference			EW	EW	EW			
Naphthalene (aq)	<0.01 µg/l	TM178	<0.01	<0.01	<0.01			
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0202			
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.00562			
Fluoranthene (aq)	<0.005 µg/l	TM178	0.00719	0.00715	1.05			
Anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0517			
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.288			
Fluorene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0204			
Chrysene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.529			
Pyrene (aq)	<0.005 µg/l	TM178	0.00839	0.0104	0.903			
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.467			
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.777			
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.402			
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002	<0.002	0.653			
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0831			
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.429			
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.456			
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082	<0.082	6.14			

Validated

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH101	BH104
Customer Sample Ref.			BH101	BH104
Depth (m)			0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)
Date Sampled			22/03/2018	21/03/2018
Sample Time			.	.
Date Received			23/03/2018	23/03/2018
SDG Ref			180323-103	180323-103
Lab Sample No.(s)			17261597	17261620
AGS Reference			EW	EW
Dibromofluoromethane**	%	TM208	110	109
Toluene-d8**	%	TM208	97.4	98.7
4-Bromofluorobenzene**	%	TM208	95.4	93.2
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #
Chloromethane	<1 µg/l	TM208	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #
Bromomethane	<1 µg/l	TM208	<1 #	<1 #
Chloroethane	<1 µg/l	TM208	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #
Chloroform	<1 µg/l	TM208	<1 #	1.19 #
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #
Benzene	<1 µg/l	TM208	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
Toluene	<1 µg/l	TM208	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Customer Sample Ref.	BH101	BH104
Depth (m)	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)
Date Sampled	22/03/2018	21/03/2018
Sample Time	.	.
Date Received	23/03/2018	23/03/2018
SDG Ref	180323-103	180323-103
Lab Sample No.(s)	17261597	17261620
AGS Reference	EW	EW

Component	LOD/Units	Method	BH101	BH104
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #
o-Xylene	<1 µg/l	TM208	<1 #	<1 #
Styrene	<1 µg/l	TM208	<1 #	<1 #
Bromoform	<1 µg/l	TM208	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #
Naphthalene	<1 µg/l	TM208	<1 #	<1 #
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

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 test.
**	% 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
1-5&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method						
		Customer Sample Ref.	BH101	BH104				
		Depth (m)	0.00 - 0.00	0.00 - 0.00				
		Sample Type	Ground Water (GW)	Ground Water (GW)				
		Date Sampled	22/03/2018	21/03/2018				
		Sample Time	.	.				
		Date Received	23/03/2018	23/03/2018				
		SDG Ref	180323-103	180323-103				
		Lab Sample No.(s)	17261597	17261620				
		AGS Reference	EW	EW				
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	<1				

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
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
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
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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	180323-103	**Client Reference:**	70037512	**Report Number:**	450637
Location:	Warren Crescent	**Order Number:**	70037512-012	**Superseded Report:**	450612

Test Completion Dates

Lab Sample No(s)	17261597	17261606	17261612	17261620	17261635	17261660	17261652	17261657	17261646	17283626
Customer Sample Ref.	BH101	BH102	BH103	BH104	BH105	Downstream	Spring 2/A	Spring 3/B	Tufa Spring 1	Upstream
AGS Ref.	EW	EW	EW	EW	EW	EW	EW	EW	EW	EW
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Alkalinity as CaCO3	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	
Ammoniacal Nitrogen	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	
Anions by ion Chromatography	29-Mar-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018	05-Apr-2018
Anions by Kone (w)	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	29-Mar-2018	04-Apr-2018
Dissolved Metals by ICP-MS	04-Apr-2018	04-Apr-2018	04-Apr-2018	04-Apr-2018	04-Apr-2018	03-Apr-2018	04-Apr-2018	04-Apr-2018	04-Apr-2018	06-Apr-2018
Dissolved Organic/Inorganic Carbon						26-Mar-2018			26-Mar-2018	
Hexavalent Chromium (w)	28-Mar-2018	28-Mar-2018	28-Mar-2018	27-Mar-2018	27-Mar-2018	27-Mar-2018	27-Mar-2018	27-Mar-2018	27-Mar-2018	
Mercury Dissolved	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	04-Apr-2018
Nitrite by Kone (w)	28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	29-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018	29-Mar-2018	04-Apr-2018
PAH Spec MS - Aqueous (W)		29-Mar-2018			29-Mar-2018				29-Mar-2018	
pH Value	27-Mar-2018	27-Mar-2018	27-Mar-2018	26-Mar-2018	27-Mar-2018	26-Mar-2018	27-Mar-2018	27-Mar-2018	26-Mar-2018	29-Mar-2018
Sulphide	29-Mar-2018	29-Mar-2018	29-Mar-2018	03-Apr-2018	03-Apr-2018	03-Apr-2018	03-Apr-2018	03-Apr-2018	03-Apr-2018	
Total Metals by ICP-MS	06-Apr-2018	06-Apr-2018	06-Apr-2018	29-Mar-2018	29-Mar-2018	03-Apr-2018	29-Mar-2018	03-Apr-2018	03-Apr-2018	
VOC MS (W)	27-Mar-2018			27-Mar-2018						

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. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 asbestos present is not determined unless specifically requested.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

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

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

21. 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.

22. 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.

23. 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.

24. **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.

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**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

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.

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 F.3

CONTROLLED WATERS ASSESSMENT SCREENING

PRE-REPORT DATA CHECK

All analyte codes are matched to the library

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
Anthracene	mg/kg	ug/l
Arsenic	mg/kg	ug/l
Boron	mg/kg	ug/l
Barium	mg/kg	ug/l
Beryllium	mg/kg	ug/l
Benzo (a) pyrene	mg/kg	ug/l
Benzo (b) fluoranthene	mg/kg	ug/l
Benzo (ghi) perylene	mg/kg	ug/l
Benzo (k) fluoranthene	mg/kg	ug/l
Cadmium	mg/kg	ug/l
Chromium	mg/kg	ug/l
Hexavalent Chromium	mg/kg	ug/l
Copper	mg/kg	ug/l
Fluoranthene	mg/kg	ug/l
Mercury	mg/kg	ug/l
Naphthalene	mg/kg	ug/l
Nickel	mg/kg	ug/l
Lead	mg/kg	ug/l
Selenium	mg/kg	ug/l
Vanadium	mg/kg	ug/l
Zinc	mg/kg	ug/l

Region	Wales and England	**Hardness**	NA
Water Body	Groundwater	**Recieving surface water status**	NA
Water Body Type	NA		
Surface Water Type	NA	**Altitude**	NA

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Alkali and Alkaline Earth Metals

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	0.037	0.070	0.103	-		mg/kg	5	5	0	
Beryllium	0.0010	0.0005	0.0010	-		mg/kg	5	-	0	
Barium	3.65	6.99	10.30	700	WHO 2017	ug/l	5	5	0	
Beryllium	0.100	0.050	0.100	12.0	WHO 2017	ug/l	5	-	0	

General Chemistry

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	7.79	8.23	8.74	6.50/10.0	UK DWS	pH Units	5	5	0	
Electrical conductivity	74.2	90.1	107.0	2,500	UK DWS	uS/cm	5	5	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Metals

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	0.011	0.026	0.048	-		mg/kg	5	5	0	
Boron	0.05	0.16	0.60	-		mg/kg	5	3	0	
Cadmium	0.0008	0.0004	0.0008	-		mg/kg	5	-	0	
Chromium	0.010	0.005	0.010	-		mg/kg	5	-	0	
Copper	0.014	0.021	0.031	-		mg/kg	5	5	0	
Hexavalent Chromium	0.30	0.15	0.30	-		mg/kg	5	-	0	
Lead	0.003	0.005	0.009	-		mg/kg	5	5	0	
Mercury	0.0001	0.0001	0.0001	-		mg/kg	5	-	0	
Nickel	0.004	0.004	0.006	-		mg/kg	5	3	0	
Selenium	0.005	0.006	0.008	-		mg/kg	5	4	0	
Vanadium	0.010	0.026	0.084	-		mg/kg	5	3	0	
Zinc	0.011	0.017	0.025	-		mg/kg	5	5	0	
Arsenic	1.13	2.64	4.84	10.0	UK DWS	ug/l	5	5	0	
Boron	5.0	16.0	59.7	1,000	UK DWS	ug/l	5	3	0	
Cadmium	0.080	0.040	0.080	5.00	UK DWS	ug/l	5	-	0	
Chromium	1.00	0.50	1.00	50.0	UK DWS	ug/l	5	-	0	
Copper	1.38	2.08	3.10	2,000	UK DWS	ug/l	5	5	0	
Hexavalent Chromium	30.0	15.0	30.0	-		ug/l	5	-	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Metals

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Lead	0.32	0.48	0.90	10.0	UK DWS	ug/l	5	5	0	
Mercury	0.010	0.005	0.010	1.00	UK DWS	ug/l	5	-	0	
Nickel	0.40	0.44	0.61	20.0	UK DWS	ug/l	5	3	0	
Selenium	0.50	0.59	0.80	10.0	UK DWS	ug/l	5	4	0	
Vanadium	1.00	2.64	8.37	-		ug/l	5	3	0	
Zinc	1.10	1.66	2.51	-		ug/l	5	5	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs

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	0.000	0.007	0.036	-		mg/kg	5	1	0	
Acenaphthylene	0.0001	0.0003	0.0016	-		mg/kg	5	1	0	
Anthracene	0.000	0.002	0.011	-		mg/kg	5	2	0	
Benzo (a) anthracene	0.0001	0.0008	0.0040	-		mg/kg	5	2	0	
Benzo (a) pyrene	0.0000	0.0007	0.0033	-		mg/kg	5	1	0	
Benzo (b) fluoranthene	0.0001	0.0009	0.0046	-		mg/kg	5	1	0	
Benzo (ghi) perylene	0.000	0.002	0.004	-		mg/kg	2	1	0	
Benzo (k) fluoranthene	0.0001	0.0004	0.0021	-		mg/kg	5	1	0	
Chrysene	0.0001	0.0008	0.0036	-		mg/kg	5	2	0	
Dibenzo (ah) anthracene	0.0001	0.0002	0.0007	-		mg/kg	5	1	0	
Fluoranthene	0.000	0.004	0.021	-		mg/kg	5	2	0	
Fluorene	0.000	0.003	0.013	-		mg/kg	5	2	0	
Indeno (1,2,3-cd) pyrene	0.0001	0.0006	0.0028	-		mg/kg	5	1	0	
Naphthalene	0.000	0.001	0.005	-		mg/kg	5	3	0	
PAH (Total)	0.001	0.040	0.193	-		mg/kg	5	2	0	
Phenanthrene	0.000	0.013	0.065	-		mg/kg	5	3	0	
Pyrene	0.000	0.003	0.016	-		mg/kg	5	2	0	
Acenaphthene	0.01	0.71	3.55	-		ug/l	5	1	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthylene	0.005	0.034	0.159	-		ug/l	5	1	0	
Anthracene	0.01	0.23	1.11	-		ug/l	5	2	0	
Benzo (a) anthracene	0.005	0.084	0.400	-		ug/l	5	2	0	
Benzo (a) pyrene	0.002	0.068	0.333	0.010	UK DWS	ug/l	5	1	1	WS103
Benzo (b) fluoranthene	0.005	0.094	0.459	-		ug/l	5	1	0	
Benzo (ghi) perylene	0.01	0.20	0.39	-		ug/l	2	1	0	
Benzo (k) fluoranthene	0.005	0.044	0.206	-		ug/l	5	1	0	
Chrysene	0.005	0.076	0.363	-		ug/l	5	2	0	
Dibenzo (ah) anthracene	0.005	0.017	0.071	-		ug/l	5	1	0	
Fluoranthene	0.01	0.43	2.11	-		ug/l	5	2	0	
Fluorene	0.01	0.27	1.33	-		ug/l	5	2	0	
Indeno (1,2,3-cd) pyrene	0.005	0.058	0.277	-		ug/l	5	1	0	
Naphthalene	0.01	0.11	0.46	-		ug/l	5	3	0	
PAH (Total)	0.08	3.96	19.30	-		ug/l	5	2	0	
Phenanthrene	0.01	1.34	6.52	-		ug/l	5	3	0	
Pyrene	0.01	0.33	1.56	-		ug/l	5	2	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Physical

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	17.1	18.3	19.2	-		DegC	5	5	0	

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
(Unrecognised code)	20.0	10.0	20.0	-		ug/l	3	-	0	
Aliphatics >C16-C35 (Unrecognised code)	10.0	35.2	156.0	-		ug/l	11	6	0	
C16-C35 Aromatics (Unrecognised code)	10.0	27.2	249.0	-		ug/l	11	1	0	
Phosphate as P (Unrecognised code)	46.0	72.3	388.0	-		ug/l	10	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
Aliphatic C05-C06	10.00	5.00	10.00	15,000	WHO 2008	ug/l	11	-	0	
Aliphatic C06-C08	10.00	5.00	10.00	15,000	WHO 2008	ug/l	11	-	0	
Aliphatic C08-C10	10.00	5.00	10.00	300	WHO 2008	ug/l	11	-	0	
Aliphatic C10-C12	10.00	5.00	10.00	300	WHO 2008	ug/l	11	-	0	
Aliphatic C12-C16	10.00	8.45	43.00	300	WHO 2008	ug/l	11	1	0	
Aliphatic C16-C21	10.0	10.1	55.0	-		ug/l	11	2	0	
Aliphatic C21-C35	10.0	29.2	101.0	-		ug/l	11	6	0	
Aliphatics C12-C35	10.0	39.1	199.0	-		ug/l	11	6	0	
Aromatic C06-C07	10.00	5.00	10.00	-		ug/l	11	-	0	
Aromatic C07-C08	10.00	5.00	10.00	-		ug/l	11	-	0	
Aromatic C08-C10	10.00	5.00	10.00	300	WHO 2008	ug/l	11	-	0	
Aromatic C10-C12	10.00	5.00	10.00	90.0	WHO 2008	ug/l	11	-	0	
Aromatic C12-C16	10.0	10.3	63.0	90.0	WHO 2008	ug/l	11	1	0	
Aromatic C12-C35	10.0	32.9	312.0	-		ug/l	11	1	0	
Aromatic C16-C21	10.0	11.2	73.0	90.0	WHO 2008	ug/l	11	1	0	
Aromatic C21-C35	10.0	20.5	176.0	90.0	WHO 2008	ug/l	11	1	1	Tufa Spring
Total Aliphatics and Aromatics (C5-C35)	10.0	67.5	511.0	10.0	EA 2009	ug/l	11	6	6	BH101, BH103, BH105, Downstream, Tufa Spring, Upstream

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	9.7	21.4	54.9	700	WHO 2017	ug/l	11	21	0	
Beryllium	0.100	0.062	0.600	12.0	WHO 2017	ug/l	11	-	0	
Calcium	105000	125450	166000	-		ug/l	11	20	0	
Magnesium	1540	3367	7070	-		ug/l	11	20	0	
Potassium	656	2529	5120	-		ug/l	11	20	0	
Sodium	16900	28710	44300	200,000	UK DWS	ug/l	11	20	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

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
1,2,4-Trimethylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3,5-Trimethylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Benzene	1.00	0.50	1.00	1.00	UK DWS	ug/l	11	-	0	
Ethylbenzene	1.00	0.50	1.00	300	WHO 2017	ug/l	11	-	0	
Methyl t-butylether (MTBE)	1.00	0.50	1.00	15.0	WHO 2017	ug/l	11	-	0	
Tertiary Amyl Methyl Ether (TAME)	1.00	0.50	1.00	-		ug/l	11	-	0	
Toluene	1.00	0.50	1.00	700	WHO 2017	ug/l	11	-	0	
Xylene	2.00	1.00	2.00	500	WHO 2017	ug/l	11	-	0	
Xylene-m & p	1.00	0.50	1.00	-		ug/l	11	-	0	
Xylene-o	1.00	0.50	1.00	-		ug/l	11	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Chlorinated Aliphatics **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
1,1,1,2-Tetrachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1,1-Trichloroethane	1.00	0.50	1.00	2,000	WHO 2017	ug/l	5	-	0	
1,1,2,2-Tetrachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1,2-Trichloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1-Dichloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1-Dichloroethene	1.00	0.50	1.00	140	WHO 2017	ug/l	5	-	0	
1,1-Dichloropropene	1.00	0.50	1.00	20.0	WHO 2017	ug/l	5	-	0	
1,2,3-Trichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2-Dichloroethane	1.00	0.50	1.00	3.00	UK DWS	ug/l	5	-	0	
1,2-Dichloropropane	1.00	0.50	1.00	40.0	WHO 2017	ug/l	5	-	0	
1,3-Dichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
2,2-Dichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbon tetrachloride	1.00	0.50	1.00	3.00	UK DWS	ug/l	5	-	0	
Chloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Chloroform	1.00	0.70	1.23	-		ug/l	5	2	0	
Chloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Cis 1,2-Dichloroethene	1.00	0.50	1.00	50.0	WHO 2017	ug/l	5	-	0	
Cis 1,3-Dichloropropene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site

Event(s) Selected: All events

Chlorinated Aliphatics **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
Dichloromethane	3.00	1.50	3.00	20.0	WHO 2017	ug/l	5	-	0	
Hexachlorobutadiene	1.00	0.50	1.00	0.60	WHO 2017	ug/l	5	-	0	
Hexachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Tetrachloroethene (PCE)	1.00	0.50	1.00	-		ug/l	5	-	0	
Trans-1,2-Dichloroethene	1.00	0.50	1.00	50.0	WHO 2017	ug/l	5	-	0	
Trans-1,3-Dichloropropene	1.00	0.50	1.00	-		ug/l	5	-	0	
Trichloroethene (TCE)	1.00	0.50	1.00	-		ug/l	5	-	0	
Vinyl chloride	1.00	0.50	1.00	0.50	UK DWS	ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Chlorinated 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
1,2,3-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2,4-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2-Dichlorobenzene	1.00	0.50	1.00	1,000	WHO 2017	ug/l	5	-	0	
1,3,5-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3-Dichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,4-Dichlorobenzene	1.00	0.50	1.00	300	WHO 2017	ug/l	5	-	0	
2-Chlorotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chlorotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
Chlorobenzene	1.00	1.56	7.89	300	WHO 2017	ug/l	5	1	0	
Hexachlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Chlorinated 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
2,4,5-Trichlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2,4,6-Trichlorophenol	1.00	0.50	1.00	200	WHO 2017	ug/l	5	-	0	
2,4-Dichlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Chlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chloro-3-Methlphenol	1.00	0.50	1.00	-		ug/l	5	-	0	

Dioxins and Furans

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
Dibenzofuran	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Dyes

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
3-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	

Explosives

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
2,4-Dinitrotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
2,6-Dinitrotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Gas — 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
Nitrogen	4490	7305	12300	-		ug/l	11	11	0	

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	7.24	7.55	7.94	6.50/10.0	UK DWS	pH Units	11	21	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Halogonated Hydrocarbons **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
1,2-Dibromo-3-Chloropropane	1.00	0.50	1.00	1.00	WHO 2017	ug/l	5	-	0	
1,2-Dibromoethane	1.00	0.50	1.00	0.40	WHO 2017	ug/l	5	-	0	
Bromobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromochloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromodichloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromoform	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromomethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Dibromochloromethane	1.00	0.50	1.00	100	WHO 2017	ug/l	5	-	0	
Dibromomethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Dichlorodifluoromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Trichlorofluoromethane	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

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
Alkalinity-Bicarbonate as CaCO3	225000	429000	1600000	-		ug/l	11	20	0	
Ammoniacal nitrogen	200	100	200	-		ug/l	11	-	0	
Calcium hardness as Calcium carbonate	279000	322364	435000	-		ug/l	11	11	0	
Chloride	15600	49175	115000	250,000	UK DWS	ug/l	11	20	0	
Fluoride	500	250	500	1,500	UK DWS	ug/l	11	-	0	
Nitrate	3720	6949	11100	50,000	UK DWS	ug/l	11	21	0	
Nitrite	15.2	27.7	135.0	500	UK DWS	ug/l	11	10	0	
Orthophosphate	50	118	733	-		ug/l	11	1	0	
Phosphate	46.0	50.0	239.0	-		ug/l	8	1	0	
Phosphorous	10.0	81.5	476.0	-		ug/l	11	9	0	
Sulphate as SO4	34400	51510	113000	250,000	UK DWS	ug/l	11	20	0	
Sulphide	10.0	83.3	1110.0	-		ug/l	11	9	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Ketones **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
Isophorone	1.00	0.50	1.00	-		ug/l	5	-	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
Aluminium	2	3703	71700	200	UK DWS	ug/l	11	14	4	Downstream, Spring A, Spring B, Tufa Spring
Antimony	0.11	0.65	4.00	5.00	UK DWS	ug/l	11	7	0	
Arsenic	0.50	0.50	3.00	10.0	UK DWS	ug/l	11	6	0	
Boron	66	136	257	1,000	UK DWS	ug/l	11	21	0	
Cadmium	0.080	0.065	0.480	5.00	UK DWS	ug/l	11	3	0	
Chromium	1.00	1.92	17.70	50.0	UK DWS	ug/l	11	4	0	
Copper	0.30	2.12	17.90	2,000	UK DWS	ug/l	11	17	0	
Ferrous Iron	100.0	50.0	100.0	-		ug/l	3	-	0	
Hexavalent Chromium	30.0	15.0	30.0	-		ug/l	11	-	0	
Iron	19.0	14.8	37.5	200	UK DWS	ug/l	8	2	0	
Lead	0.20	1.52	27.60	10.0	UK DWS	ug/l	11	6	1	Downstream
Manganese	3	949	13800	50.0	UK DWS	ug/l	11	17	8	BH101, BH102, BH103, BH106, Downstream, Spring A, Spring B, Tufa Spring
Manganese II	200	100	200	-		ug/l	3	-	0	
Mercury	0.010	0.042	0.210	1.00	UK DWS	ug/l	11	7	0	
Nickel	0.75	2.35	11.20	20.0	UK DWS	ug/l	11	20	0	
Selenium	0.50	0.75	3.00	10.0	UK DWS	ug/l	11	7	0	
Tin	0.36	0.18	0.36	-		ug/l	11	-	0	
Vanadium	1.00	0.80	6.00	-		ug/l	11	2	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
Zinc	1.00	8.18	96.90	-		ug/l	11	19	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
2-Chloronaphthalene	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Bromophenylphenyl ether	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chloroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chlorophenyl phenyl ether	1.00	0.50	1.00	-		ug/l	5	-	0	
Azobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Bis (2-chloroethoxy) methane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bis (2-chloroethyl) ether	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbazole	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbon Disulphide	1.00	0.50	1.00	-		ug/l	5	-	0	
DOC	3000	5064	22600	-		ug/l	11	9	0	
Nitrobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Nitrosodi-n-Propylamine	1.00	0.50	1.00	-		ug/l	5	-	0	
Styrene	1.00	0.50	1.00	20.0	WHO 2017	ug/l	5	-	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
2-Methylnaphthalene	1.00	0.50	1.00	-		ug/l	5	-	0	
Acenaphthene	0.005	0.011	0.075	-		ug/l	11	7	0	
Acenaphthylene	0.005	0.006	0.049	-		ug/l	11	2	0	
Anthracene	0.005	0.013	0.100	-		ug/l	11	3	0	
Benzo (a) anthracene	0.01	0.11	0.88	-		ug/l	11	8	0	
Benzo (a) pyrene	0.00	0.12	0.93	0.010	UK DWS	ug/l	11	8	3	Spring A, Spring B, Tufa Spring
Benzo (b) fluoranthene	0.01	0.16	1.27	-		ug/l	11	8	0	
Benzo (ghi) perylene	0.005	0.087	0.648	-		ug/l	11	6	0	
Benzo (k) fluoranthene	0.005	0.075	0.550	-		ug/l	11	7	0	
Chrysene	0.01	0.10	0.70	-		ug/l	11	8	0	
Dibenzo (ah) anthracene	0.005	0.015	0.097	-		ug/l	11	2	0	
Fluoranthene	0.01	0.21	1.52	-		ug/l	11	10	0	
Fluorene	0.005	0.022	0.227	-		ug/l	11	7	0	
Indeno (1,2,3-cd) pyrene	0.01	0.10	0.88	-		ug/l	11	5	0	
Naphthalene	0.010	0.084	1.000	-		ug/l	11	9	0	
PAH (Total)	0.08	1.33	10.40	-		ug/l	11	9	0	
Phenanthrene	0.005	0.083	0.673	-		ug/l	11	9	0	
Pyrene	0.01	0.21	1.64	-		ug/l	11	13	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Pesticides, Herbicides and Insectici   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
Hexachlorocyclopentadiene	1.00	0.50	1.00	-		ug/l	5	-	0	
Pentachlorophenol	1.00	0.50	1.00	9.00	WHO 2017	ug/l	5	-	0	

Pharmaceuticals   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
2-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	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
2,4-Dimethylphenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Methylphenol (o-Cresol)	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Nitrophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Methylphenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Nitrophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
Phenol	1.00	0.77	2.00	-		ug/l	11	-	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Phthalates

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
Bis (2-ethylhexyl) phthalate	2.00	1.00	2.00	8.00	WHO 2017	ug/l	5	-	0	
Butyl benzyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Diethyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Dimethyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Di-n-butyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Di-n-octyl phthalate	5.00	2.50	5.00	-		ug/l	5	-	0	

QA Standard

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
4-Bromofluorobenzene	93	101	103	-		%	5	7	0	
Dibromofluoromethane	109	115	120	-		%	5	7	0	
Toluene-d8 Surrogate	97	100	102	-		%	5	7	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

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	94.9	100.0	-		%	11	11	0	
PRO (C5-C12)	50.0	25.0	50.0	-		ug/l	11	-	0	

VOCs

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
4-Isopropyltoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
iso-Propylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Propylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Sec-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Tert-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	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	11	13	0	

Chlorinated Phenols

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
Chlorophenols - Total (Summed Isomers)	1.00	1.00	1.00	-		ug/l	5	5	0	

Phenols

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
Methylphenols Total (Summed)	1.00	1.00	1.00	-		ug/l	5	5	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: LEACHATE

PAHs

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Benzo (a) pyrene	WS103	1 - 1	0.33	UK DWS	0.010	ug/l	Made Ground Granular

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Aliphatics and Aromatics

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Aromatic C21-C35	Tufa Spring	0	176	WHO 2008	90.0	ug/l	
Total Aliphatics and Aromatics (C5-C35)	BH101	8 - 11.7	33.0	EA 2009	10.0	ug/l	Beckley Sand Member
	BH103	8.8 - 11.8	30.0	EA 2009	10.0	ug/l	
	BH105	6.4 - 10.9	100	EA 2009	10.0	ug/l	
	Downstream	0	21.0	EA 2009	10.0	ug/l	
	Tufa Spring	0	511	EA 2009	10.0	ug/l	
	Upstream	0	22.0	EA 2009	10.0	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Aluminium	Downstream	0	588	UK DWS	200	ug/l	
	Spring A	0	648	UK DWS	200	ug/l	
	Spring B	0	884	UK DWS	200	ug/l	
	Tufa Spring	0	71700	UK DWS	200	ug/l	
Lead	Downstream	0	27.6	UK DWS	10.0	ug/l	
Manganese	BH101	8 - 11.7	144	UK DWS	50.0	ug/l	Beckley Sand Member
	BH102	4 - 6.7	100	UK DWS	50.0	ug/l	Beckley Sand Member / No Recovery
	BH103	8.8 - 11.8	170	UK DWS	50.0	ug/l	Beckley Sand Member
	BH106	8 - 12	116	UK DWS	50.0	ug/l	
	Downstream	0	148	UK DWS	50.0	ug/l	
	Spring A	0	1060	UK DWS	50.0	ug/l	
	Spring B	0	13800	UK DWS	50.0	ug/l	
	Tufa Spring	0	456	UK DWS	50.0	ug/l	

PAHs

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Benzo (a) pyrene	Spring A	0	0.013	UK DWS	0.010	ug/l	
	Spring B	0	0.045	UK DWS	0.010	ug/l	
	Tufa Spring	0	0.65	UK DWS	0.010	ug/l	
		0	0.93	UK DWS	0.010	ug/l	

PRE-REPORT DATA CHECK

All analyte codes are matched to the library

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
Anthracene	mg/kg	ug/l
Arsenic	mg/kg	ug/l
Boron	mg/kg	ug/l
Barium	mg/kg	ug/l
Beryllium	mg/kg	ug/l
Benzo (a) pyrene	mg/kg	ug/l
Benzo (b) fluoranthene	mg/kg	ug/l
Benzo (ghi) perylene	mg/kg	ug/l
Benzo (k) fluoranthene	mg/kg	ug/l
Cadmium	mg/kg	ug/l
Chromium	mg/kg	ug/l
Hexavalent Chromium	mg/kg	ug/l
Copper	mg/kg	ug/l
Fluoranthene	mg/kg	ug/l
Mercury	mg/kg	ug/l
Naphthalene	mg/kg	ug/l
Nickel	mg/kg	ug/l
Lead	mg/kg	ug/l
Selenium	mg/kg	ug/l
Vanadium	mg/kg	ug/l
Zinc	mg/kg	ug/l

Region	Wales and England	**Hardness**	> 250 mg/l
Water Body	Surface water	**Recieving surface water status**	Good (or below)
Water Body Type	Inland		
Surface Water Type	River or Stream	**Altitude**	Any

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Alkali and Alkaline Earth Metals

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	0.037	0.070	0.103	-		mg/kg	5	5	0	
Beryllium	0.0010	0.0005	0.0010	-		mg/kg	5	-	0	
Barium	3.65	6.99	10.30	-		ug/l	5	5	0	
Beryllium	0.100	0.050	0.100	-		ug/l	5	-	0	

General Chemistry

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	7.79	8.23	8.74	6.00/9.00	EQS 2015	pH Units	5	5	0	
Electrical conductivity	74.2	90.1	107.0	-		uS/cm	5	5	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site
Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Metals

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	0.011	0.026	0.048	-		mg/kg	5	5	0	
Boron	0.05	0.16	0.60	-		mg/kg	5	3	0	
Cadmium	0.0008	0.0004	0.0008	-		mg/kg	5	-	0	
Chromium	0.010	0.005	0.010	-		mg/kg	5	-	0	
Copper	0.014	0.021	0.031	-		mg/kg	5	5	0	
Hexavalent Chromium	0.30	0.15	0.30	-		mg/kg	5	-	0	
Lead	0.003	0.005	0.009	-		mg/kg	5	5	0	
Mercury	0.0001	0.0001	0.0001	-		mg/kg	5	-	0	
Nickel	0.004	0.004	0.006	-		mg/kg	5	3	0	
Selenium	0.005	0.006	0.008	-		mg/kg	5	4	0	
Vanadium	0.010	0.026	0.084	-		mg/kg	5	3	0	
Zinc	0.011	0.017	0.025	-		mg/kg	5	5	0	
Arsenic	1.13	2.64	4.84	50.0	EQS 2015	ug/l	5	5	0	
Boron	5.0	16.0	59.7	-		ug/l	5	3	0	
Cadmium	0.080	0.040	0.080	-		ug/l	5	-	0	
Chromium	1.00	0.50	1.00	4.70	EQS 2015	ug/l	5	-	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Metals

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Copper	1.38	2.08	3.10	1.00	EQS 2015 - Bioavailable	ug/l	5	5	5	BH101, BH102, BH105, WS103, WS104
Hexavalent Chromium	30.0	15.0	30.0	3.40	EQS 2015	ug/l	5	-	0	
Lead	0.32	0.48	0.90	1.20	EQS 2015 - Bioavailable	ug/l	5	5	0	
Mercury	0.010	0.005	0.010	0.070	EQS 2015 MAC	ug/l	5	-	0	
Nickel	0.40	0.44	0.61	4.00	EQS 2015 - Bioavailable	ug/l	5	3	0	
Selenium	0.50	0.59	0.80	-		ug/l	5	4	0	
Vanadium	1.00	2.64	8.37	-		ug/l	5	3	0	
Zinc	1.10	1.66	2.51	10.9	EQS 2015 - Bioavailable	ug/l	5	5	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site
Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

PAHs

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	0.000	0.007	0.036	-		mg/kg	5	1	0	
Acenaphthylene	0.0001	0.0003	0.0016	-		mg/kg	5	1	0	
Anthracene	0.000	0.002	0.011	-		mg/kg	5	2	0	
Benzo (a) anthracene	0.0001	0.0008	0.0040	-		mg/kg	5	2	0	
Benzo (a) pyrene	0.0000	0.0007	0.0033	-		mg/kg	5	1	0	
Benzo (b) fluoranthene	0.0001	0.0009	0.0046	-		mg/kg	5	1	0	
Benzo (ghi) perylene	0.000	0.002	0.004	-		mg/kg	2	1	0	
Benzo (k) fluoranthene	0.0001	0.0004	0.0021	-		mg/kg	5	1	0	
Chrysene	0.0001	0.0008	0.0036	-		mg/kg	5	2	0	
Dibenzo (ah) anthracene	0.0001	0.0002	0.0007	-		mg/kg	5	1	0	
Fluoranthene	0.000	0.004	0.021	-		mg/kg	5	2	0	
Fluorene	0.000	0.003	0.013	-		mg/kg	5	2	0	
Indeno (1,2,3-cd) pyrene	0.0001	0.0006	0.0028	-		mg/kg	5	1	0	
Naphthalene	0.000	0.001	0.005	-		mg/kg	5	3	0	
PAH (Total)	0.001	0.040	0.193	-		mg/kg	5	2	0	
Phenanthrene	0.000	0.013	0.065	-		mg/kg	5	3	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

PAHs

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Pyrene	0.000	0.003	0.016	-		mg/kg	5	2	0	
Acenaphthene	0.01	0.71	3.55	-		ug/l	5	1	0	
Acenaphthylene	0.005	0.034	0.159	-		ug/l	5	1	0	
Anthracene	0.01	0.23	1.11	0.10	EQS 2015	ug/l	5	2	1	WS103
Benzo (a) anthracene	0.005	0.084	0.400	-		ug/l	5	2	0	
Benzo (a) pyrene	0.002	0.068	0.333	0.0002	EQS 2015	ug/l	5	1	1	WS103
Benzo (b) fluoranthene	0.005	0.094	0.459	0.017	EQS 2015 MAC	ug/l	5	1	1	WS103
Benzo (ghi) perylene	0.01	0.20	0.39	0.008	EQS 2015 MAC	ug/l	2	1	1	WS103
Benzo (k) fluoranthene	0.005	0.044	0.206	0.017	EQS 2015 MAC	ug/l	5	1	1	WS103
Chrysene	0.005	0.076	0.363	-		ug/l	5	2	0	
Dibenzo (ah) anthracene	0.005	0.017	0.071	-		ug/l	5	1	0	
Fluoranthene	0.01	0.43	2.11	0.006	EQS 2015	ug/l	5	2	2	BH105, WS103
Fluorene	0.01	0.27	1.33	-		ug/l	5	2	0	
Indeno (1,2,3-cd) pyrene	0.005	0.058	0.277	-		ug/l	5	1	0	
Naphthalene	0.01	0.11	0.46	2.00	EQS 2015	ug/l	5	3	0	
PAH (Total)	0.08	3.96	19.30	-		ug/l	5	2	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

PAHs

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Phenanthrene	0.01	1.34	6.52	-		ug/l	5	3	0	
Pyrene	0.01	0.33	1.56	-		ug/l	5	2	0	

Physical

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	17.1	18.3	19.2	-		DegC	5	5	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
(Unrecognised code)	20.0	10.0	20.0	-		ug/l	3	-	0	
Aliphatics >C16-C35 (Unrecognised code)	10.0	35.2	156.0	-		ug/l	11	6	0	
C16-C35 Aromatics (Unrecognised code)	10.0	27.2	249.0	-		ug/l	11	1	0	
Phosphate as P (Unrecognised code)	46.0	72.3	388.0	-		ug/l	10	3	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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	11	-	0	
Aliphatic C06-C08	10.00	5.00	10.00	-		ug/l	11	-	0	
Aliphatic C08-C10	10.00	5.00	10.00	-		ug/l	11	-	0	
Aliphatic C10-C12	10.00	5.00	10.00	-		ug/l	11	-	0	
Aliphatic C12-C16	10.00	8.45	43.00	-		ug/l	11	1	0	
Aliphatic C16-C21	10.0	10.1	55.0	-		ug/l	11	2	0	
Aliphatic C21-C35	10.0	29.2	101.0	-		ug/l	11	6	0	
Aliphatics C12-C35	10.0	39.1	199.0	-		ug/l	11	6	0	
Aromatic C06-C07	10.00	5.00	10.00	10.0	CL:AIRE 2017	ug/l	11	-	0	
Aromatic C07-C08	10.00	5.00	10.00	74.0	CL:AIRE 2017	ug/l	11	-	0	
Aromatic C08-C10	10.00	5.00	10.00	20.0	CL:AIRE 2017	ug/l	11	-	0	
Aromatic C10-C12	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	11	-	0	
Aromatic C12-C16	10.0	10.3	63.0	2.00	CL:AIRE 2017	ug/l	11	1	1	Tufa Spring
Aromatic C12-C35	10.0	32.9	312.0	-		ug/l	11	1	0	
Aromatic C16-C21	10.0	11.2	73.0	0.10	CL:AIRE 2017	ug/l	11	1	1	Tufa Spring
Aromatic C21-C35	10.0	20.5	176.0	0.0002	CL:AIRE 2017	ug/l	11	1	1	Tufa Spring

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
Total Aliphatics and Aromatics (C5-C35)	10.0	67.5	511.0	-		ug/l	11	6	0	

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	9.7	21.4	54.9	-		ug/l	11	21	0	
Beryllium	0.100	0.062	0.600	-		ug/l	11	-	0	
Calcium	105000	125450	166000	-		ug/l	11	20	0	
Magnesium	1540	3367	7070	-		ug/l	11	20	0	
Potassium	656	2529	5120	-		ug/l	11	20	0	
Sodium	16900	28710	44300	-		ug/l	11	20	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
1,2,4-Trimethylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3,5-Trimethylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Benzene	1.00	0.50	1.00	10.0	EQS 2015	ug/l	11	-	0	
Ethylbenzene	1.00	0.50	1.00	20.0	Proposed EQS	ug/l	11	-	0	
Methyl t-butylether (MTBE)	1.00	0.50	1.00	-		ug/l	11	-	0	
Tertiary Amyl Methyl Ether (TAME)	1.00	0.50	1.00	-		ug/l	11	-	0	
Toluene	1.00	0.50	1.00	74.0	EQS 2015	ug/l	11	-	0	
Xylene	2.00	1.00	2.00	30.0	CL:AIRE 2017	ug/l	11	-	0	
Xylene-m & p	1.00	0.50	1.00	-		ug/l	11	-	0	
Xylene-o	1.00	0.50	1.00	-		ug/l	11	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Chlorinated Aliphatics **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
1,1,1,2-Tetrachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1,1-Trichloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1,2,2-Tetrachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1,2-Trichloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1-Dichloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1-Dichloroethene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,1-Dichloropropene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2,3-Trichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2-Dichloroethane	1.00	0.50	1.00	10.0	EQS 2015	ug/l	5	-	0	
1,2-Dichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3-Dichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
2,2-Dichloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbon tetrachloride	1.00	0.50	1.00	12.0	EQS 2015	ug/l	5	-	0	
Chloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Chloroform	1.00	0.70	1.23	2.50	EQS 2015	ug/l	5	2	0	
Chloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site
Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Chlorinated Aliphatics **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
Cis 1,2-Dichloroethene	1.00	0.50	1.00	-		ug/l	5	-	0	
Cis 1,3-Dichloropropene	1.00	0.50	1.00	-		ug/l	5	-	0	
Dichloromethane	3.00	1.50	3.00	20.0	EQS 2015	ug/l	5	-	0	
Hexachlorobutadiene	1.00	0.50	1.00	0.60	EQS 2015 MAC	ug/l	5	-	0	
Hexachloroethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Tetrachloroethene (PCE)	1.00	0.50	1.00	10.0	EQS 2015	ug/l	5	-	0	
Trans-1,2-Dichloroethene	1.00	0.50	1.00	-		ug/l	5	-	0	
Trans-1,3-Dichloropropene	1.00	0.50	1.00	-		ug/l	5	-	0	
Trichloroethene (TCE)	1.00	0.50	1.00	10.0	EQS 2015	ug/l	5	-	0	
Vinyl chloride	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Chlorinated 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
1,2,3-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2,4-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2-Dichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3,5-Trichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,3-Dichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
1,4-Dichlorobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Chlorotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chlorotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
Chlorobenzene	1.00	1.56	7.89	-		ug/l	5	1	0	
Hexachlorobenzene	1.00	0.50	1.00	0.050	EQS 2015 MAC	ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Chlorinated 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
2,4,5-Trichlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2,4,6-Trichlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2,4-Dichlorophenol	1.00	0.50	1.00	4.20	EQS 2015	ug/l	5	-	0	
2-Chlorophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chloro-3-Methlphenol	1.00	0.50	1.00	-		ug/l	5	-	0	

Dioxins and Furans   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
Dibenzofuran	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Dyes

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
3-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	

Explosives

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
2,4-Dinitrotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
2,6-Dinitrotoluene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Gas

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
Nitrogen	4490	7305	12300	-		ug/l	11	11	0	

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	7.24	7.55	7.94	6.00/9.00	EQS 2015	pH Units	11	21	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Halogonated Hydrocarbons **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
1,2-Dibromo-3-Chloropropane	1.00	0.50	1.00	-		ug/l	5	-	0	
1,2-Dibromoethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromochloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromodichloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromoform	1.00	0.50	1.00	-		ug/l	5	-	0	
Bromomethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Dibromochloromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Dibromomethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Dichlorodifluoromethane	1.00	0.50	1.00	-		ug/l	5	-	0	
Trichlorofluoromethane	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
Alkalinity-Bicarbonate as CaCO3	225000	429000	1600000	-		ug/l	11	20	0	
Ammoniacal nitrogen	200	100	200	-		ug/l	11	-	0	
Calcium hardness as Calcium carbonate	279000	322364	435000	-		ug/l	11	11	0	
Chloride	15600	49175	115000	-		ug/l	11	20	0	
Fluoride	500	250	500	-		ug/l	11	-	0	
Nitrate	3720	6949	11100	-		ug/l	11	21	0	
Nitrite	15.2	27.7	135.0	-		ug/l	11	10	0	
Orthophosphate	50	118	733	-		ug/l	11	1	0	
Phosphate	46.0	50.0	239.0	-		ug/l	8	1	0	
Phosphorous	10.0	81.5	476.0	-		ug/l	11	9	0	
Sulphate as SO4	34400	51510	113000	-		ug/l	11	20	0	
Sulphide	10.0	83.3	1110.0	-		ug/l	11	9	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Ketones **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
Isophorone	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
Aluminium	2	3703	71700	-		ug/l	11	14	0	
Antimony	0.11	0.65	4.00	-		ug/l	11	7	0	
Arsenic	0.50	0.50	3.00	50.0	EQS 2015	ug/l	11	6	0	
Boron	66	136	257	-		ug/l	11	21	0	
Cadmium	0.080	0.065	0.480	-		ug/l	11	3	0	
Chromium	1.00	1.92	17.70	4.70	EQS 2015	ug/l	11	4	2	BH102, Spring A
Copper	0.30	2.12	17.90	1.00	EQS 2015 - Bioavailable	ug/l	11	17	6	BH101, BH103, BH104, Downstream, Spring B, Upstream
Ferrous Iron	100.0	50.0	100.0	-		ug/l	3	-	0	
Hexavalent Chromium	30.0	15.0	30.0	3.40	EQS 2015	ug/l	11	-	0	
Iron	19.0	14.8	37.5	1,000	EQS 2015	ug/l	8	2	0	
Lead	0.20	1.52	27.60	1.20	EQS 2015 - Bioavailable	ug/l	11	6	1	Downstream
Manganese	3	949	13800	123	EQS 2015 - Bioavailable	ug/l	11	17	6	BH101, BH103, Downstream, Spring A, Spring B, Tufa Spring
Manganese II	200	100	200	-		ug/l	3	-	0	
Mercury	0.010	0.042	0.210	0.070	EQS 2015 MAC	ug/l	11	7	4	BH102, BH103, BH104, BH105
Nickel	0.75	2.35	11.20	4.00	EQS 2015 - Bioavailable	ug/l	11	20	3	BH101, BH103, Downstream

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
Selenium	0.50	0.75	3.00	-		ug/l	11	7	0	
Tin	0.36	0.18	0.36	-		ug/l	11	-	0	
Vanadium	1.00	0.80	6.00	-		ug/l	11	2	0	
Zinc	1.00	8.18	96.90	10.9	EQS 2015 - Bioavailable	ug/l	11	19	1	Downstream

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
2-Chloronaphthalene	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Bromophenylphenyl ether	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chloroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Chlorophenyl phenyl ether	1.00	0.50	1.00	-		ug/l	5	-	0	
Azobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Bis (2-chloroethoxy) methane	1.00	0.50	1.00	-		ug/l	5	-	0	
Bis (2-chloroethyl) ether	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbazole	1.00	0.50	1.00	-		ug/l	5	-	0	
Carbon Disulphide	1.00	0.50	1.00	-		ug/l	5	-	0	
DOC	3000	5064	22600	-		ug/l	11	9	0	
Nitrobenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Nitrosodi-n-Propylamine	1.00	0.50	1.00	-		ug/l	5	-	0	
Styrene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
2-Methylnaphthalene	1.00	0.50	1.00	-		ug/l	5	-	0	
Acenaphthene	0.005	0.011	0.075	-		ug/l	11	7	0	
Acenaphthylene	0.005	0.006	0.049	-		ug/l	11	2	0	
Anthracene	0.005	0.013	0.100	0.10	EQS 2015	ug/l	11	3	0	
Benzo (a) anthracene	0.01	0.11	0.88	-		ug/l	11	8	0	
Benzo (a) pyrene	0.00	0.12	0.93	0.0002	EQS 2015	ug/l	11	8	7	BH102, BH103, Downstream, Spring A, Spring B, Tufa Spring, Upstream
Benzo (b) fluoranthene	0.01	0.16	1.27	0.017	EQS 2015 MAC	ug/l	11	8	5	BH102, Downstream, Spring A, Spring B, Tufa Spring
Benzo (ghi) perylene	0.005	0.087	0.648	0.008	EQS 2015 MAC	ug/l	11	6	5	BH102, Downstream, Spring B, Tufa Spring, Upstream
Benzo (k) fluoranthene	0.005	0.075	0.550	0.017	EQS 2015 MAC	ug/l	11	7	2	Spring B, Tufa Spring
Chrysene	0.01	0.10	0.70	-		ug/l	11	8	0	
Dibenzo (ah) anthracene	0.005	0.015	0.097	-		ug/l	11	2	0	
Fluoranthene	0.01	0.21	1.52	0.006	EQS 2015	ug/l	11	10	8	BH102, BH103, BH105, Downstream, Spring A, Spring B, Tufa Spring, Upstream
Fluorene	0.005	0.022	0.227	-		ug/l	11	7	0	
Indeno (1,2,3-cd) pyrene	0.01	0.10	0.88	-		ug/l	11	5	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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
Naphthalene	0.010	0.084	1.000	2.00	EQS 2015	ug/l	11	9	0	
PAH (Total)	0.08	1.33	10.40	-		ug/l	11	9	0	
Phenanthrene	0.005	0.083	0.673	-		ug/l	11	9	0	
Pyrene	0.01	0.21	1.64	-		ug/l	11	13	0	

Pesticides, Herbicides and Insectici

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
Hexachlorocyclopentadiene	1.00	0.50	1.00	-		ug/l	5	-	0	
Pentachlorophenol	1.00	0.50	1.00	0.40	EQS 2015	ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Pharmaceuticals

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
2-Nitroaniline	1.00	0.50	1.00	-		ug/l	5	-	0	

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
2,4-Dimethylphenol	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Methylphenol (o-Cresol)	1.00	0.50	1.00	-		ug/l	5	-	0	
2-Nitrophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Methylphenol	1.00	0.50	1.00	-		ug/l	5	-	0	
4-Nitrophenol	1.00	0.50	1.00	-		ug/l	5	-	0	
Phenol	1.00	0.77	2.00	7.70	EQS 2015	ug/l	11	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Phthalates **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
Bis (2-ethylhexyl) phthalate	2.00	1.00	2.00	1.30	EQS 2015	ug/l	5	-	0	
Butyl benzyl phthalate	1.00	0.50	1.00	7.50	EQS 2015	ug/l	5	-	0	
Diethyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Dimethyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Di-n-butyl phthalate	1.00	0.50	1.00	-		ug/l	5	-	0	
Di-n-octyl phthalate	5.00	2.50	5.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

QA Standard

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
4-Bromofluorobenzene	93	101	103	-		%	5	7	0	
Dibromofluoromethane	109	115	120	-		%	5	7	0	
Toluene-d8 Surrogate	97	100	102	-		%	5	7	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	94.9	100.0	-		%	11	11	0	
PRO (C5-C12)	50.0	25.0	50.0	-		ug/l	11	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

VOCs **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
4-Isopropyltoluene	1.00	0.50	1.00	-		ug/l	5	-	0	
iso-Propylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
n-Propylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Sec-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	
Tert-Butylbenzene	1.00	0.50	1.00	-		ug/l	5	-	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site
Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

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	11	13	0	

Chlorinated Phenols

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
Chlorophenols - Total (Summed Isomers)	1.00	1.00	1.00	-		ug/l	5	5	0	

Sample Matrix: WATER

Site Area(s) Selected: N/A, NONE, Whole site

Event(s) Selected: Jan-2018, All events, Mar-2018, N/A

Phenols **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
Methylphenols Total (Summed)	1.00	1.00	1.00	-		ug/l	5	5	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: LEACHATE

Metals

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Copper	BH101	0.6 - 0.6	1.38	EQS 2015 - Bioavailable	1.00	ug/l	Ashgill Formation
	BH102	0.4 - 0.4	3.10	EQS 2015 - Bioavailable	1.00	ug/l	Made Ground Granular
	BH105	0.6 - 0.6	2.40	EQS 2015 - Bioavailable	1.00	ug/l	
	WS103	1 - 1	2.10	EQS 2015 - Bioavailable	1.00	ug/l	
	WS104	0.7 - 0.7	1.43	EQS 2015 - Bioavailable	1.00	ug/l	

PAHs

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Anthracene	WS103	1 - 1	1.11	EQS 2015	0.10	ug/l	Made Ground Granular
Benzo (a) pyrene	WS103	1 - 1	0.33	EQS 2015	0.0002	ug/l	Made Ground Granular
Benzo (b) fluoranthene	WS103	1 - 1	0.46	EQS 2015 MAC	0.017	ug/l	Made Ground Granular
Benzo (ghi) perylene	WS103	1 - 1	0.39	EQS 2015 MAC	0.008	ug/l	Made Ground Granular
Benzo (k) fluoranthene	WS103	1 - 1	0.21	EQS 2015 MAC	0.017	ug/l	Made Ground Granular
Fluoranthene	BH105	0.6 - 0.6	0.054	EQS 2015	0.006	ug/l	Made Ground Granular
	WS103	1 - 1	2.11	EQS 2015	0.006	ug/l	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Aliphatics and Aromatics

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Aromatic C12-C16	Tufa Spring	0	63.0	CL:AIRE 2017	2.00	ug/l	
Aromatic C16-C21	Tufa Spring	0	73.0	CL:AIRE 2017	0.10	ug/l	
Aromatic C21-C35	Tufa Spring	0	176	CL:AIRE 2017	0.0002	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Chromium	BH102	4 - 6.7	17.7	EQS 2015	4.70	ug/l	Beckley Sand Member / No Recovery
	Spring A	0	4.74	EQS 2015	4.70	ug/l	
Copper	BH101	8 - 11.7	1.28	EQS 2015 - Bioavailable	1.00	ug/l	Beckley Sand Member
		8 - 11.7	1.95	EQS 2015 - Bioavailable	1.00	ug/l	
	BH103	8.8 - 11.8	2.55	EQS 2015 - Bioavailable	1.00	ug/l	
		8.8 - 11.8	7.93	EQS 2015 - Bioavailable	1.00	ug/l	
	BH104	3 - 7	1.02	EQS 2015 - Bioavailable	1.00	ug/l	No Recovery
	Downstream	0	1.60	EQS 2015 - Bioavailable	1.00	ug/l	
		0	17.9	EQS 2015 - Bioavailable	1.00	ug/l	
	Spring B	0	1.73	EQS 2015 - Bioavailable	1.00	ug/l	
	Upstream	0	1.60	EQS 2015 - Bioavailable	1.00	ug/l	
		0	1.62	EQS 2015 - Bioavailable	1.00	ug/l	
Lead	Downstream	0	27.6	EQS 2015 - Bioavailable	1.20	ug/l	
Manganese	BH101	8 - 11.7	144	EQS 2015 - Bioavailable	123	ug/l	Beckley Sand Member
	BH103	8.8 - 11.8	170	EQS 2015 - Bioavailable	123	ug/l	
	Downstream	0	148	EQS 2015 - Bioavailable	123	ug/l	
	Spring A	0	1060	EQS 2015 - Bioavailable	123	ug/l	
	Spring B	0	13800	EQS 2015 - Bioavailable	123	ug/l	
	Tufa Spring	0	456	EQS 2015 - Bioavailable	123	ug/l	
Mercury	BH102	4 - 6.7	0.091	EQS 2015 MAC	0.070	ug/l	Beckley Sand Member / No Recovery
	BH103	8.8 - 11.8	0.21	EQS 2015 MAC	0.070	ug/l	Beckley Sand Member
	BH104	3 - 7	0.21	EQS 2015 MAC	0.070	ug/l	No Recovery

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

Metals

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Mercury	BH105	6.4 - 10.9	0.19	EQS 2015 MAC	0.070	ug/l	Beckley Sand Member
Nickel	BH101	8 - 11.7	8.70	EQS 2015 - Bioavailable	4.00	ug/l	Beckley Sand Member
	BH103	8.8 - 11.8	11.2	EQS 2015 - Bioavailable	4.00	ug/l	
	Downstream	0	4.28	EQS 2015 - Bioavailable	4.00	ug/l	
Zinc	Downstream	0	96.9	EQS 2015 - Bioavailable	10.9	ug/l	

PAHs

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Benzo (a) pyrene	BH102	4 - 6.7	0.009	EQS 2015	0.0002	ug/l	Beckley Sand Member / No Recovery
	BH103	8.8 - 11.8	0.006	EQS 2015	0.0002	ug/l	Beckley Sand Member
	Downstream	0	0.008	EQS 2015	0.0002	ug/l	
	Spring A	0	0.013	EQS 2015	0.0002	ug/l	
	Spring B	0	0.045	EQS 2015	0.0002	ug/l	
	Tufa Spring	0	0.65	EQS 2015	0.0002	ug/l	
		0	0.93	EQS 2015	0.0002	ug/l	
	Upstream	0	0.005	EQS 2015	0.0002	ug/l	
Benzo (b) fluoranthene	BH102	4 - 6.7	0.020	EQS 2015 MAC	0.017	ug/l	Beckley Sand Member / No Recovery
	Downstream	0	0.022	EQS 2015 MAC	0.017	ug/l	
	Spring A	0	0.033	EQS 2015 MAC	0.017	ug/l	
	Spring B	0	0.083	EQS 2015 MAC	0.017	ug/l	
	Tufa Spring	0	0.78	EQS 2015 MAC	0.017	ug/l	
		0	1.27	EQS 2015 MAC	0.017	ug/l	
Benzo (ghi) perylene	BH102	4 - 6.7	0.021	EQS 2015 MAC	0.008	ug/l	Beckley Sand Member / No Recovery
	Downstream	0	0.020	EQS 2015 MAC	0.008	ug/l	
	Spring B	0	0.069	EQS 2015 MAC	0.008	ug/l	
	Tufa Spring	0	0.43	EQS 2015 MAC	0.008	ug/l	
		0	0.65	EQS 2015 MAC	0.008	ug/l	
	Upstream	0	0.013	EQS 2015 MAC	0.008	ug/l	
Benzo (k) fluoranthene	Spring B	0	0.043	EQS 2015 MAC	0.017	ug/l	
	Tufa Spring	0	0.40	EQS 2015 MAC	0.017	ug/l	
		0	0.55	EQS 2015 MAC	0.017	ug/l	
Fluoranthene	BH102	4 - 6.7	0.007	EQS 2015	0.006	ug/l	Beckley Sand Member / No Recovery
		4 - 6.7	0.061	EQS 2015	0.006	ug/l	
	BH103	8.8 - 11.8	0.010	EQS 2015	0.006	ug/l	Beckley Sand Member
	BH105	6.4 - 10.9	0.007	EQS 2015	0.006	ug/l	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

PAHs

Analyte	Point ID	Response Zone Depth (M)	Result	Criteria Source	Threshold	Units	Stratum
Fluoranthene	Downstream	0	0.048	EQS 2015	0.006	ug/l	
	Spring A	0	0.028	EQS 2015	0.006	ug/l	
	Spring B	0	0.12	EQS 2015	0.006	ug/l	
	Tufa Spring	0	1.05	EQS 2015	0.006	ug/l	
		0	1.52	EQS 2015	0.006	ug/l	
	Upstream	0	0.064	EQS 2015	0.006	ug/l	

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