Alexandra Basin Redevelopment 2

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Appendix 8-1 PRA Report

Volume 3



CALAFORT ÁTHA CLIATH
DUBLIN PORT

TETRA TECH

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Final	Preliminary Risk Assessment (Desk Study)	D.Maguire, Graduate Scientist	J. McGrath, Associate	J. McGrath, Associate	24/02/2026

Approval for issue

Joseph McGrath	J.McG	24/02/2026

© Copyright R P S Group Limited. All rights reserved.

The proposal has been prepared for the exclusive use and benefit of our client, and for the sole and specific purpose for which it is provided. R P S Group Limited, any of its subsidiaries, or a related entity (collectively 'RPS') does not accept any liability if this proposal is used for an alternative purpose from which it is intended. The proposal does not account for any changes relating the subject matter of the proposal, or any legislative or regulatory changes that have occurred since the proposal was produced and that may affect the proposal.

RPS does not accept any responsibility for any documents or information supplied to RPS by others. It is expressly stated that no independent verification of any documents or information supplied by others has been made.

Unless otherwise agreed in writing by RPS no other party may use, make use of, or rely on the contents of this proposal. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to, or arising out of any use or reliance on the proposal.

Prepared by:

RPS

Diarmuid Maguire

Graduate Scientist

Elmwood House, 74 Boucher Road, Belfast, Northern Ireland, BT12 6RZ

T 028 9066 7914

E Diarmuid.maguire@rps.tetratech.com

Prepared for:

Dublin Port Company

Contents

1 Introduction 4
1.1 Project Description 4
1.2 Report Objectives and Scope 4
1.3 Previous Studies 4
1.4 Sources of Information 5
1.5 Guidance 5
1.6 Risk Assessment 5
1.7 Pollutant Linkage Diagram 6
1.8 Limitations 7

2 Site Description 8
2.1 Site Location 8
2.2 Study Area 9
2.2.1 Current Site Use 9
2.2.2 Ground Cover 10
2.2.3 Localised Site Topography 10
2.3 Surrounding Land Use 10
2.4 Proposed Development 10

3 Site History 11
3.1 Historical Development of the Site 11

4 Site Geology & Hydrogeology 13
4.1 Solid Geology 13
4.2 Drift Geology 13
4.3 Hydrology 15
4.4 Groundwater Vulnerability 17
4.5 Groundwater Status 18
4.6 Water Framework Directive 19
4.7 Groundwater Recharge 19
4.8 Groundwater Wells and Springs 21
4.9 Surface Water Hydrology 22
4.10 Licenses and Permits 23

5 PREVIOUS INVESTIGATIONS & REPORTS 24
5.1 MP2 24
5.1.1 Preliminary Risk Assessment Report 24
5.1.2 Intrusive Ground Investigation 25
5.1.3 Ground Conditions Encountered 26
5.1.4 Groundwater 27
5.1.5 Laboratory Analysis 27
5.1.6 Risk Assessment 28
5.2 Controlled Waters Risk Assessment 29
5.2.1 Intrusive Ground Investigation 29
5.2.2 Ground Conditions Encountered 29
5.2.3 Groundwater 29
5.2.4 Detailed Quantitative Risk Assessment 30

6 INDUSTRIAL EMISSIONS LICENSE 32
6.1 Dublin Port IE License 32
6.2 Monitoring 32
6.3 Laboratory Analysis 33

6.4 Summary of Results 34
6.4.1 Heavy Metals 34
6.4.2 Organotins 34
6.4.3 Hydrocarbons 34
6.4.4 Polycyclic Aromatic Hydrocarbons (PAHs) 34
6.4.5 Semi-Volatile Organic Compounds (SVOCs) 34
6.4.6 Volatile Organic Compounds (VOCs) 35
6.4.7 Summary Overview 35

7 Overview of Potential Contamination 36
7.1 Introduction 36
7.2 On site sources 36
7.2.1 Current land Use 36
7.2.2 Previous Land Use – Historical Development 36
7.2.3 Ground Borne Gases 36
7.3 Off Site Sources 37
7.3.1 Surrounding Land Uses – Current 37
7.3.2 Surrounding Land Uses – Historical 37

8 Conceptual Site Model and Risk Assessment 38
8.1 Conceptual Site Model 38

9 Conclusions and Recommendations 41
9.1 Conclusions 41

Tables

Table 2-1 Surrounding Land Use 10
Table 8-1 Risk Assessment and Conceptual Site Model 39

Figures

Figure 1.1 Pollutant Linkage Diagram 6
Figure 2.1 Site Location 8
Figure 2.2 ABR2 Study Area 9
Figure 4.1 Solid Geology (taken from GSI) 13
Figure 4.2 Drift Geology (taken from GSI) 14
Figure 4.3 Groundwater Aquifer (taken from GSI's Spatial Resources portal) 16
Figure 4.4 Groundwater Vulnerability (taken from GSI) 17
Figure 4.5 Water Framework Directive status 2013-2018 (taken from EPA maps) 18
Figure 4.6 Water Framework Directive risk status (taken from EPA maps) 19
Figure 4.7 Groundwater Recharge (taken from GSI) 20
Figure 4.8 Groundwater Wells and Springs (taken from GSI) 21
Figure 4.9 Surface Water Features (Mapping by GSI) 22
Figure 4.10 Industrial Emission Licences (IELs) and Integrated Pollution Control (IPC) (taken from EPA) 23
Figure 5.1 Potential Sources of Contamination from 2018 PRA Report 25
Figure 5.2 2018 Ground Investigation Locations 26
Figure 6.1 IE License Monitoring Locations at Berth52/53 33

Appendices

Appendix A – Historical Maps

Appendix B – Previous Reports

1 Introduction

1.1 Project Description

RPS/Tetra Tech was appointed by Dublin Port Company to undertake a Preliminary Risk Assessment (Desk Study Report) for the proposed ABR2 project. The ABR2 project will comprise redevelopment works in two areas of Dublin port:

- Alexandra Basin West; and
- Berth 52/53

This report describes the research and assessments undertaken to assess the ground conditions and potential for any ground contamination that may have arisen from the site's present and historical use.

1.2 Report Objectives and Scope

The objectives of this report are as follows:

- Collate desk study information regarding the site and surrounds to allow the identification of potential contaminant sources, potential pathways and potential receptors in accordance with Land contamination risk management (LCRM) and EPA guidance. This will form the basis of the Preliminary Risk Assessment and production of a Conceptual Site Model (CSM).
- Collation of existing geo-environmental data to facilitate a risk assessment with regard to potential risks to human health and environmental risks.
- Assessment of the above to determine if intrusive investigation and further assessment will be necessary.

1.3 Previous Studies

The following reports and assessments were completed by RPS in support of the planning application for the MP2 project (ABP-304888-19).

- Dublin Port Company, MP2 Project. Preliminary Risk Assessment (Desk Study) Report. RPS, IBR1085, April 2018.
- Dublin Port Company, MP2 Project. Generic Quantitative Risk Assessment (GQRA) Report. RPS, IBR1085, September 2018.

A groundwater detailed quantitative risk assessment (DQRA) was completed in 2015 in support of an Industrial Emissions (IE) licence application to the EPA for the treatment of contaminated dredge material within a licenced boundary at the port.

- Dublin Port – Alexandra Basin Redevelopment. Controlled Waters Risk Assessment. RPS, RCEI33367-001R, March 2015.

1.4 Sources of Information

Sources of information used in the production of this report include:

- Internet based aerial photography
- Ordnance Survey Ireland mapviewer
- (http://maps.osi.ie/publicviewer/#V2,719558,734710,9,7)
- Geological Survey Ireland Spatial Resources Map Viewer – Department of Communications, Climate Action and Environment (http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228)
- Environmental Protection Agency Radon Map (http://www.epa.ie/radiation/radonmap/)
- Geological Survey of Ireland Geotechnical Data Viewer (http://spatial.dcenr.gov.ie/GeologicalSurvey/GeoTechnicalViewer/index.html)
- Environmental Protection Agency map viewer (https://gis.epa.ie/EPAMaps/)
- Land and Soil EPA maps (Geohive maps)

1.5 Guidance

The following guidance documents have been used in the production of this report:

- Land contamination risk management (LCRM) - How to assess and manage the risks from land contamination. Environment Agency, October 2020 (last updated June 2025).
- Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Environmental Protection Agency, 2013.

1.6 Risk Assessment

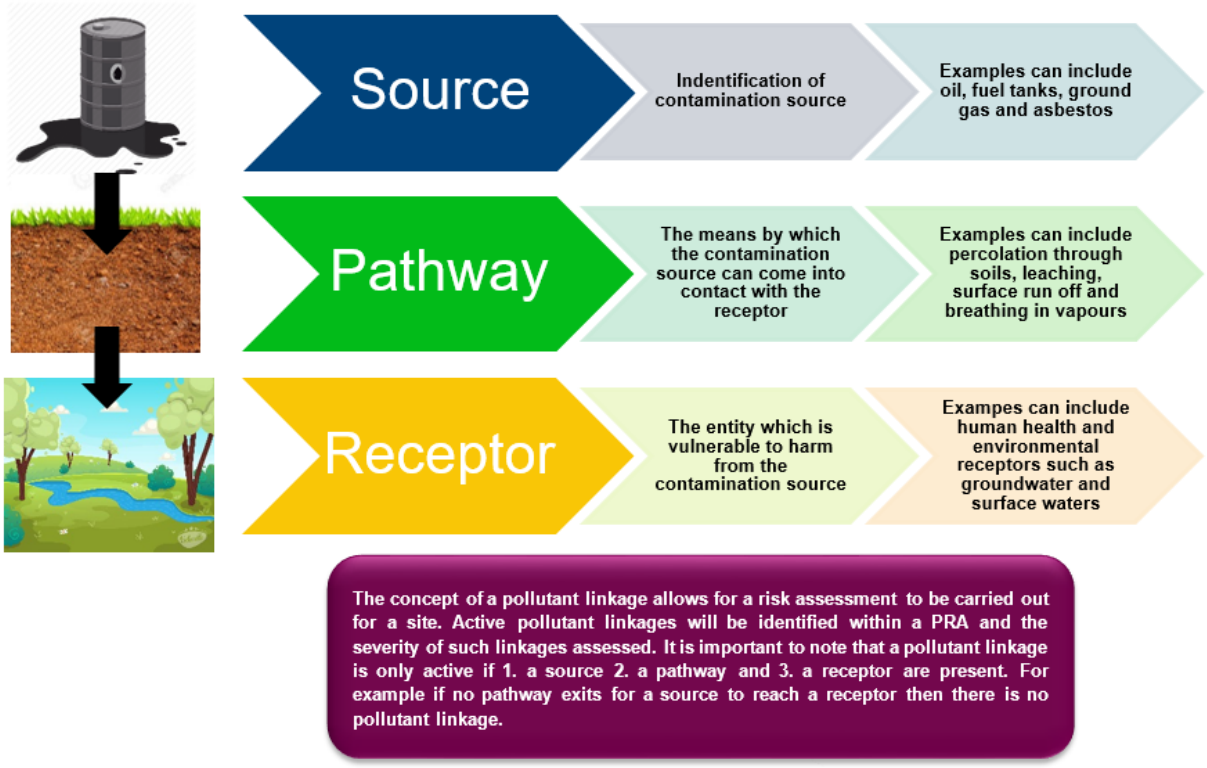
Underpinning the guidance within LCRM is a source-pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:

- **Source**: a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution:
- **Pathway**: a route by which a receptor is or could be affected by a contaminant
- **Receptor**: something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings, crops or animals.

An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of the preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process. A risk is present only when a source-pathway-receptor linkage is present and active. Without a pollutant linkage, there is not a risk, even if a contaminant is present.

1.7 Pollutant Linkage Diagram

Figure 1.1 Pollutant Linkage Diagram



1.8 Limitations

This report is for the use of Dublin Port Company only and should not be relied upon by other parties unless specifically advised by RPS in writing. Furthermore, new information, design changes, changed practices or new legislation may necessitate revised interpretation of the report after its date of submission.

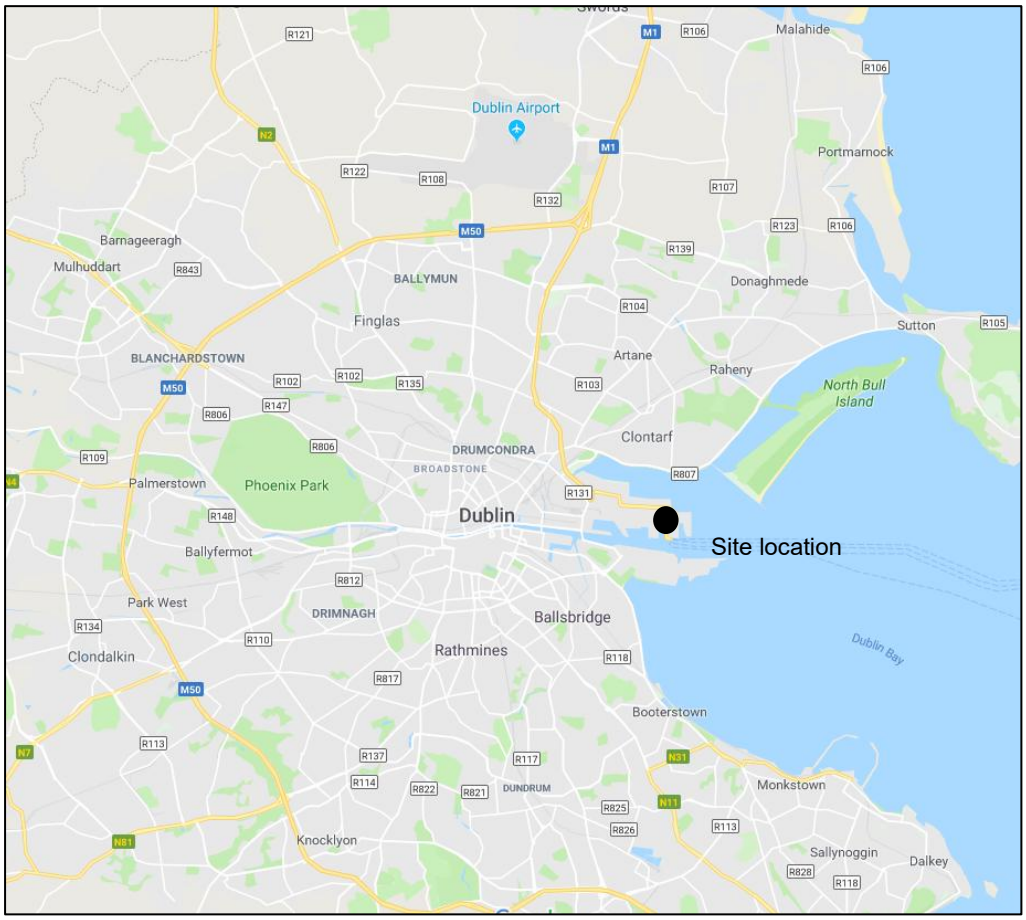
This report has been prepared by RPS/Tetra Tech on the basis of the available information received during the study period. Although every reasonable effort has been made to obtain all relevant information, all potential contaminants, environmental constraints or liabilities associated with the site may not be necessarily have been revealed.

2 Site Description

2.1 Site Location

As shown in Figure 2.1, the proposed ABR2 Project is located within the existing northern estate of Dublin Port immediately north of the mouth of the River Liffey. The site is situated approximately 4km east of the Dublin City Centre.

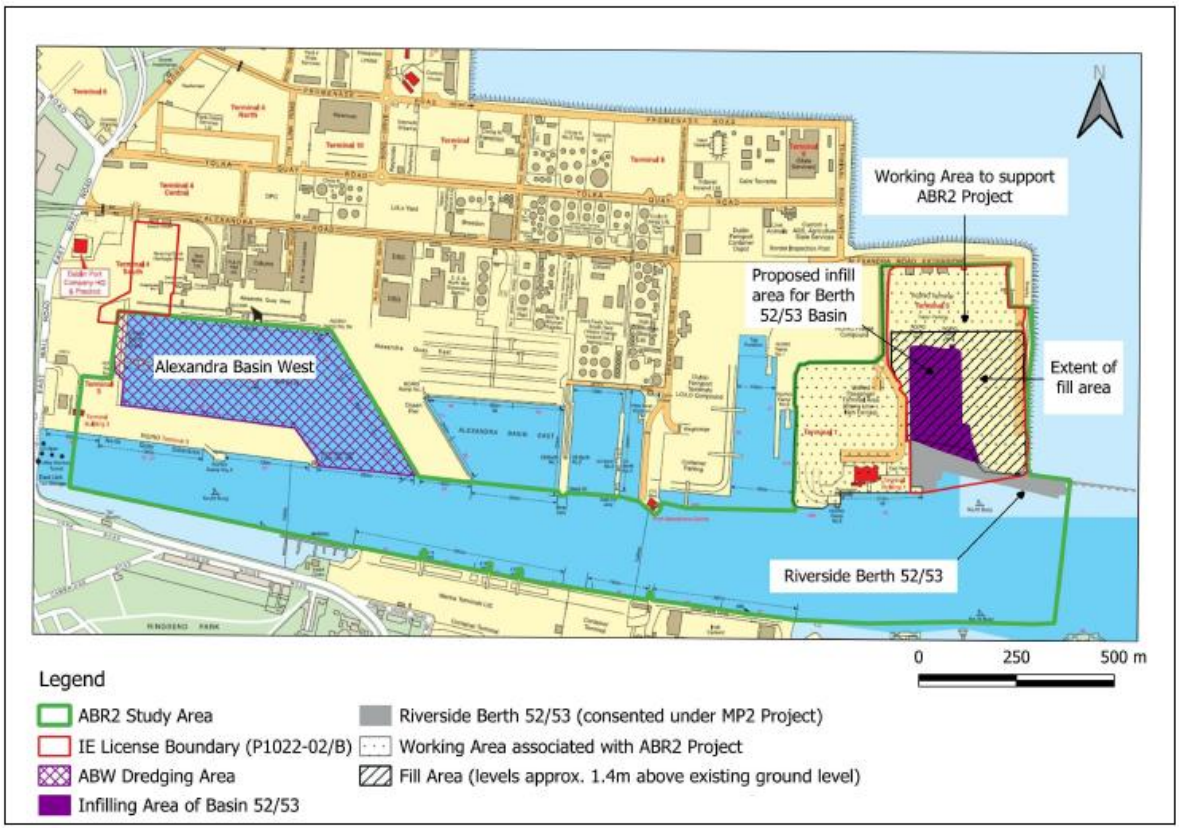
Figure 2.1 Site Location



2.2 Study Area

The proposed redevelopment areas of the ABR2 project are shown in Figure 2.2. The proposed areas include Alexandra Basin West and Berth 52/53.

Figure 2.2 ABR2 Study Area



2.2.1 Current Site Use

Alexandra Basin West:

Alexandra Basin West (ABW) is located in the western section of Dublin Port and this region of the port is predominately used for industrial and maritime port operations including cargo handling and freight logistics, Terminal 3 Ro-Ro (Roll-on/roll-off) and Lo-Lo (lift-on/lift-off) shipping operations and berthing facilities for various marine vessels including cruise ships.

Berth 52/53

Berth 52/53 is situated in the eastern section of Dublin Port. The current site use within the Berth 52/53 region is for commercial shipping activities and associated port operations. The study area includes a number of ferry terminals; Terminal 1 Irish Ferries and Stena Line unified passenger ferry terminal and Terminal 5 which is a Ro-Ro freight terminal.

2.2.2 Ground Cover

The ground cover predominantly comprises of concrete hardstanding.

2.2.3 Localised Site Topography

The study area is generally level with localised topography having no obvious gradient.

2.3 Surrounding Land Use

The pertinent surrounding land uses of the study area are listed in table 2.1

Table 2-1 Surrounding Land Use

Surrounding Land Uses	
Boundary	**Surrounding Land Uses of the Proposed Development**
North	Immediately north is further Dublin Port infrastructure and access roads. C.260m north of Berth 52/53 Basin is Dublin Bay with Clontarf Promenade c.1km north of Berth 52/53 Basin.
East	Dublin Bay and River Tolka Estuary SPA is present to the east of the study area.
South	The River Liffey is present to the south of the study area. Poolbeg Peninsula is present to the south of the River Liffey.
West	Various industrial activities of Dublin Port are present to the west of the study area.

2.4 Proposed Development

Alexandra Basin West

Dredging of 470,000 m^3 of contaminated sediment material to a depth of -10.0m CD (Chart Datum) over an area of 194,000 m^3 within the redeveloped Alexandra Basin West and its subsequent remediation.

Berth 52/53 Basin

Infilling of the Terminal 5 Ro-Ro basin (45,650 m^2); raising of existing levels by 1.4m over an area of 95,000 m^2.

3 Site History

3.1 Historical Development of the Site

A review of available historical ordnance survey maps was undertaken to ascertain the development history of the site. Two historical maps of the area are provided on the Ordnance Survey Ireland map viewer: a six-inch map from c. 1830s and a twenty-five-inch map from c. 1890s. Table 3.1 provides a summary of potentially contaminating activities during the history of the site and its surrounding area.

Table 3-1 Historical Development of the Site

Historical Development		
Date	**Site History**	**Surrounding Land Use**
c. 1830s	The site is undeveloped; it consists of mud flats that have not been reclaimed for development.	A Harbour, barracks and Pigeon House Fort have been developed to the south of the site, on the opposite bank of the River Liffey. A number of potentially contaminating land uses are present a significant distance to the west of the site where the land extends to, including a glass works and a vitriol works.
c. 1890s	A breakwater has been developed where the modern-day Breakwater Road is present.	Increased development is present in the area to the west of the site. Dublin Port has extended closer to the site with a number of quay extensions, a shipbuilding yard, railway line, timber yard, coal yard, chemical manure works and a number of oil tanks present. Increased development is also present on the opposite bank of the River Liffey with electricity works and outfall works present surrounding Pigeon House Fort.

By 1907, many of the principal features of the deepwater port in Dublin were established, including the shipbuilding yard, the North Wall graving dock and the North Quay Extension, which formed the south side of the deepwater facility. Alexandra Quay was built in the 1920s (placed along the north side of Alexandra Basin) and Alexandra Quay East, Ocean Pier, and a number of Oil Jetties were completed by 1955. A new phase of reclamation works was

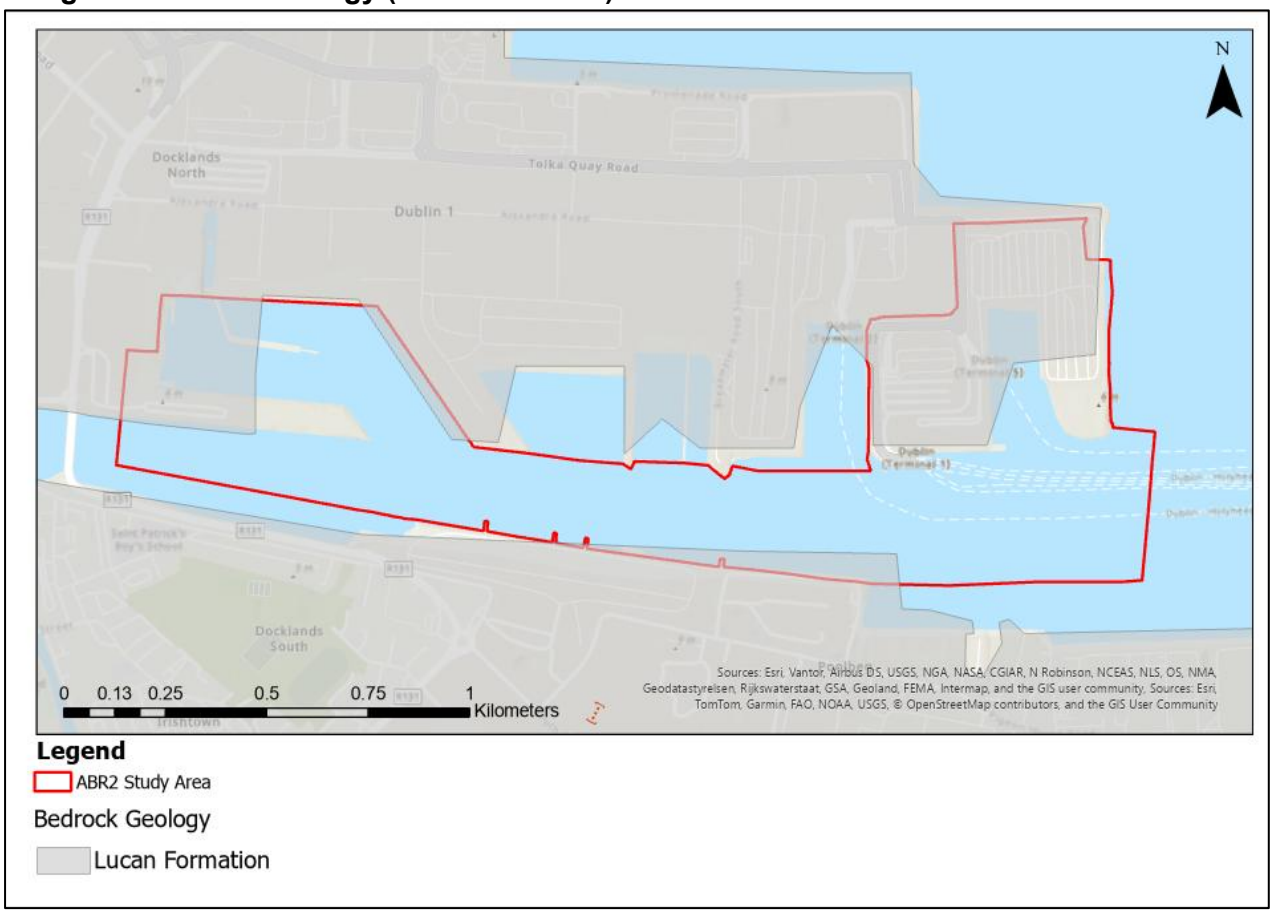
initiated at this time and pushed the boundaries of the port northwards, along the East Wall, towards the Clontarf shoreline. Further reclamation works to the east define the current extent of Dublin Port; most of the area relevant to the MP2 redevelopment is within the most recently reclaimed area.

4 Site Geology & Hydrogeology

4.1 Solid Geology

The bedrock geology anticipated in the vicinity of the site is shown on Figure 4.1. The entire Dublin area is underlain by the Lucan Formation. The formation comprises dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are also rare, dark, coarser grained, calcarenitic limestones, which are sometimes graded, present. The formation ranges from 300m to 800m in thickness and is Carboniferous.

Figure 4.1 Solid Geology (taken from GSI)



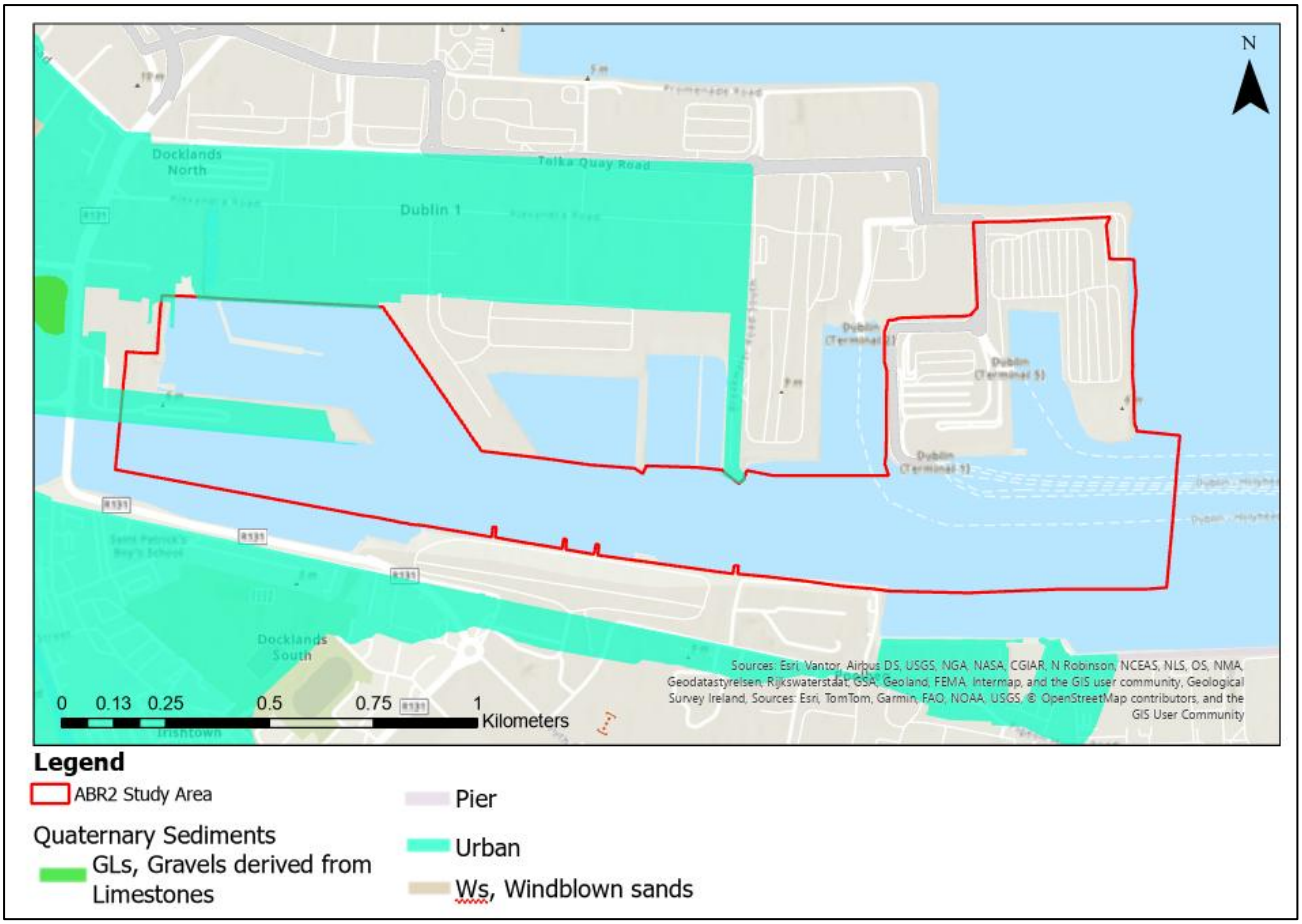
4.2 Drift Geology

Drift is a general term applied to all mineral material (clay, sand, silt, boulders) transported by a glacier and deposited directly by or from the ice, or by running water emanating from the glacier. It generally applies to Pleistocene glacial deposits.

The drift geology of the area is expected to principally reflect the depositional process of the last glaciation when an extensive ice sheet that extended into the Irish Sea covered the region. Typically, during the ice advance boulder clays were deposited sub-glacially as lodgement till over the eroded rock head surface, whilst moraine deposits were laid down at the glacier margins. Subsequently, with the progressive retreat of the ice sheet from the region, fluvio-glacial deposits (sand, gravel and silt) were laid down by melt waters discharging from the front of the glacier. Recent deposition prior to reclamation of the site principally reflects marine erosional and depositional processes, which have modified the glacial deposits.

As shown on Figure 4.2, the site is anticipated to be underlain by made ground. Dublin Port is located entirely on made ground (fill deposits).

Figure 4.2 Drift Geology (taken from GSI)



4.3 Hydrology

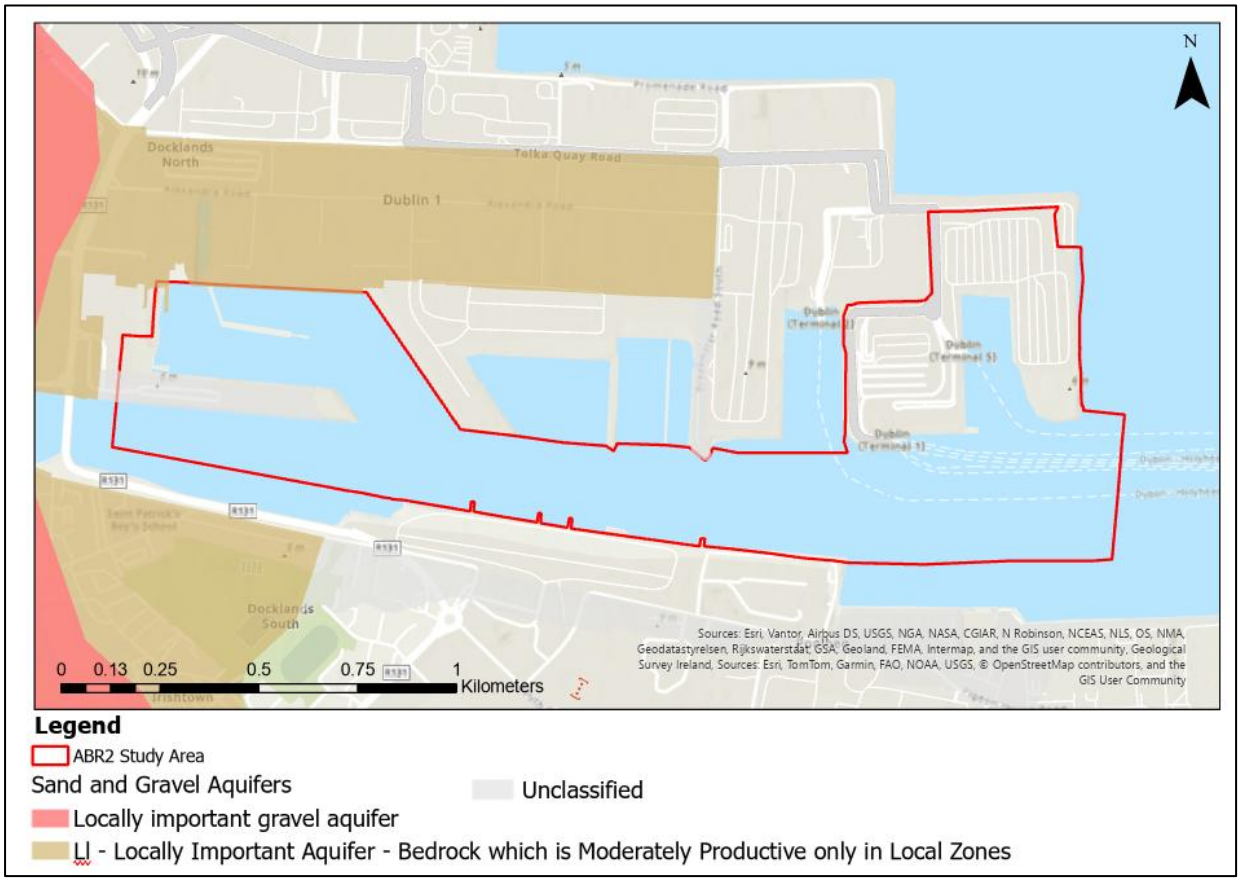
The hydrogeology of the area has been described by the Geological Survey of Ireland as complex and very variable. The Limestone bedrock is generally considered to be indurated and hence dominated by fissure permeability (e.g. joints and faults). Such permeability is likely to be low except where coarse, clean Limestones where present, have been karstified, dolomitised or are highly fractured.

The Lower Carboniferous rocks that underlie the region have been classified by the Geological Survey of Ireland as “Locally Important Aquifer, bedrock which is moderately productive only in local zones” (Figure 6). These locally productive zones are due to the presence of more permeable strata that are encountered in different parts of the outcrop area due to substantial faults, fractures or fissures. The limited groundwater movement within the rock tends to be restricted to the weathered horizons or to non-extensive fractured zones. These zones tend to have a limited hydraulic continuity, low storage capacity and low potential yield.

The Quaternary drift is considered the principal medium for groundwater movement in the area. The infiltration capacity of the clay deposits would be limited due to their low permeability and hence groundwater movement is likely to be confined to the fluvio-glacial sand and gravel deposits that overlie the clays. The potential importance of the Quaternary drift deposits as a groundwater resource is a function of their permeability, thickness and extent. The low permeable fine grained glacial clays represent aquitards that limit infiltration and restrict recharge to bedrock aquifers when sufficiently thick. The overlying fluvio-glacial sand and gravel deposits represent material with a significantly higher permeability. Consequently, these deposits have a high potential recharge and storage capacity.

It is generally expected that groundwater levels beneath the site will remain close to sea level and may exhibit tidal variation. Groundwater at the site is expected to be brackish / saline and unsuitable for potable supply.

Figure 4.3 Groundwater Aquifer (taken from GSI's Spatial Resources portal)

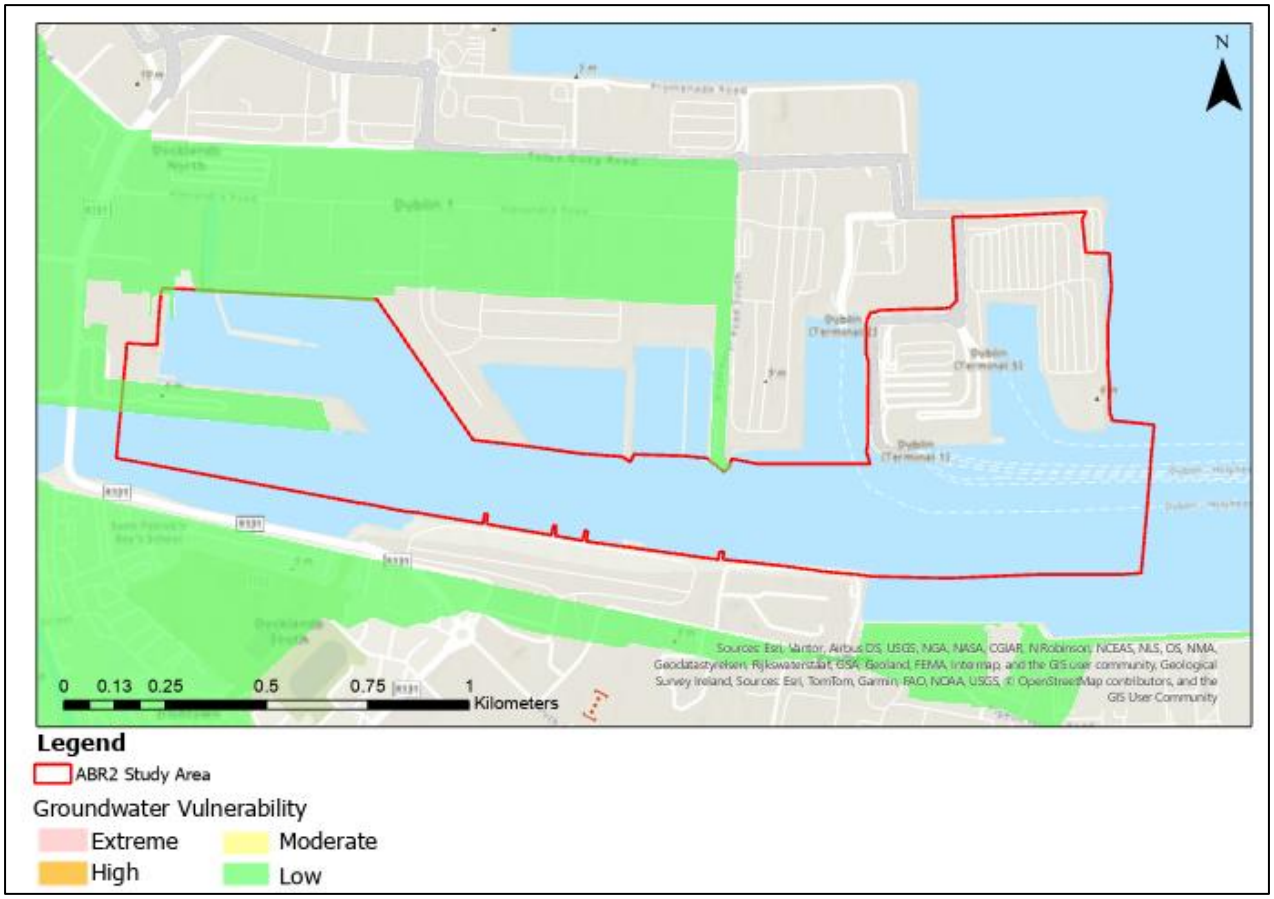


4.4 Groundwater Vulnerability

In accordance with the Water Framework Directive (2000/60/EC) it is necessary to understand the groundwater vulnerability of the site, which is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface.

According to the GSI map for groundwater vulnerability (Figure 4.4), the site is not mapped, however immediate surrounding areas have a low groundwater vulnerability indicating that the natural groundwater is unlikely to be easily contaminated by human activities.

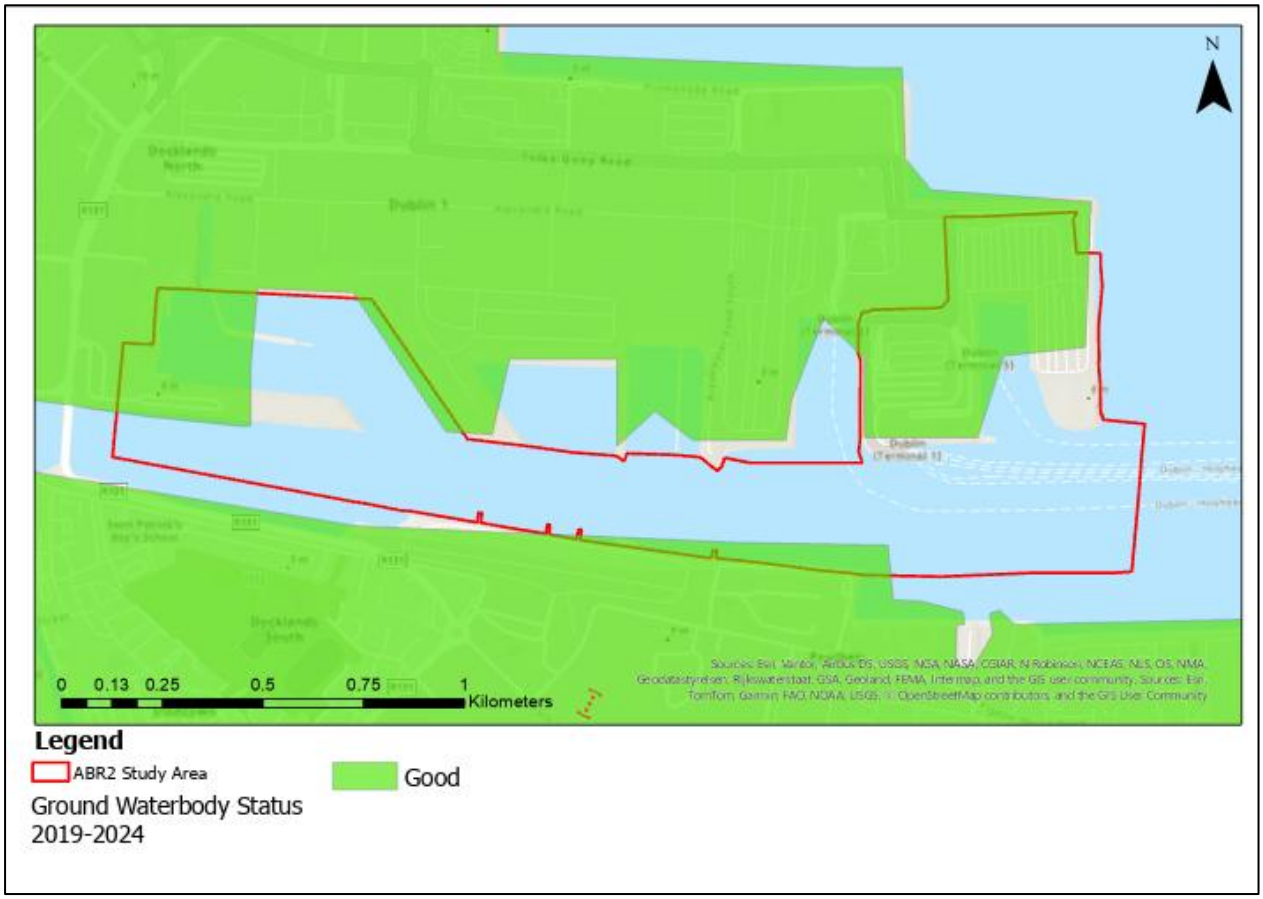
Figure 4.4 Groundwater Vulnerability (taken from GSI)



4.5 Groundwater Status

An assessment carried out under the Water Framework Directive (WFD) 2013-2018 groundwater body (EPA, 2022) has concluded that the groundwater within the bedrock aquifer is presently of 'Good Status'.

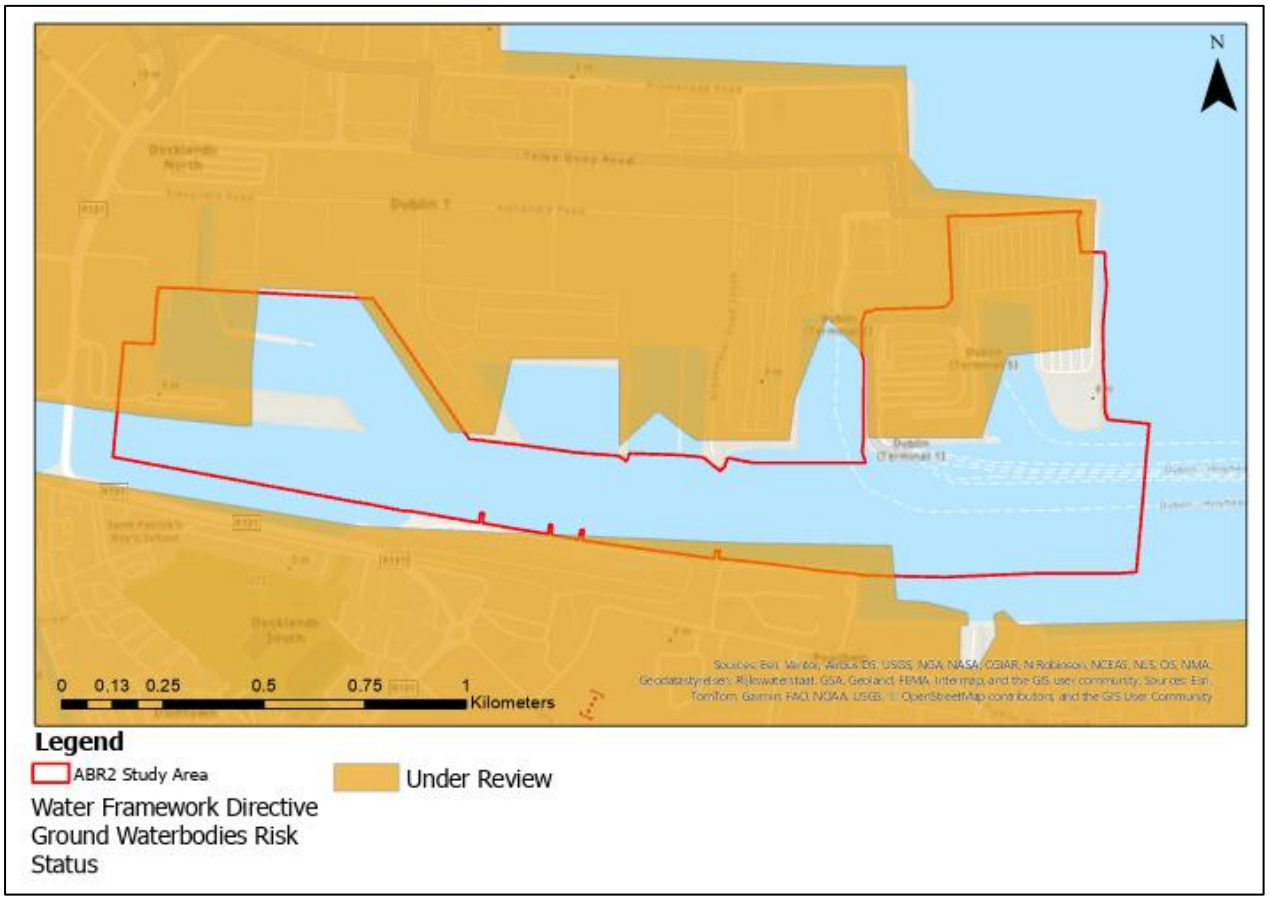
Figure 4.5 Water Framework Directive status 2013-2018 (taken from EPA maps)



4.6 Water Framework Directive

Groundwater Risk looks at the current water quality and trends and is used to highlight waterbodies that are at risk of deteriorating or being at less than Good status in the future. As seen in Figure 4.6, the site is categorised as being under review.

Figure 4.6 Water Framework Directive risk status (taken from EPA maps)

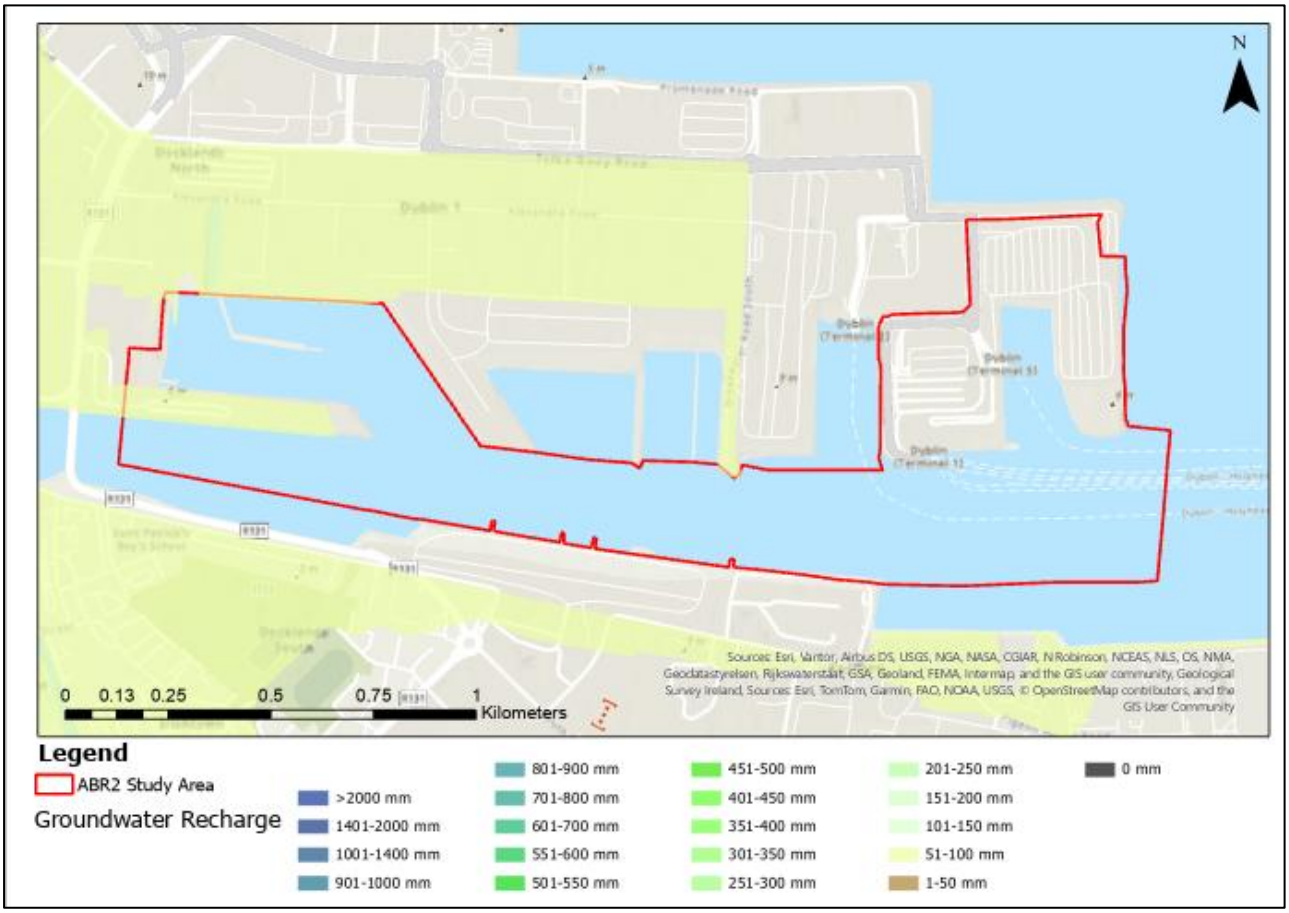


4.7 Groundwater Recharge

Diffuse recharge generally occurs via rainfall percolating through the subsoil and reaching the bedrock aquifer. Recharge is higher in areas where the subsoil is thinner and/or more permeable. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope.

Average recharge is 55mm/yr on the charted areas surrounding the site, with large proportions remaining unmapped. This does not account for leakage to the ground from water supply, storm drains and sewers.

Figure 4.7 Groundwater Recharge (taken from GSI)



4.8 Groundwater Wells and Springs

During consultation with the GSI GeoIndex web viewer, it was found that there were no groundwater wells and springs in a 500m radius of the site as per Figure 4.8

Figure 4.8 Groundwater Wells and Springs (taken from GSI)



4.9 Surface Water Hydrology

The River Liffey is the dominant surface water feature that runs through the centre of Dublin, flowing from west to east before discharging into the Irish Sea. The transitional water quality status for The River Liffey from 2018 to 2020 under the Water Framework Directive (WFD), is described as being good and unpolluted. The Dodder River flows into the River Liffey just west of Tom Clarke Bridge.

Figure 4.9 Surface Water Features (Mapping by GSI)



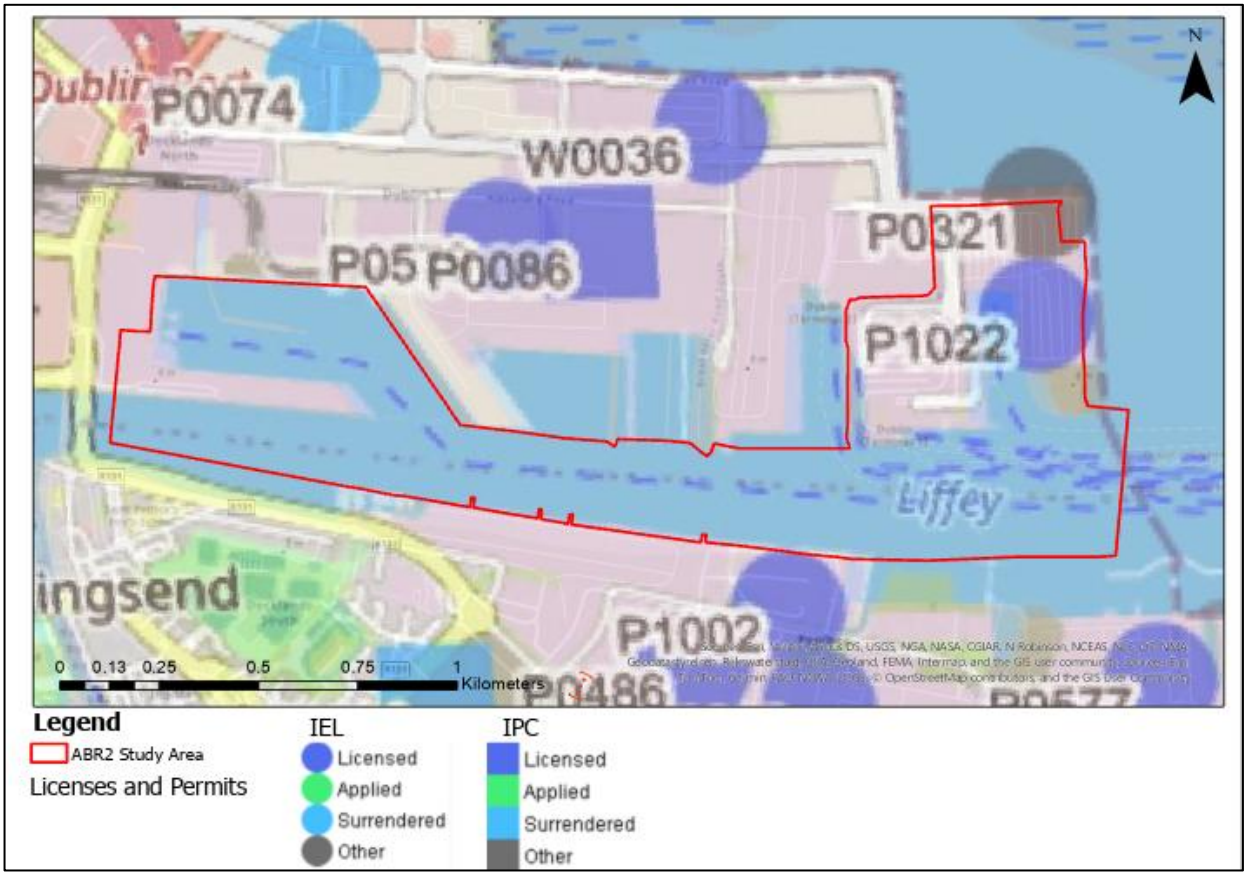
4.10 Licenses and Permits

A search was undertaken on the Environmental Protection Agency map viewer to investigate if any Industrial Emission licences (IELs) and Integrated Pollution Control (IPC) sites which are present surrounding the scheme area.

As seen below in figure 4.10, three IELs are present within a 500m radius of the proposed development areas. IEL P1022 is situated immediately east of Berth 52/53 Basin within Dublin Port Terminal 5 which is categorised as being licensed and industrial in nature. IEL PO579 (Electricity Supply Board) is situated c.390m northwest of Alexandra Basin West within the North Wall Power Station. The IEL is licensed and categorised as industrial. The IEL situated c.230m north of Bert 52/53 Basin (P0321) is registered as Asahi Synthetic Fibres (Irl) Limited categorised for industry.

A shown below in figure 4.10, one IPC is registered within 500m of the development areas. P0086 is registered as Irish Tar and Bitumen Suppliers, categorised for industry.

Figure 4.10 Industrial Emission Licences (IELs) and Integrated Pollution Control (IPC) (taken from EPA)



5 PREVIOUS INVESTIGATIONS & REPORTS

5.1 MP2

As part of the planning application process for the MP2 project, RPS undertook a contaminated land assessment in 2018 within the Berth 52/53 area which comprised a Preliminary Risk Assessment (PRA) desk study, intrusive ground investigation and production of a Generic Quantitative Risk Assessment report. The reports were produced in support of an Environmental Impact Assessment Report for the MP2 project. Planning permission (ABP-304888-19) for the MP2 project was granted in 2020.

5.1.1 Preliminary Risk Assessment Report

A PRA report was completed by RPS in April 2018 (Dublin Port Company, MP2 Project. Preliminary Risk Assessment (Desk Study) Report, IBR1085, April 2018). The report comprised a site walkover and desk study to collate information to identify potential sources of contamination.

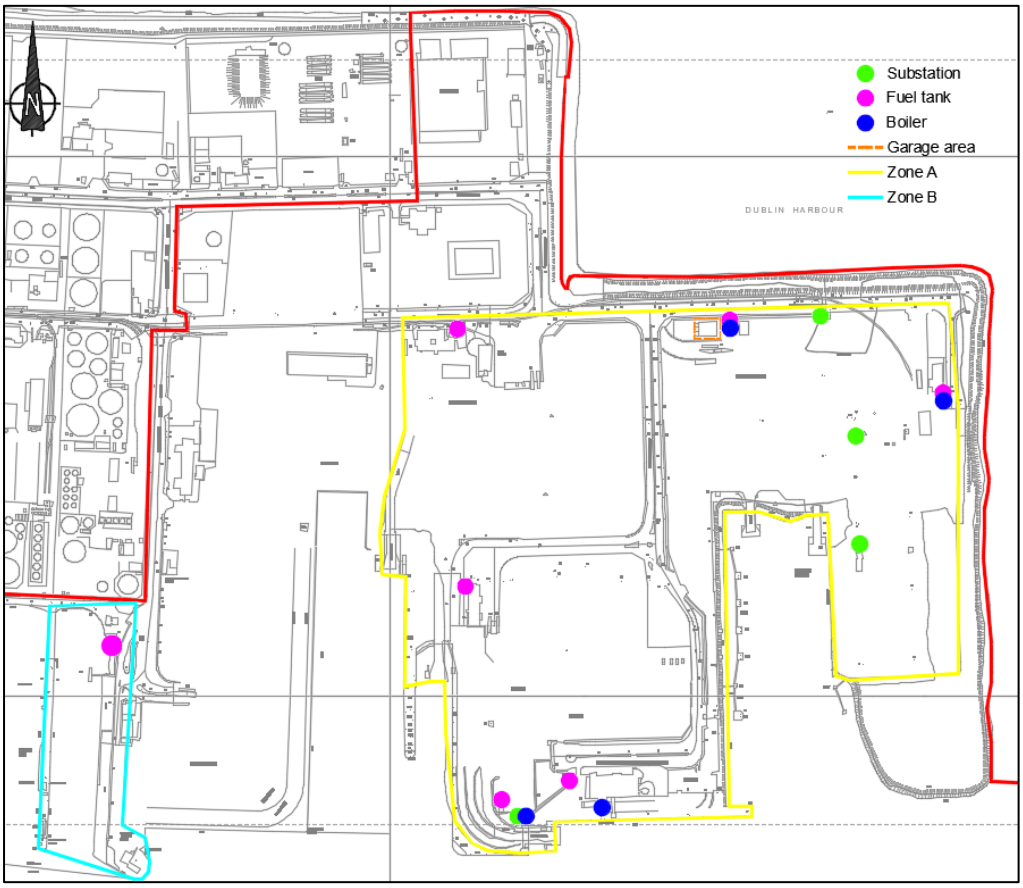
The site walkover undertaken in May 2018 identified the following potential sources of contamination. The potential sources are shown in Figure 5.1.

Three ferry terminals were situated within the Berth 52/53 area, including Terminal 1 Irish Ferries, Terminal 2 Stena Line and Terminal 5 Seatruck. Terminal 5 had a number of substations present on site, the age of these substations was unknown. A maintenance and refuelling area was present to the north of Terminal 5 with a fuel tank and generator present. Oil staining of the ground surrounding the existing fuel tank was present.

Three fuel tanks were identified on the Terminal 1 site. A fuel tank was present to the west of the freight office present in the northwest of Terminal 1. Another fuel tank was present to the west of the passenger office in the south of Terminal 1, with boilers present in the south of that building. Another fuel tank was present in the southwest of Terminal 1; significant oil staining of the ground surrounded this fuel tank. Oil drums, with a small amount of oil remaining in them, were present surrounding this oil tank. A generator and substation were present to the southeast of this oil tank.

A single oil tank was identified to the north of the Stena Line building on Terminal 2. This oil tank appeared to be relatively new and as such in very good condition.

Figure 5.1 Potential Sources of Contamination from 2018 PRA Report



5.1.2 Intrusive Ground Investigation

Following the completion of the PRA, an intrusive ground investigation was specified in order to collect soil and groundwater samples from the identified potential sources of contamination. The ground investigation (GI) was undertaken by Causeway Geotech during August 2018. The ground investigation comprised the following;

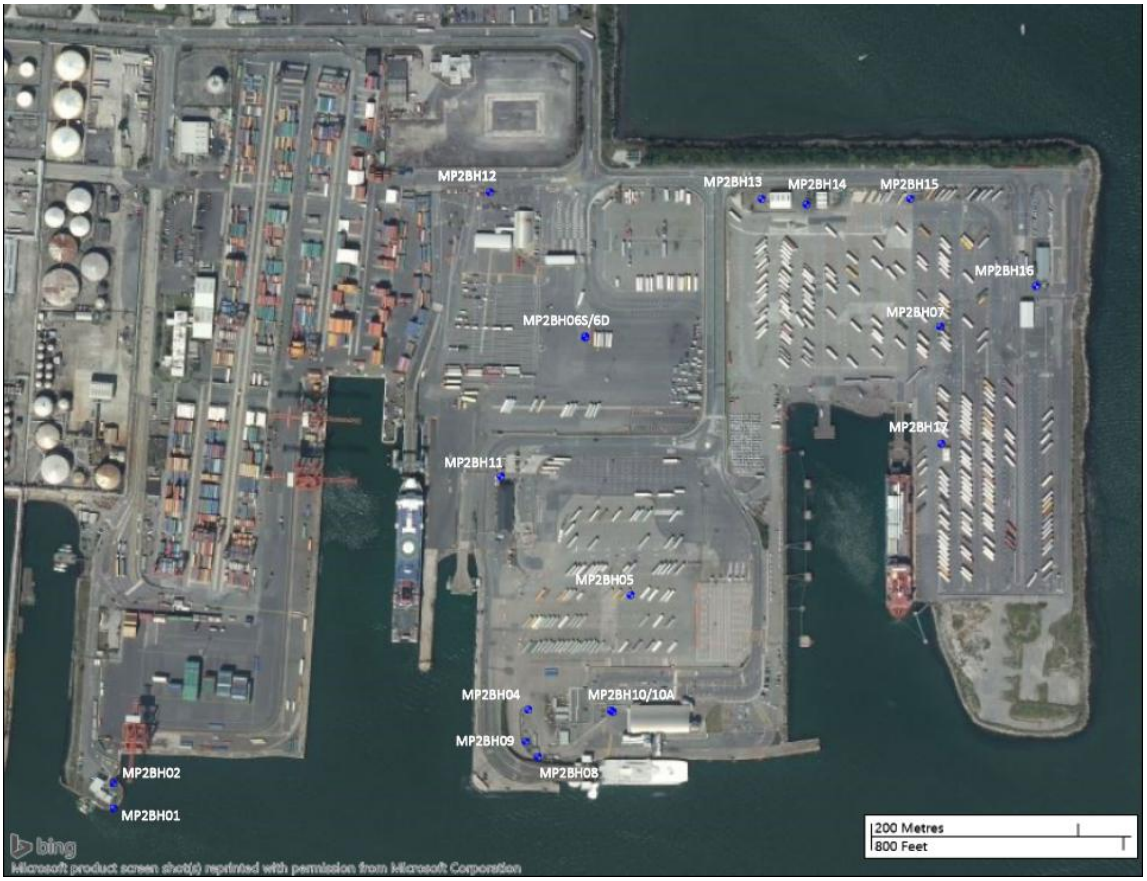
- Five (5) light cable percussion boreholes to a maximum depth of 12.0m below ground level (bgl) - BH01, BH02, BH04, BH06D and BH07.
- Thirteen (13) boreholes by dynamic (windowless) sampling methods to a maximum depth of 6.0m bgl.

Environmental soil samples were taken at regular intervals throughout the length of the excavation of each borehole. A single 50mm HDPE groundwater monitoring standpipe was installed in boreholes MP2BH01, MP2BH02, MP2BH07, MP2BH09 and MP2BH11-MP2BH17. Dual installations; one targeting the shallow groundwater body and other the

deeper groundwater body, were installed in boreholes MP2BH04 and MP2BH06D. Groundwater samples were collected from all the installed boreholes except BH07 and BH09 (boreholes dry) and BH11 (no access) in August 2018, following development and purging of at least three well volumes, to ensure a representative sample of groundwater was taken from each well.

The 2018 GI locations are shown in Figure 5.2.

Figure 5.2 2018 Ground Investigation Locations



5.1.3 Ground Conditions Encountered

The ground conditions encountered during the 2018 investigation are summarised below.

- Topsoil/concrete
- Made ground
- Gravel
- Sand
- Clay
- Gravel

Made Ground

Made ground was identified at all borehole locations to a maximum depth of 6.00m bgl. The made ground was not consistent in nature across the site; it was identified as a sand, silt, clay and gravel at different locations and depths. In places the made ground was noted to contain pieces of red brick and concrete.

Gravel

Deposits of dense grey sandy silty subangular to subrounded fine to coarse gravel with low cobble and boulder content were encountered at BH01 between 4.9m and 7.9m bgl.

Sand

Deposits of loose to dense greyish black gravelly silty fine to coarse sand, gravel is subangular to subrounded fine to coarse were encountered at BH06 between 4.8m and 7.1m bgl, BH04 between 6m and 9.2m bgl and BH01 between 7.9m and 8.8m bgl.

Clay

Deposits of clay in the form of soft grey sandy organic clay, sand is fine to coarse were encountered at BH06 between 7.1m and 11.5m bgl.

Gravel

Deposits of greyish black slightly silty subangular to subrounded fine to coarse gravel were encountered at BH04 between 9.2m and 12m bgl.

5.1.4 Groundwater

Groundwater monitoring installations were targeted to the shallow groundwater within the made ground. Follow on groundwater level monitoring was undertaken on one occasion in August 2018. No discernible direction of groundwater flow could be interpreted from the one monitoring round completed. It is likely that the shallow groundwater within the made ground is in hydraulic conductivity with the deeper deposits as the made ground has been shown to directly overlie deposits of sands and gravels. It is also possible that groundwater is in hydraulic conductivity with the surrounding water bodies; River Liffey and Dublin Bay.

5.1.5 Laboratory Analysis

Twenty-four (24) soil samples were sent to Chemtest for analysis. Samples were analysed for a mixture of; pH, Sulphate (2:1 water soluble as SO4), Sulphur (elemental), Sulphur (total), Cyanide (total), Asbestos identification, ACM type, Arsenic, Barium, Beryllium, Boron (hot water soluble), Iron

(total), Cadmium, Chromium (total), Copper, Mercury, Nickel, Lead, Selenium, Vanadium, Zinc, Chromium (hexavalent), Organic matter, Total Petroleum Hydrocarbons (TPH-CWG C5 – C35 aromatic-aliphatic split), speciated Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), speciated Poly Chlorinated Biphenyls (PCBs) and Phenols (speciated HPLC).

Groundwater samples were collected from all the installed boreholes except BH07 and BH09 (boreholes dry) and BH11 (no access) in August 2018, following development and purging of at least three well volumes, to ensure a representative sample of groundwater was taken from each well. Surface water samples were also taken; as shown on Figure 9 SW1 was taken in proximity to the Port Operations Centre, SW2 at Irish Ferries and SW3 at Seatruck. The groundwater and surface water samples were analysed for metals, phenols, TPH-CWG, speciated PAHs, PCBs, VOCs and SVOCs.

5.1.6 Risk Assessment

The information gathered during the ground investigation was used to complete a generic quantitative risk assessment (GQRA) report (Dublin Port Company, MP2 Project. Generic Quantitative Risk Assessment (GQRA) Report. RPS, IBR1085, September 2018).

5.1.6.1 Soils

The risk to site end users from identified sub-soil contamination (Asbestos and Lead) was minimal due to the emplacement of hard-standing across the site.

5.1.6.2 Shallow groundwater

The shallow groundwater was identified to be impacted by elevated levels of Nitrate as N, Arsenic, Chromium (total), Lead, Nickel and Zinc. Shallow groundwater on site was not considered to be a controlled water and does not represent an exploitable source of groundwater.

5.1.6.3 Deep groundwater

Shallow groundwater was considered likely to be in hydraulic conductivity with deep groundwater due to the permeable nature of the strata encountered across the site. Similar exceedances to those demonstrated within the shallow groundwater were determined in the deeper groundwater, reinforcing that these groundwater bodies are likely to be in hydraulic conductivity.

5.1.6.4 Surface water

No significant contamination was identified within the surface water samples.

5.1.6.5 Risk assessment conclusions

The 2018 risk assessment concluded that any risk from soil contamination would be managed due to the presence of hardstanding which would break the source-pathway-receptor linkage.

The groundwater and surface water did not show any impact from hydrocarbon contamination despite the presence of a number of fuel storage tanks across the site.

5.2 Controlled Waters Risk Assessment

In support of the application for an Industrial Emissions (IE) license (discussed further in Section 6.0), RPS undertook a Controlled Waters Risk Assessment (Dublin Port – Alexandra Basin Redevelopment. Controlled Waters Risk Assessment. RPS, RCEI33367-001R, March 2015) to evaluate potential impacts on surface water (primarily the River Liffey) arising from the proposed reuse of stabilised dredged sediments to infill Graving Dock No.2 and Berths 52/53 as part of the Alexandra Basin Redevelopment Project.

5.2.1 Intrusive Ground Investigation

An intrusive ground investigation was carried out between January and February 2015 in the area around Berth 52/53. The investigation comprised nine (9) hollow stem auger boreholes to a maximum depth of 18.45m bgl. All boreholes were installed with monitoring standpipes and seven were installed with dual installations to target shallow groundwater in the made ground and deeper groundwater within the underlying sands and gravels.

Fifteen (15) groundwater samples and two (2) surface water samples were collected from the monitoring boreholes on 20th February 2015.

5.2.2 Ground Conditions Encountered

The geology encountered around Berth 52/53 consisted of Made Ground, underlain by Estuarine deposits. The Glacial Till and Limestone were not encountered during the RPS site investigation. The Made Ground generally comprised gravelly sandy clay, sandy gravel and cobbles of brick and concrete, it was between 3.4 – 5.6m in thickness. The Superficial Deposits encountered below the Made Ground generally comprised silty sandy gravel and silty sand. These deposits were encountered to the maximum depth of all the boreholes between 15.0m.bgl to 15.45m.bgl.

5.2.3 Groundwater

Groundwater was encountered in all nine boreholes during excavation at depths of between 2.9m.bgl and 3.4m.bgl adjacent to Berth 52/53.

Follow on hydraulic conductivity testing was undertaken in twelve (12) of the standpipes. The overall effect of tidal influence was measured using in-situ groundwater monitoring loggers in both boreholes screened in the Made Ground and boreholes screened through the superficial deposits. Highly variable groundwater levels were recorded in groundwater within Made Ground and Superficial deposits adjacent to Berth 52/53. Groundwater fluctuations within Made Ground varied between approximately 1.0m and 2.5m in BH6, BH7, BH8, BH10 and BH12. Monitoring of groundwater within Superficial deposits indicated a fluctuation of groundwater of approximately 3.0m in BH6, BH7, BH8, BH10 and BH12.

5.2.4 Detailed Quantitative Risk Assessment

A detailed quantitative risk assessment was carried out to assess the potential impacts the infilling of Berth 52/53 may have the on the River Liffey. The risk assessment was carried out using the UK Remedial Targets Worksheet (in absence of an equivalent Irish Model), which was used to determine if the levels of contaminants which may leach from treated dredgings into the River Liffey were acceptable.

An assessment of site specific conditions were carried out using data acquired from the site investigations and published data. Models were produced which derived acceptable levels (i.e. below the EU Surface Water Objectives - for the majority of contaminants) of contamination that could be leached from the infilled areas into the River Liffey. Analytical data of samples collected from the River Liffey upstream and downstream of Alexandra basin identified elevated concentrations of arsenic, cadmium and TBT. The presence of TBT in these samples suggested that the quality of the River Liffey had been impacted by contamination associated with historical use of Port. It was likely that the primary source of TBT in the River Liffey was contamination in sediments associated with Alexandra Basin.

The model assumed leaching of the entire source area and did not take into account the structural integrity of the treated sediments, in reality leaching of the infilled areas would be confined to the surface area and the area around the cracks. The models were run with steady state conditions (i.e. no declining source term); this did not reflect reality as leaching would occur gradually over time.

The models did not account for existing physical structures or physical structures that will be present post development. The modelling process was therefore considered to have a high level of conservatism and in reality it was considered that these parameters were likely to reduce the amount of contaminant that leaches and the rate of leaching from the source area.

The batch leachate data indicated that the stabilisation process significantly reduced the leachable concentrations of the vast majority of contaminants including metals, TBT, PAHs and PCBs. This suggested that the process will result in a significant betterment of conditions.

The maximum predicted average aquifer concentrations (10 years) as derived by the Conceptual Design Model developed based on the preliminary tank test analytical data were less than the derived Remedial Target Criteria (RTCs). This provided evidence to suggest that the predicted time averaged concentrations of TBT and nickel will be less than published assessment criteria and the RTCs derived by RPS. Based on this assessment the predicted impact on surface waters (the River Liffey) was less than the published and site specific derived target concentrations.

6 INDUSTRIAL EMISSIONS LICENSE

6.1 Dublin Port IE License

Works associated with the original ABR Project commenced in 2016 and were consented under Strategic Infrastructure Development (SID) consent (Ref. PL 29N.PA0034). Works are also subject to an Industrial Emissions (IE) licence issued by the EPA (Licence Register No: P1022-02) to regulate the treatment of contaminated dredge material within a licenced boundary at the port. IE Licence P1022-02 is for the ex-situ treatment by stabilisation/solidification of contaminated dredge material sourced from the ABR Project. The treated waste under the terms of the IE Licence is to be utilised to undertake infilling at two locations within the Dublin Port area, namely at the decommissioned Graving Dock No.2 and at Berths 52/53. A total of 1,262,800 tonnes of dredge sediment will be treated and recovered over the lifetime of the activity.

Due to the Port's operational requirements, the treatment and infilling of the treated materials have been undertaken on a phased basis.

During the initial phase (Phase 1) dredging activities resulted in the removal of approximately 97,000m3 (net dredged material, pre-bulking) of sediments from ABW to a maximum standard depth of -8mCD. The dredged sediments were taken ashore, treated and used to infill Graving Dock No.2, with a portion of the treated material exceeding the capacity of Graving Dock No.2 stockpiled in a temporary bund adjacent to the Berth 52/53 basin in accordance with the conditions of the IE Licence granted by the EPA.

6.2 Monitoring

As part of the license conditions, regular monitoring of groundwater (GW) in the vicinity of Berth 52/53 is required. Monitoring is also undertaken on storm water emissions (SWO) and wastewater emissions to water (WW1). The monitoring locations are shown in Figure 6.1.

Figure 6.1 IE License Monitoring Locations at Berth52/53



Groundwater was sampled from the boreholes (GW6A&B, GW7A&B, GW8A&B, GW10A&B and GW12C-S&D) surrounding Berth 52/53 on the following occasions.

- July 2019 – November 2019 (monthly)
- February 2020 – May 2021 (monthly)
- January 2022 – February 2022 (monthly)
- May 2023 (Annually)
- December 2024 (Annually)

6.3 Laboratory Analysis

In accordance with the IE License, the groundwater samples were analysed for the following parameters.

- General Inorganics
- Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Chromium VI)
- Organotins (TBT and DBT)

- Speciated Hydrocarbons (Aliphatic and Aromatic C5-C44)
- Speciated 16 PAHs
- VOCs
- SVOCs
- PCBs (7)
- pH, electrical conductivity, Chemical Oxygen Demand
- Nitrate
- Ammonia
- Chloride and Fluoride
- Total Nitrogen
- Nitrate as NO3

6.4 Summary of Results

A brief summary of the groundwater monitoring results from around Berth 52/53 is provided in the following sections.

6.4.1 Heavy Metals

Concentrations of heavy metals in the samples show no long-term worsening or improvement trend with infrequent exceedances over the screening values.

6.4.2 Organotins

No exceedances of Organotin compounds (Tributylin TBT) were recorded during the monitoring.

6.4.3 Hydrocarbons

Across all monitoring rounds from 2019-2024, no exceedances of any petroleum hydrocarbons were recorded in any of the samples from the boreholes.

6.4.4 Polycyclic Aromatic Hydrocarbons (PAHs)

Across all monitoring rounds from 2019-2024, no exceedances of any PAHs were recorded in any of the samples from the boreholes.

6.4.5 Semi-Volatile Organic Compounds (SVOCs)

Across all monitoring rounds from 2019-2024, no exceedances of SVOCs were recorded in any of the samples from the boreholes within the study area. VOCs show a stable, long-term pattern of non-detect results across all samples and all sampling rounds (2019–2024), with no exceedances and no temporal or spatial trends.

6.4.6 Volatile Organic Compounds (VOCs)

Across all sampling rounds in the dataset, no volatile organic compound (VOC) exceedances were reported for any of the samples from the boreholes within the study area. VOCs show a stable pattern of non-detect or below-limit results across all wells and monitoring rounds (2019–2024), with no exceedances and no temporal or spatial trends.

6.4.7 Summary Overview

The monitoring from 2019 to 2024 provides a good baseline for groundwater quality within the vicinity of Berth 52/53. Groundwater quality is good overall with stable low levels of TBT, Hydrocarbons, PAHs, VOCs and SVOCs with no temporal or spatial trends. Some exceedances of heavy metals were noted but overall, there was no significant trend or change in metal concentrations in the groundwater samples.

7 Overview of Potential Contamination

7.1 Introduction

The nature of potential contamination that may have arisen from current and past activities on and surrounding the site is considered below.

7.2 On site sources

7.2.1 Current land Use

Alexandra Basin West and Berth 52/53 are currently used for various port activities including cargo handling and freight logistics and commercial shipping activities.

The 2018 studies undertaken in support of the MP2 application identified a number of potential sources of contamination including fuel storage. However, the ground investigation and contamination assessment identified minimal ground and groundwater contamination.

The groundwater monitoring undertaken around Berth 52/53 from 2019 to 2024 as required under the Industrial Emissions (IE) licence issued by the EPA (Licence Register No: P1022-02), identified good groundwater quality overall with stable low levels of TBT, Hydrocarbons, PAHs, VOCs and SVOCs with no temporal or spatial trends.

7.2.2 Previous Land Use – Historical Development

The area of Berth 52/53 has been reclaimed and infilled with made ground material. The 2018 studies did not identify any significant sources of contamination associated with this material.

Environmental sampling of sediment within ABW has demonstrated that the bed of the basin is contaminated with a range of heavy metals, Dibutyl Tin (DBT) and Tributyl Tin (TBT) as a result of past ship maintenance and repair activities and the handling of lead and zinc ores. Levels of contamination of existing materials within ABW results in this material being unsuitable for disposal at sea.

7.2.3 Ground Borne Gases

Made ground or organic rich alluvial soils underlying the site would have the potential to generate elevated levels of ground gases. However, no new buildings are proposed as part of the ABR2 development.

7.3 Off Site Sources

7.3.1 Surrounding Land Uses – Current

A number of potential sources of contamination have been identified surrounding the proposed development areas of the ABR2 project which include fuel storage and various commercial shipping and freight activities. The 2018 studies for the MP2 project did not identify any significant ground or groundwater contamination from off-site sources.

7.3.2 Surrounding Land Uses – Historical

Historical development in the area surrounding the site has included a shipbuilding yard, railway line, timber yard, coal yard, chemical manure works and a number of oil tanks.

8 Conceptual Site Model and Risk Assessment

8.1 Conceptual Site Model

Risk estimation involves detailed evaluation of source - pathway - receptor scenarios to determine whether a linkage exists between any sources of contamination and potential receptors. A risk exists where a receptor is exposed to a source of contamination, via a pathway. If any element of the source-pathway-target linkage is absent, then no risk is present.

In order to consider potential risks at the site, a conceptual site model was developed, to examine the potential source - pathway - receptor linkages that may exist on the site. The conceptual model and the risk assessment for the site are illustrated in Table 8.1.

Table 8-1 Risk Assessment and Conceptual Site Model

Risk Assessment & Conceptual Site Model				
Source	**Potential Pathway(s)**	**Potential Receptors(s)**	**Source – Pathway – Receptor Linkage**	**Further Investigation Required**
On Site Sources				
Contaminants within the soils and groundwater	Dermal contact, ingestion of/and direct inhalation of potential contaminants present within soil	Humans in form of future site users	No significant SPR linkage. The investigation and assessments undertaken in 2018 did not idenitfy any significant SPR linkages. Groundwater monitoring at Berth 52/53 as required under the IE License has not identified any significant groundwater contamination.	**No**
	Subsurface infiltration, leaching from sub-soils and groundwater flow Surface run-off	Perched groundwater, bedrock aquifer, South Dublin Bay and River Tolka Estuary SPA, River Liffey		
Contaminants in dredged sediment	Subsurface infiltration, leaching from sub-soils and groundwater flow Surface run-off	Perched groundwater, bedrock aquifer, South Dublin Bay and River Tolka Estuary SPA, River Liffey	No SPR linkage. Dredged sediment will be remediated and treated under an existing IE License	**No**
Soil gas: Made Ground or highly organic soils may contain high organic content that is degrading and producing Methane, Carbon dioxide and depleted Oxygen gases	Migration along cracks in foundations and service trenches	Humans in the form of future site users	No SPR Linkage. No new buildings are proposed as part of the ABR2 project and as such risks from ground gas are not relevant.	**No**
Off Site Sources				
Current and historical surrounding land uses	Subsurface infiltration, leaching from sub-soils and groundwater flow Surface run-off	Perched groundwater, bedrock aquifer, South Dublin Bay and River Tolka Estuary SPA, River Liffey	No significant SPR linkage. The investigation and assessments undertaken in 2018 did not idenitfy any significant SPR linkages from	**No**

			off-site sources of contamination..	

9 Conclusions and Recommendations

9.1 Conclusions

- The desk study has highlighted that the study area has been investigated and assessed previously in support of the planning application for the MP2 project.
- Contaminated dredged sediments will be treated and remediated under the existing IE License.
- No significant source-pathway-receptor linkages were identified and the risk to environmental and human health receptors from ground contamination is low.

Appendix A

Historical Maps

MapGenie 6 Inch First Edition Black & White (c.1830s)



MapGenie 25 Inch (c.1890s)



Appendix B

Previous Reports

Contents

1 Introduction 1
1.1 Report objectives and scope 1
1.2 Sources of information 1
2 Site description 3
2.1 Introduction 3
2.2 Study area 3
2.3 Surrounding land-use 6
3 Site history 7
3.1 Historical development of the site 7
4 Site geology & hydrogeology 8
4.1 Site geology 8
4.2 Hydrogeology 10
4.3 Groundwater vulnerability 11
4.4 Surface water hydrology 12
4.5 Licenses and permits 12
5 Previous site investigation 15
5.1 Dublin Port IED application 15
5.2 GSI Geotechnical viewer 17
5.2.1 Port Operations Centre 17
5.2.2 North east of Oil Berth 4 18
5.2.3 Terminal 5 19
5.2.4 Terminal 1 20
5.2.5 Terminal 2 21
6 Consultation 22
7 Overview of potential contamination 23
7.1 Introduction 23
7.2 On site sources 23
7.2.1 Current land use 23
7.2.2 Previous land use – historical development 23
7.2.3 Ground borne gases 23
7.2.4 Radon gas 23
7.3 Off site sources 24
7.3.1 Surrounding land uses – current 24
7.3.2 Surrounding land uses – historical 24
8 Conceptual Site Model and Risk Assessment 25
8.1 Conceptual Site Model 25
9 Conclusions and recommendations 28
9.1 Conclusions 28
9.2 Recommendations 28

Figures

Figure 1 Site location
Figure 2 Site layout plan
Figure 3 Potential sources of contamination
Figure 4 Solid geology (taken from GSI's Spatial Resources portal)
Figure 5 Sub soils (taken from GSI's Spatial Resources portal)
Figure 6 Groundwater aquifer (taken from GSI's Spatial Resources portal)
Figure 7 Groundwater vulnerability (taken from GSI's Spatial Resources portal)
Figure 8 IELs and IPC sites in vicinity of site
Figure 9 IPPC sites in vicinity of site
Figure 10 IED licence monitoring locations

Tables

Table 1 Application site details
Table 2 Surrounding land uses
Table 3 Historical site and surrounding area development
Table 4 Dublin Port IED application BH6 – February 2015
Table 5 Dublin Port IED application BH7 – February 2015
Table 6 Dublin Port IED application BH8 – February 2015
Table 7 Dublin Port IED application BH10 – February 2015
Table 8 Borehole 134491 – GSI Report 5533 (March 2003)
Table 9 Borehole 134492 – GSI Report 5533 (March 2003)
Table 10 Borehole 92269 – GSI Report 2813 (March 1971)
Table 11 Borehole 92270 – GSI Report 2813 (March 1971)
Table 12 Borehole 92262 – GSI Report 2816 (June 1969)
Table 13 Borehole 92265 – GSI Report 2816 (June 1969)
Table 14 Borehole 92476 – GSI Report 2847 (December 1997)
Table 15 Borehole 121168 – GSI Report 4170 (November 1999)
Table 16 Risk Assessment & Site Conceptual Model

Appendices

Appendix A Photographic record of site walkover
Appendix B Relevant IED borehole logs
Appendix B GSI Geotechnical viewer borehole logs

1 Introduction

RPS was appointed by Dublin Port Company to undertake a Preliminary Risk Assessment (Desk Study) Report for the proposed MP2 Project. The MP2 project will include the amalgamation of three existing ferry terminals into one, infilling to the east of oil berth 4, demolition of a number of existing buildings and the end of the old eastern breakwater, and extension of a number of berths.

This report describes the research and assessments undertaken to assess the ground conditions and potential for any ground contamination that may have arisen from the site's present and historical use.

1.1 Report objectives and scope

The objectives of this report are as follows:

- Collate desk study information regarding the site and surrounds to allow the identification of potential contaminant sources, potential pathways and potential receptors in accordance with DEFRA's Contaminated Land Report 11. This will form the basis of the Preliminary Risk Assessment and production of a Conceptual Site Model (CSM).
- Collation of existing geo-environmental data to facilitate a risk assessment with regards to potential risks to human health and environmental risks.
- Assessment of the above to determine if intrusive investigation and further assessment will be necessary.

1.2 Sources of information

Sources of information used in the production of this report include:

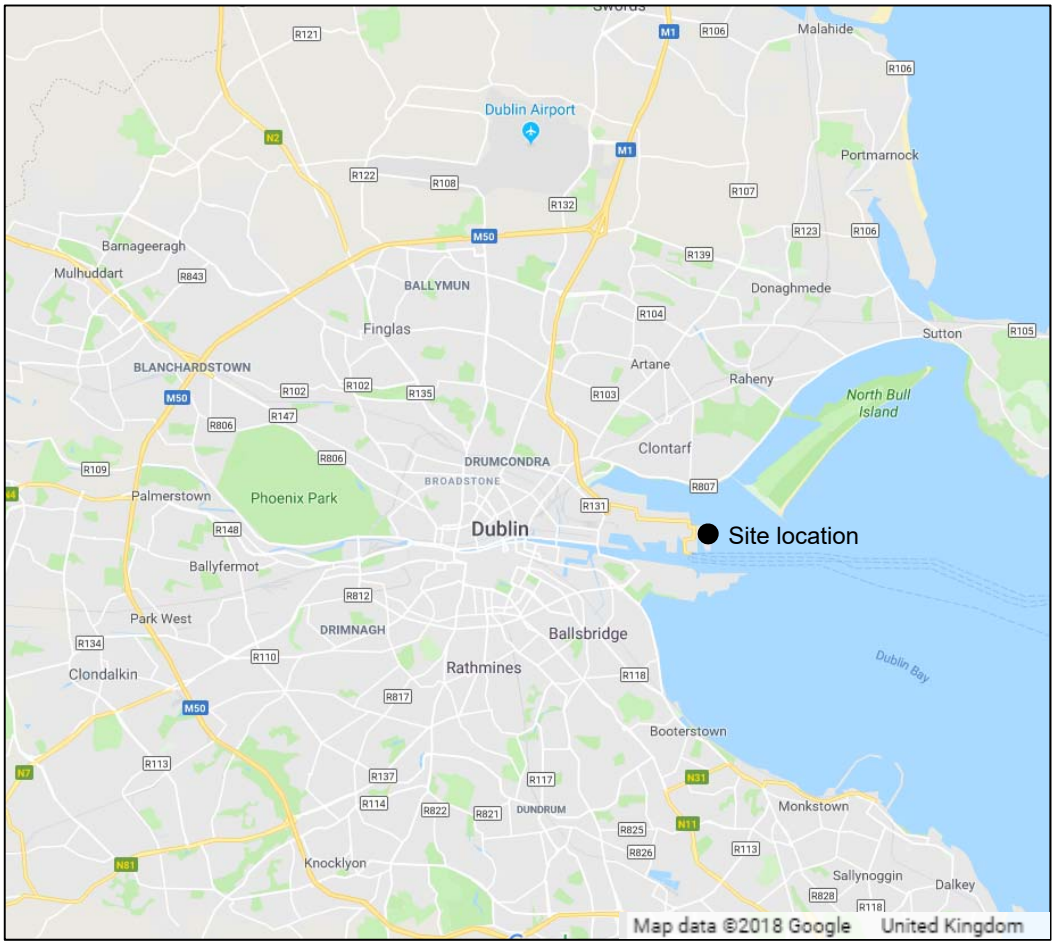
- Internet based aerial photography
- Ordnance Survey Ireland mapviewer (http://maps.osi.ie/publicviewer/#V2,719558,734710,9,7)
- Geological Survey Ireland Spatial Resources Map Viewer – Department of Communications, Climate Action and Environment (http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228)
- Environmental Protection Agency Radon Map (http://www.epa.ie/radiation/radonmap/)

- Geological Survey of Ireland Geotechnical Data Viewer (http://spatial.dcenr.gov.ie/GeologicalSurvey/GeoTechnicalViewer/index.html)
- Environmental Protection Agency map viewer (https://gis.epa.ie/EPAMaps/)

2 Site description

2.1 Introduction

Figure 1 Site location



As shown on Figure 1, the proposed MP2 Project is located at the eastern end of Dublin Port, approximately 4km east of Dublin city centre.

2.2 Study area

A site walkover was completed by RPS personnel on 1st May 2018; a photographic record of the site walkover is included in Appendix A. The planning boundary for the proposed MP2 redevelopment is shown on Figure 2.

Figure 2 Site layout plan

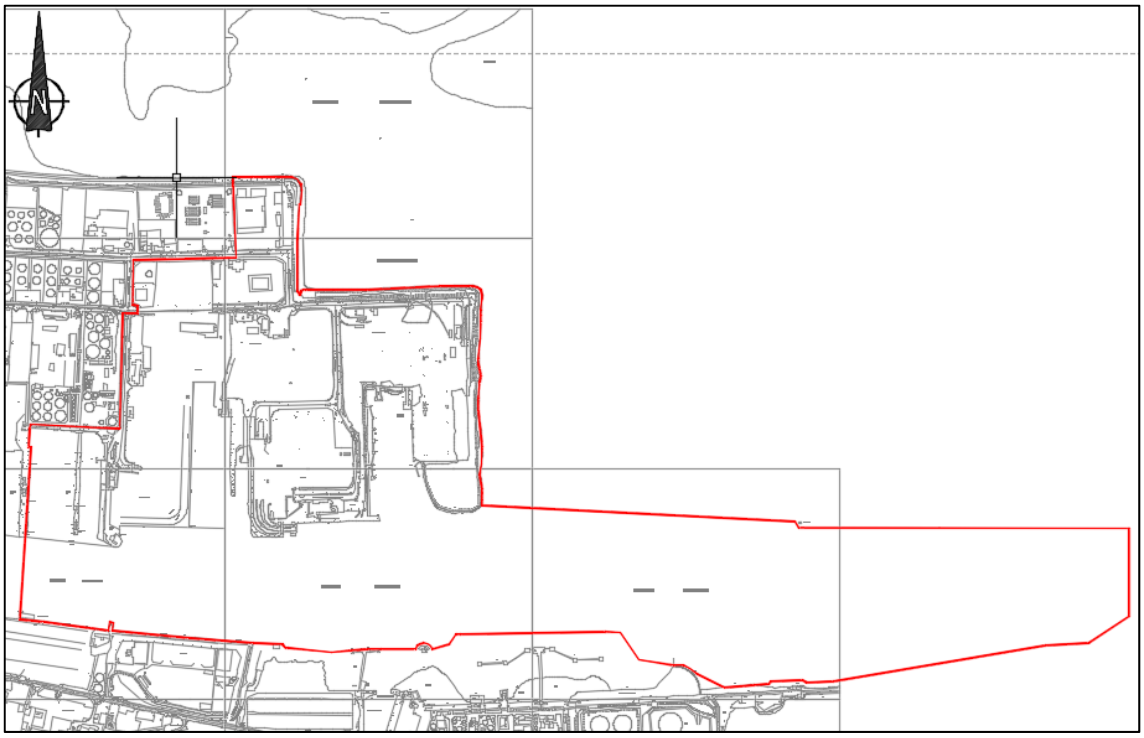
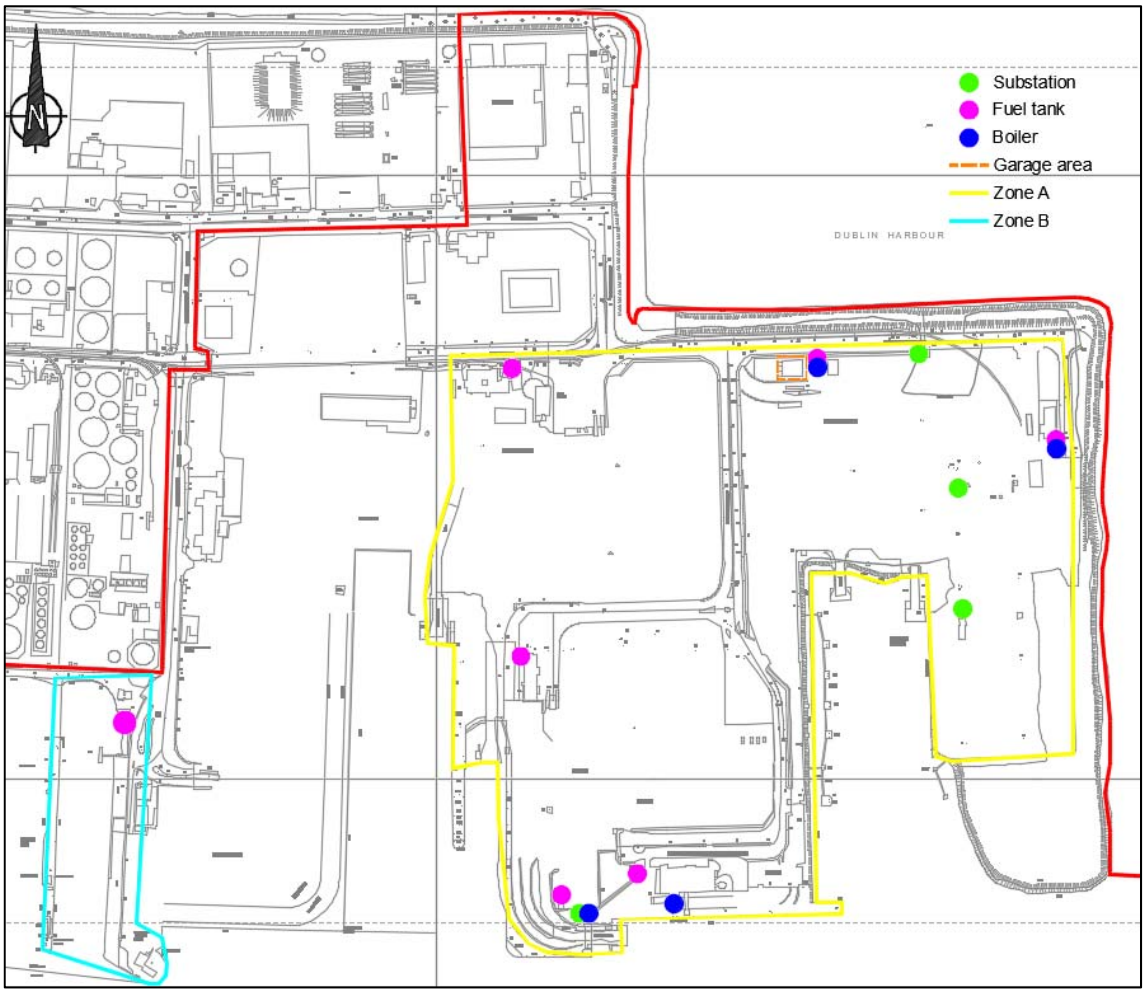


Figure 3 Potential sources of contamination



As shown in Figure 3, a number of potential sources have been identified within the land based area of the proposed MP2 project. It should be noted that a number of structures are to be demolished in advance of the MP2 project as part of other permissions. This includes the warehouses present in the north of the site, which are used by a number of businesses including Ecocem. Ecocem use part of the building for storing and distributing their cement products.

Zone A represents the existing ferry terminals while Zone B represents the area to the east of Oil Berth 4 to be infilled and the end of the old eastern breakwater (to be demolished).

Zone A currently consists of three separate ferry terminals; Terminal 1 Irish Ferries, Terminal 2 Stena Line and Terminal 5 Seatruck. The identified fuel tanks, substations and generators/boilers within Zone A are demonstrated on Figure 3. The existing Terminal 5 has a number of substations present on site; the age of these substations in unknown. A maintenance and refuelling area is present to the north of Terminal 5 with a fuel tank and generator present. Oil staining of the ground surrounding the existing fuel tank is obvious.

Three fuel tanks were identified on the Terminal 1 site. A fuel tank is present to the west of the freight office present in the north west of Terminal 1. Another fuel tank is present to the west of the passenger office in the south of Terminal 1, with boilers present in the south of that building. Another fuel tank is present in the south west of Terminal 1; significant oil staining of the ground surrounds this fuel tank. Oil drums, with a small amount of oil remaining in them, are present surrounding this oil tank. A generator and substation are present to the south east of this oil tank.

A single oil tank was identified to the north of the Stena Line building on Terminal 2. This oil tank appeared to be relatively new and as such in very good condition.

A single oil tank is present to the north east of Oil Berth 4 in Zone B. A large area of bitumen and tar storage is present directly north of Zone B. This area is managed by Hugh Munro & Company Ltd and contains storage for Irish Bitumen Storage Ltd, Dublin Joint Fuels Terminal and Irish Tar & Bitumen Suppliers.

Table 1 Application site details

Site address	Tolka Quay Road, Dublin Port, Dublin, Ireland
Grid reference	320277E 234742N
Estimated site area	57 hectares

2.3 Surrounding land-use

The pertinent surrounding land uses of the site are given in Table 2.

Table 2 Surrounding land uses

Boundary	Surrounding land uses of the proposed development
North	South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) is present to the north of the site.
East	South Dublin Bay and River Tolka Estuary SPA is present to the east of the site.
South	The River Liffey is present to the south of the site. Poolbeg Peninsula is present to the south of the River Liffey.
West	Various industrial activities of Dublin Port are present to the west of the site.

3 Site history

3.1 Historical development of the site

Two historical maps of the area are provided on the Ordnance Survey Ireland mapviewer; a six inch map from c. 1830s and a twenty-five inch map from c. 1890s. Table 3 provides a summary of potentially contaminating activities during the history of both the site and its surrounding area.

Table 3 Historical site and surrounding area development

Date	Site history	Surrounding land use history
c. 1830s	The site is undeveloped; it consists of mud flats that have not been reclaimed for development.	A Harbour, barracks and Pigeon House Fort have been developed to the south of the site, on the opposite bank of the River Liffey. A number of potentially contaminating land uses are present a significant distance to the west of the site where the land extends to, including a glass works and a vitriol works.
c. 1890s	A breakwater has been developed where the modern day Breakwater Road is present.	Increased development is present in the area to the west of the site. Dublin Port has extended closer to the site with a number of quay extensions, a shipbuilding yard, railway line, timber yard, coal yard, chemical manure works and a number of oil tanks present. Increased development is also present on the opposite bank of the River Liffey with electricity works and outfall works present surrounding Pigeon House Fort.

By 1907, many of the principal features of the deepwater port in Dublin were established, including the shipbuilding yard, the North Wall graving dock and the North Quay Extension, which formed the south side of the deepwater facility. Alexandra Quay was built in the 1920s (placed along the north side of Alexandra Basin) and Alexandra Quay East, Ocean Pier, and a number of Oil Jetties were completed by 1955. A new phase of reclamation works was initiated at this time and pushed the boundaries of the port northwards, along the East Wall, towards the Clontarf shoreline. Further reclamation works to the east define the current extent of Dublin Port; most of the area relevant to the MP2 redevelopment is within the most recently reclaimed area.

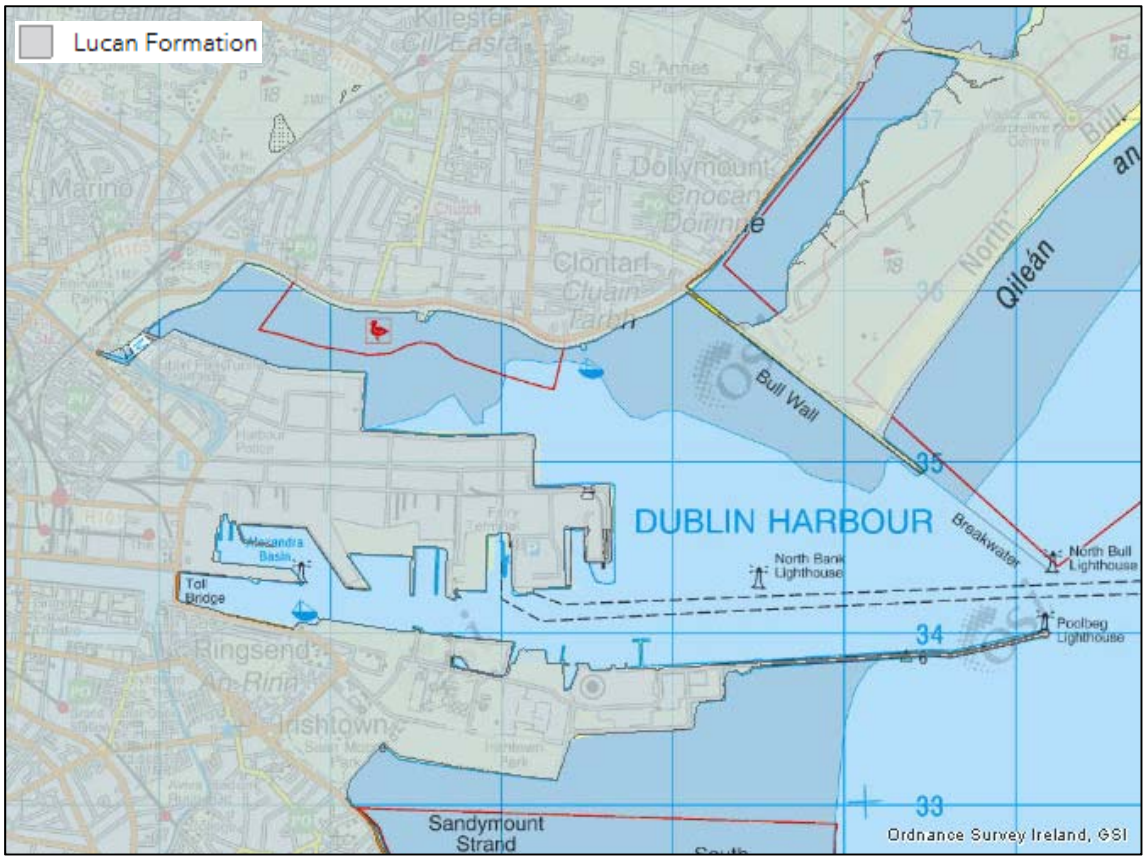
4 Site geology & hydrogeology

4.1 Site geology

Information held online by Geological Survey Ireland at their Spatial Resources Map Viewer was used to identify the geological and hydrogeological conditions of the site. The following describes the findings of this preliminary research.

Solid geology

Figure 4 Solid geology (taken from GSI's Spatial Resources portal)



The bedrock geology anticipated in the vicinity of the site is shown on Figure 4. The entire Dublin area is underlain by the Lucan Formation. The formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are also rare, dark, coarser grained, calcarenitic limestones, which are sometimes graded, present. The formation ranges from 300m to 800m in thickness and is Carboniferous.

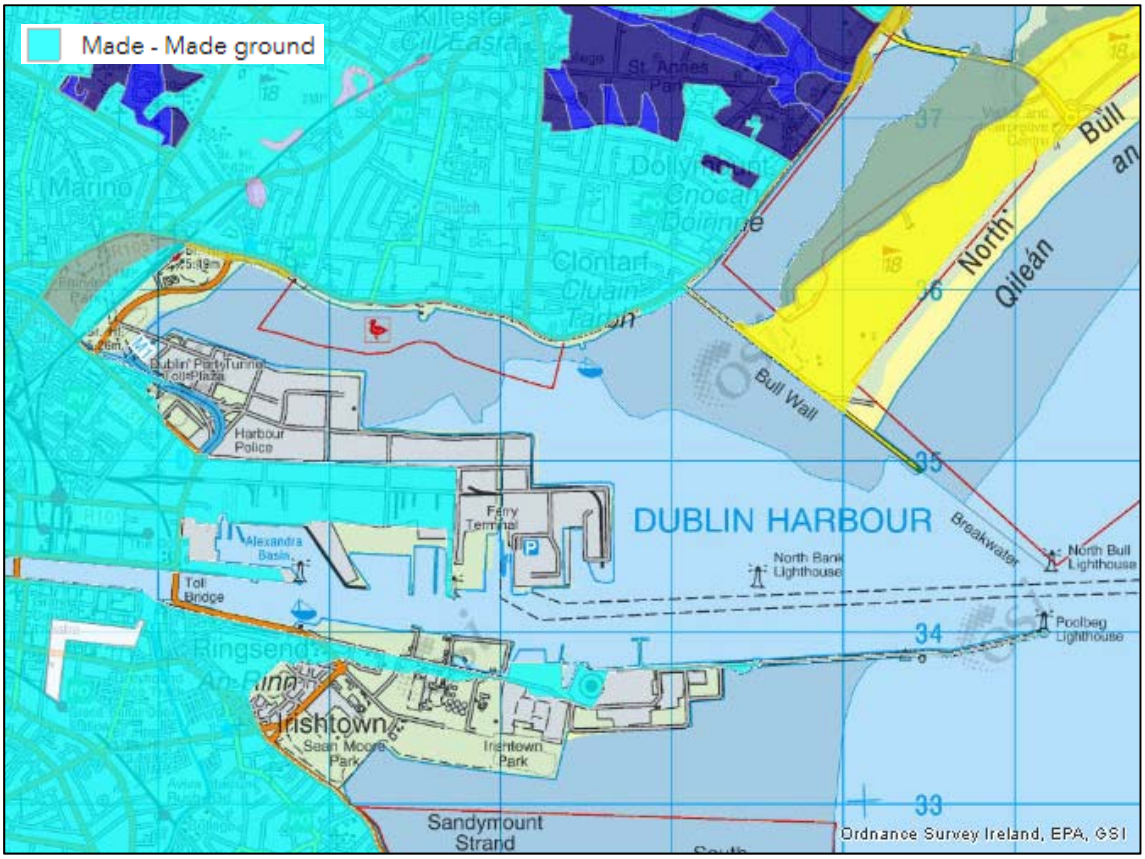
Drift geology

Drift is a general term applied to all mineral material (clay, sand, silt, boulders) transported by a glacier and deposited directly by or from the ice, or by running water emanating from the glacier. It generally applies to Pleistocene glacial deposits.

The drift geology of the area is expected to principally reflect the depositional process of the last glaciation when an extensive ice sheet that extended into the Irish Sea covered the region. Typically during the ice advance boulder clays were deposited sub-glacially as lodgement till over the eroded rock head surface, whilst moraine deposits were laid down at the glacier margins. Subsequently, with the progressive retreat of the ice sheet from the region, fluvio-glacial deposits (sand, gravel and silt) were laid down by melt waters discharging from the front of the glacier. Recent deposition prior to reclamation of the site principally reflects marine erosional and depositional processes, which have modified the glacial deposits.

As shown on Figure 5, the site is anticipated to be underlain by made ground. Dublin Port is located entirely on made ground (fill deposits).

Figure 5 Sub soils (taken from GSI's Spatial Resources portal)



4.2 Hydrogeology

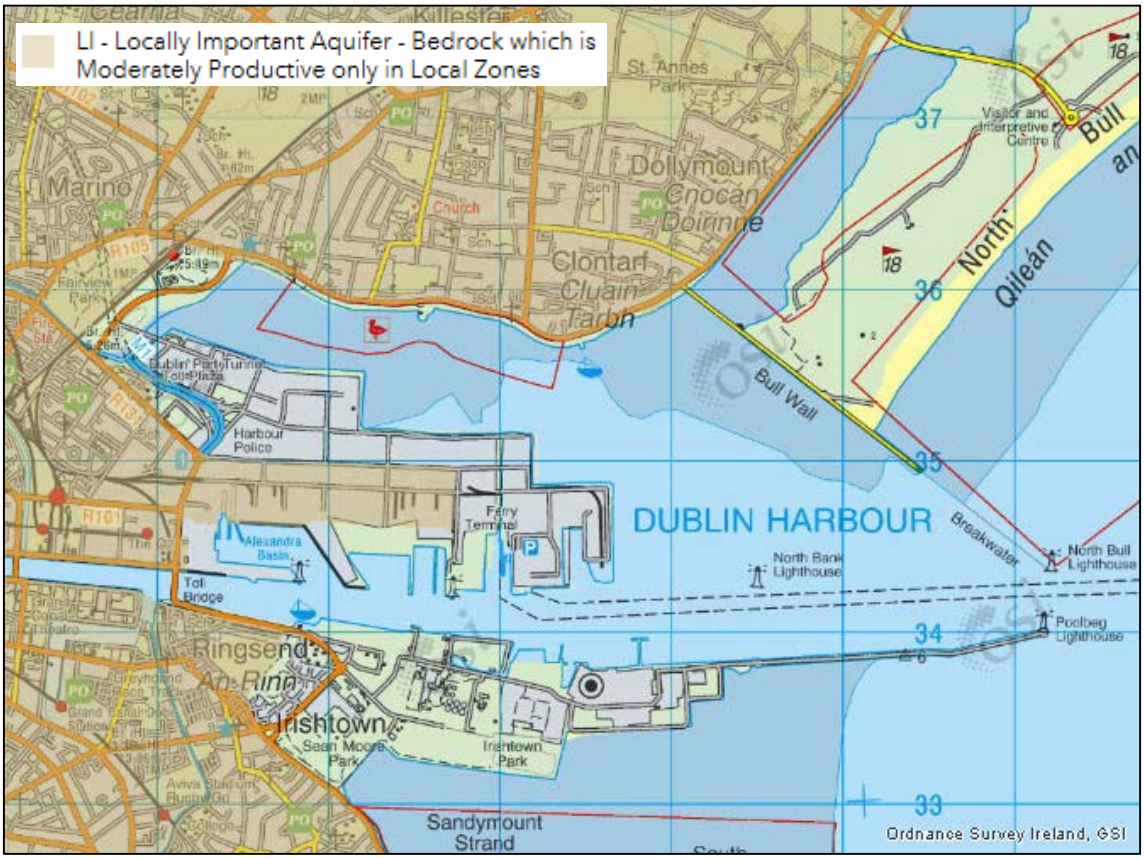
The hydrogeology of the area has been described by the Geological Survey of Ireland as complex and very variable. The Limestone bedrock is generally considered to be indurated and hence dominated by fissure permeability (e.g. joints and faults). Such permeability is likely to be low except where coarse, clean Limestones where present, have been karstified, dolomitised or are highly fractured.

The Lower Carboniferous rocks that underlie the region have been classified by the Geological Survey of Ireland as "Locally Important Aquifer, bedrock which is moderately productive only in local zones" (Figure 6). These locally productive zones are due to the presence of more permeable strata that are encountered in different parts of the outcrop area due to substantial faults, fractures or fissures. The limited groundwater movement within the rock tends to be restricted to the weathered horizons or to non-extensive fractured zones. These zones tend to have a limited hydraulic continuity, low storage capacity and low potential yield.

The Quaternary drift is considered the principal medium for groundwater movement in the area. The infiltration capacity of the clay deposits would be limited due to their low permeability and hence groundwater movement is likely to be confined to the fluvio-glacial sand and gravel deposits that overlie the clays. The potential importance of the Quaternary drift deposits as a groundwater resource is a function of their permeability, thickness and extent. The low permeable fine grained glacial clays represent aquitards that limit infiltration and restrict recharge to bedrock aquifers when sufficiently thick. The overlying fluvio-glacial sand and gravel deposits represent material with a significantly higher permeability. Consequently these deposits have a high potential recharge and storage capacity.

It is generally expected that groundwater levels beneath the site will remain close to sea level and may exhibit tidal variation. Groundwater at the site is expected to be brackish / saline and unsuitable for potable supply.

Figure 6 Groundwater aquifer (taken from GSI's Spatial Resources portal)

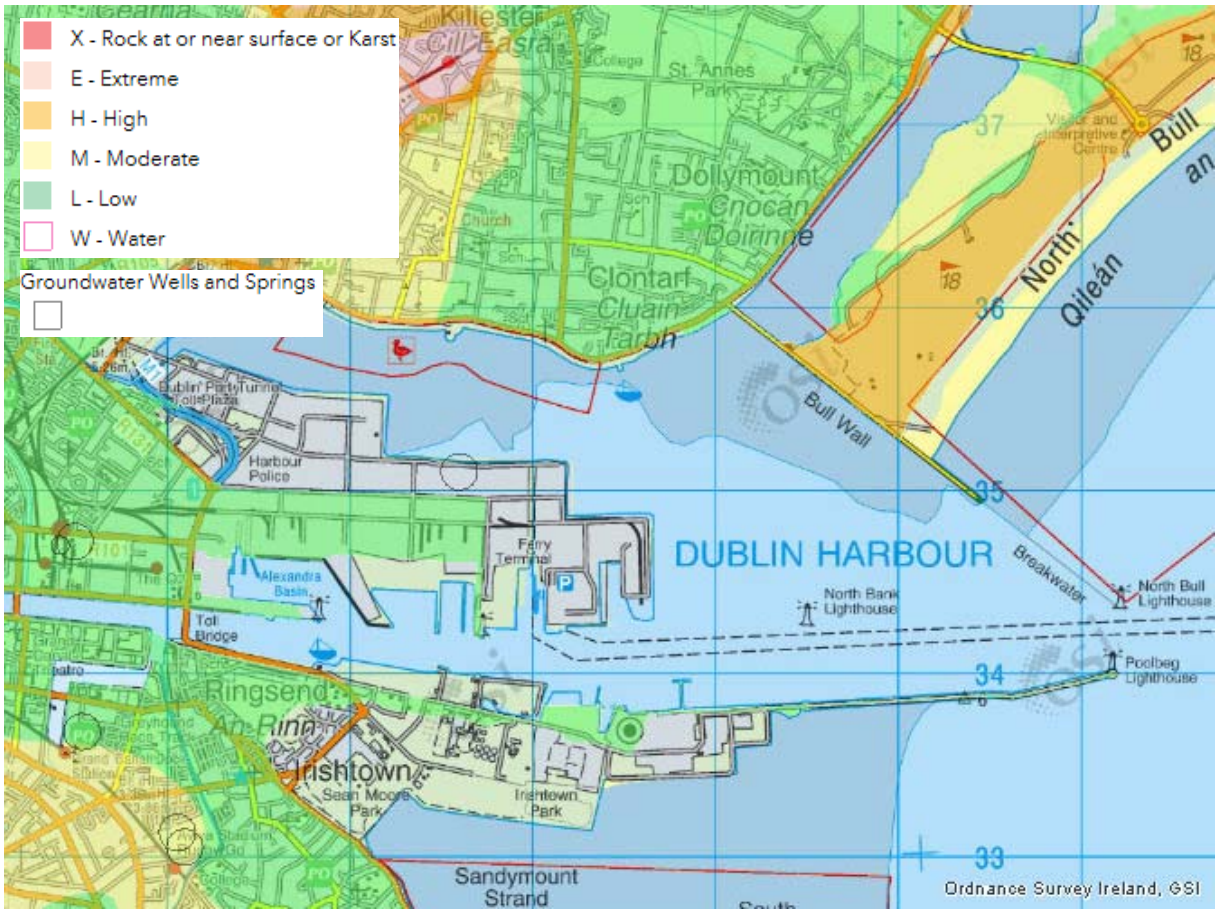


4.3 Groundwater vulnerability

In accordance with the Water Framework Directive (2000/60/EC) it is necessary to understand the groundwater vulnerability of the site, which is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface.

The site falls within an area of low groundwater vulnerability. A groundwater borehole of unknown use is present to the north west of the site.

Figure 7 Groundwater vulnerability (taken from GSI's Spatial Resources portal)



4.4 Surface water hydrology

The South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) is present directly north and west of the site. The River Liffey is present directly south of the site. The Dodder River flows into the River Liffey just west of Tom Clarke Bridge.

4.5 Licenses and permits

Environmental Protection Agency map viewer

Figure 8 demonstrates the Industrial Emission licences (IELs) and Integrated Pollution Control (IPC) sites which are present surrounding the site. Dublin Port Company have an IEL (licence number P1022-01) on the existing Sea Truck terminal site.

Figure 8 IELs and IPC sites in vicinity of site

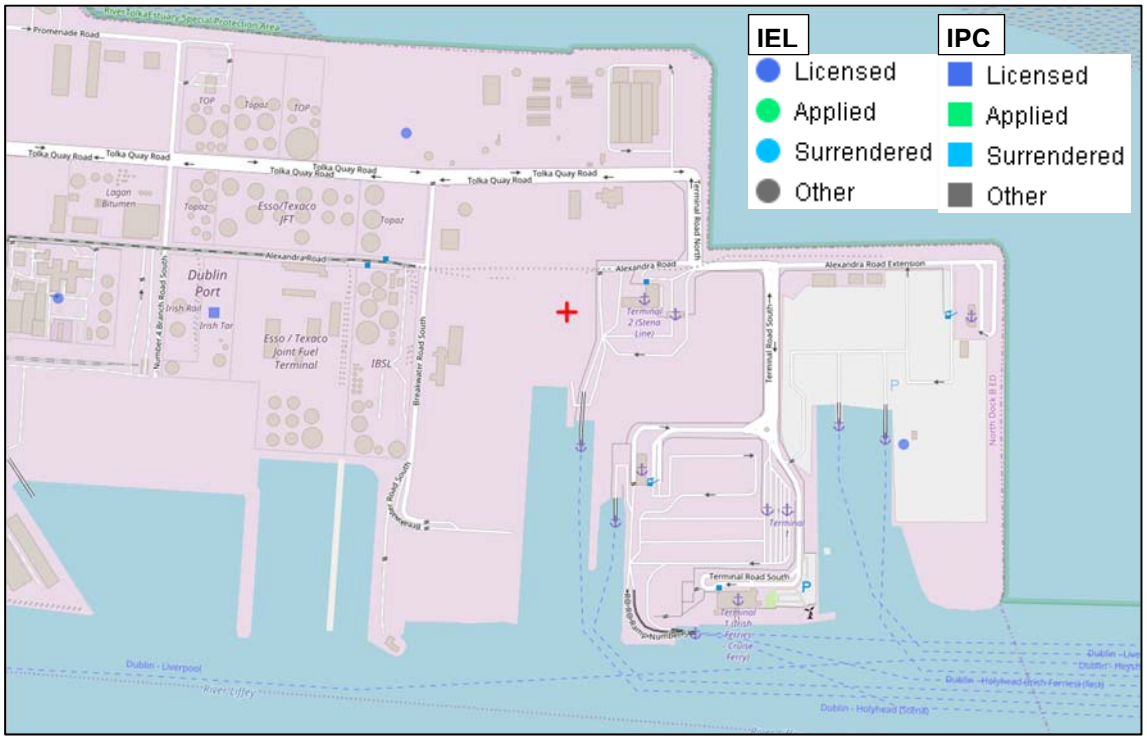


Figure 9 demonstrates the Integrated Pollution Prevention and Control (IPPC) facilities within the vicinity of the site.

Figure 9 IPPC sites in vicinity of site



In addition, Indaver Ireland Limited are registered as having a hazardous waste facility (ref. W0036-02) to the north of Tolka Quay Road (just north west of its junction with Breakwater Road South).

The Tolka Estuary and Liffey Estuary Lower are noted to be 'of risk' and of moderate status on the EPA map viewer. The Liffey Estuary Lower is noted to be unpolluted for the 2010-2012 reporting period, while the Tolka Estuary is noted to be potentially eutrophic for the same period. The Dublin groundwater body is noted to be 'not at risk' and of good status.

Tolka Estuary and the Liffey Estuary are classified as nutrient sensitive estuaries under the Urban Waste Water Treatment Directive Sensitive Area. North Dublin Bay and South Dublin Bay are proposed Natural Heritage Areas.

5 Previous site investigation

5.1 Dublin Port IED application

A number of boreholes were sunk across the wider Dublin Port site as part of the site investigation prior to the Industrial Emissions Directive (IED) licence application. As part of this site investigation, completed by Geotechnical Environmental Services in January-February 2015, four boreholes were sunk within the proposed MP2 redevelopment area; BH6, BH7, BH8 and BH10 (as shown on Figure 9). The logs for these boreholes are included in Appendix B; the boreholes are summarised in Tables 4-7.

Figure 10 IED licence monitoring locations



Table 4 Dublin Port IED application BH6 – February 2015

Depth (m)	Strata
0.00-0.35	Topsoil
0.35-3.60	MADE GROUND: Firm brown with grey and dark brown mottling slightly sandy silty CLAY containing red brick, slate and glass remnants.
3.60-3.90	MADE GROUND: Soft grey slightly sandy slightly gravelly clayey SILT. Gravel is fine to medium, sub-angular to sub-rounded. Steady groundwater strike was recorded at 3.60m, rising to 3.40m in 20 minutes

Depth (m)	Strata
3.90-7.30	MADE GROUND: Brown and dark brown silty gravelly fine to coarse SAND containing red brick and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.
7.30-9.00	MADE GROUND: Black silty sandy fine to coarse GRAVEL containing red brick, concrete and cinder remnants. Gravel is sub-angular to sub-rounded.
9.00-10.00	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.
10.00-15.00	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.

Table 5 Dublin Port IED application BH7 – February 2015

Depth (m)	Strata
0.00-0.40	Topsoil
0.40-3.40	MADE GROUND: Firm dark brown and grey gravelly sandy CLAY containing red brick, mortar, slate, timber and tarmac remnants. Gravel is fine to coarse, sub-angular to sub-rounded.
3.40-11.70	Dark grey and black silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded. Steady groundwater strike was recorded at 3.40m
11.70-15.45	Medium dense grey silty fine SAND.

Table 6 Dublin Port IED application BH8 – February 2015

Depth (m)	Strata
0.00-0.10	Pavlor brick
0.10-0.20	Fill: Quarry dust
0.20-0.70	Concrete
0.70-3.80	MADE GROUND: Firm brown and dark brown slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded. Steady groundwater strike was recorded at 3.20m.
3.80-5.60	MADE GROUND: Soft to firm dark grey and black slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded.
5.60-7.50	Soft to firm grey slightly sandy silty CLAY.
7.50-15.45	Grey silty fine to medium SAND containing occasional bands of sandy fine to coarse GRAVEL. Gravel is fine to medium, sub-angular to sub-rounded.

Table 7 Dublin Port IED application BH10 – February 2015

Depth (m)	Strata
0.00-0.15	Tarmac
0.15-0.30	Fill: Hardcore
0.30-0.60	Concrete
0.60-0.90	Fill: Hardcore
0.90-1.40	MADE GROUND: Grey silty slightly gravelly fine to coarse SAND containing shell remnants. Gravel is fine to medium, sub-angular to sub-rounded.
1.40-2.90	MADE GROUND: Soft to fiem brown and dark brown slightly sandy slightly gravelly CLAY with cobble content. Gravel is fine to coarse, sub-angular rto sub-rounded.
2.90-3.50	MADE GROUND: Brown and grey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded. Steady groundwater strike was recorded at 2.90m.
3.50-4.20	MADE GROUND: Soft black slightly sandy slightly gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded.
4.20-5.90	Black silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.
5.90-11.70	Firm dark grey slightly sandy clayey SILT with occasional interbedded silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.
11.70-15.45	Medium dense grey and grey brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.

5.2 GSI Geotechnical viewer

The GSI Geotechnical viewer was consulted to gain an understanding of historical site investigations undertaken on or in proximity to the site. The full downloaded reports including location plans are included in Appendix C; the relevant boreholes are summarised in the sections below.

5.2.1 Port Operations Centre

Two boreholes were historically drilled in proximity to the existing Port Operations Centre. The boreholes were drilled via the rotary core method to a maximum depth of 16m and are summarised in Tables 8 and 9.

Table 8 Borehole 134491 – GSI Report 5533 (March 2003)

Depth (m)	Strata
0.00-13.60	Fill – Made ground
13.60-15.00	Gravel
15.00-16.00	Gravel and silt

Table 9 Borehole 134492 – GSI Report 5533 (March 2003)

Depth (m)	Strata
0.00-13.80	Fill – Made ground
13.80-15.00	Gravel and silt

5.2.2 North east of Oil Berth 4

Two boreholes were formerly drilled, via cable percussion (shell and auger), to a maximum depth of 16.77m to the north east of Oil Berth 4 (Tables 10 and 11). As no made ground is denoted on the logs it is assumed that these boreholes were drilled prior to the land being reclaimed.

Table 10 Borehole 92269 – GSI Report 2813 (March 1971)

Depth (m)	Strata
0.00-3.66	Clayey sandy gravel
3.66-6.71	Sand
6.71-7.32	Soft grey organic silt
7.32-8.54	Sandy gravel
8.54-12.80	Sand
12.80-13.72	Soft grey silt
13.72-14.94	Sandy gravel
14.94-16.11	Soft grey silty clay
16.11-16.77	Clayey gravel

Table 11 Borehole 92270 – GSI Report 2813 (March 1971)

Depth (m)	Strata
0.00-2.44	Clayey sandy gravel
2.44-6.09	Sand

5.2.3 Terminal 5

Boreholes 92262 and 92265 were drilled in the west and east of terminal 5 respectively. As no made ground is denoted on the logs it is assumed that these boreholes were drilled prior to the land being reclaimed. Both boreholes were drilled via cable percussion (shell and auger) and are summarised in Tables 12 and 13.

Table 12 Borehole 92262 – GSI Report 2816 (June 1969)

Depth (m)	Strata
0.00-1.55	Organic clay
1.55-2.93	Organic clay and gravel
2.93-3.07	Gravelly sand
3.07-4.60	Sand
4.60-10.55	Sandy gravel
10.55-11.77	Organic sand and clay
11.77-12.38	Slightly clayey sand
12.38-13.29	Coarse sand and gravel
13.29-14.82	Gravel
14.82-15.42	Sand and gravel
15.42-15.73	Boulder clay
15.73-16.95	Boulders
16.95-19.08	Boulder clay
19.08-22.74	Bedrock

Table 13 Borehole 92265 – GSI Report 2816 (June 1969)

Depth (m)	Strata
0.00-2.74	Organic silt
2.74-3.50	Fine to medium sand
3.50-7.93	Fine sand
7.93-8.23	Fine to medium sand
8.23-8.54	Fine to medium sand
8.54-10.67	Fine to medium sand
10.67-12.96	Silty clay
12.96-13.57	Clayey silt
13.57-15.10	Gravel
15.10-17.83	Bedrock
17.83-19.60	Bedrock

5.2.4 Terminal 1

Borehole 92476 was drilled just south of the existing passenger terminal building at Terminal 1. It was drilled to a depth of 28.5m via cable percussion (shell and auger) and is summarised in Table 14.

Table 14 Borehole 92476 – GSI Report 2847 (December 1997)

Depth (m)	Strata
0.00-5.00	Fill – Made ground
5.00-10.00	Fill – Made ground
10.00-15.30	Fill – Made ground
15.30-16.00	Grey coarse sand
16.00-18.40	Fine to coarse, sandy gravel and cobbles
18.40-20.50	Very stiff, dark grey, very silty clay
20.50-21.50	Fine, sandy gravel
21.50-28.35	Fine to coarse gravel and cobbles
28.35-28.50	Bedrock

5.2.5 Terminal 2

Borehole 121168 was drilled just south of the existing freight terminal building at Terminal 2. It was drilled to a depth of 25.5m via cable percussion (shell and auger) and is summarised in Table 15.

Table 15 Borehole 121168 – GSI Report 4170 (November 1999)

Depth (m)	Strata
0.00-0.30	Fill – Made ground
0.30-5.80	Fill – Made ground
5.80-6.20	Soft grey silt
6.20-8.00	Medium dense silty sand
8.00-15.50	Firm grey blue silt
15.50-16.80	Brown fine sand
16.80-17.50	Sandy gravel
17.50-19.40	Dense fine to coarse gravel
19.40-22.90	Stiff grey silty clay
22.90-23.50	Dense grey gravel
23.50-25.50	Grey weathered rock

6 Consultation

Significant consultation regarding the overall Dublin Port Masterplan 2012-2040 and the MP2 Project has been completed with the local community, An Bord Pleanála, Dublin City Council and various other Statutory Bodies. No concerns with regard to contaminated land were raised.

7 Overview of potential contamination

7.1 Introduction

The nature of potential contamination that may have arisen from the past activities on and surrounding the site is considered below.

7.2 On site sources

7.2.1 Current land use

A number of potential sources of contamination have been identified on the existing site. Areas of fuel storage, boilers, substations and a garage area are all present on the site. Obvious staining resulting from fuel spills and/or leaks are present in certain areas of the site.

As the entire area is formed on reclaimed ground, made ground will underlie the proposed MP2 development. The nature of this made ground is unknown and has the potential to contain contamination.

7.2.2 Previous land use – historical development

Historical land uses of the site are unknown. It is likely that the site has always been developed with industrial land uses.

7.2.3 Ground borne gases

Made ground or organic rich alluvial soils underlying the site would have the potential to generate elevated levels of ground gases.

7.2.4 Radon gas

The site falls across the boundary of two 10km grid squares with regards to Radon gas; the east of the port is within an area where less than 1% of homes would be expected to be above the reference level while the western part of the port is within an area where between 1 and 5% of homes would be expected to be above the reference level.

7.3 Off site sources

7.3.1 Surrounding land uses – current

Industrial land uses surround the site. The most obvious source of potential contamination is the large area of bitumen and tar storage present directly north of Zone B. This area is managed by Hugh Munro & Company Ltd and contains storage for Irish Bitumen Storage Ltd, Dublin Joint Fuels Terminal and Irish Tar & Bitumen Suppliers.

7.3.2 Surrounding land uses – historical

Historical development in the area surrounding the site has included a shipbuilding yard, railway line, timber yard, coal yard, chemical manure works and a number of oil tanks.

8 Conceptual Site Model and Risk Assessment

8.1 Conceptual Site Model

Risk estimation involves detailed evaluation of source - pathway - receptor scenarios to determine whether a linkage exists between any sources of contamination and potential receptors. A risk exists where a receptor is exposed to a source of contamination, via a pathway. If any element of the source-pathway-target linkage is absent, then no risk is present.

In order to consider potential risks at the site, a conceptual site model was developed, to examine the potential source - pathway - receptor linkages that may exist on the site. The conceptual model and the risk assessment for the site are illustrated in Table 16.

Table 16 Risk Assessment & Site Conceptual Model

Source	Potential pathway(s)	Potential receptors(s)	Relevant Source – Pathway – Receptor Linkage	Further investigation required
On site sources				
Contaminants within the soils and groundwater	Dermal contact, ingestion of/and direct inhalation of potential contaminants present within soil	Humans in form of future site users (commercial, site workers), landscaping and maintenance workers	Potential sources of contamination present on site include fuel storage, boilers, substations and garage areas. The nature of the made ground underlying the site is unknown; it may have the potential to contain contamination (including asbestos).	**Yes** Intrusive investigation and collection /analysis of sub-soil and groundwater samples followed by generic risk assessment as per CLR 11 methodology will be required prior to commencement of construction.
	Subsurface infiltration, leaching from sub-soils and groundwater flow Surface run-off	Perched groundwater, bedrock aquifer, South Dublin Bay and River Tolka Estuary SPA, River Liffey	Contaminants in soil have the potential to leach through sub-soils and effect perched groundwater, adjacent surface water and/or the bedrock aquifer.	
Soil gas: Radon	Migration along service trenches	Humans in the form of future site users	According to the radon map for the Republic of Ireland, the east of the port is within an area where less than 1% of homes would be expected to be above the reference level while the western part of the port is within an area where between 1 and 5% of homes would be expected to be above the reference level. No new buildings are proposed as part of the MP2 project and as such risks from Radon are not relevant.	**No**
Soil gas: Made Ground or highly organic soils may contain high organic content that is degrading and producing Methane, Carbon dioxide and depleted Oxygen gases	Migration along cracks in foundations and service trenches	Humans in the form of future site users	No new buildings are proposed as part of the MP2 project and as such risks from ground gas are not relevant.	**No**

Source	Potential pathway(s)	Potential receptors(s)	Relevant Source – Pathway – Receptor Linkage	Further investigation required
Off site sources				
Current and historical surrounding land uses	Subsurface infiltration, leaching from sub-soils and groundwater flow Surface run-off	Perched groundwater, bedrock aquifer, South Dublin Bay and River Tolka Estuary SPA, River Liffey	Historical development in the area surrounding the site has included a shipbuilding yard, railway line, timber yard, coal yard, chemical manure works and a number of oil tanks.	**Yes** Intrusive investigation and collection /analysis of sub-soil and groundwater samples followed by generic risk assessment as per CLR 11 methodology will be required prior to commencement of construction.

9 Conclusions and recommendations

9.1 Conclusions

- The desk study has highlighted the potential contamination sources, pathways and receptors which are likely to be present on the current site.
- The principal source of contamination is likely to be the presence of fuel storage, boilers, substations and a garage area on site. .
- Made ground is known to underlie the site and has the potential to effect groundwater and contaminants in shallow soils.
- Ground gas/Radon gas is not considered to be an issue as no new buildings are proposed as part of the MP2 project.
- In accordance with CLR11, an intrusive site investigation and quantitative risk assessment should be carried out if the site is redeveloped to ascertain if the source – pathway – receptor linkages are present.

9.2 Recommendations

- A number of boreholes should be advanced across the site with a density as suggested in BS 10175:2011+A2:2017 having consideration of the development proposals.
- A number of representative sub-soil samples will be collected and sent for laboratory analysis. The suites of analysis will include; Metals, Polycyclic Aromatic Hydrocarbons, Inorganics, Hydrocarbons (TPH CWG), PCBs and Dioxins, Volatile Organic Compounds and Semi Volatile Organic Compounds.
- Boreholes will be installed with monitoring installations to facilitate the collection of groundwater samples. Groundwater samples will be analysed as per a similar suite of analysis as described above for soils.
- A Generic Quantitative Risk Assessment (GQRA) will be undertaken to ascertain the potential risks to future site users (human health) and environmental receptors.
- If deemed necessary from the GQRA, a Detailed Quantitative Risk Assessment (DQRA) will be undertaken to set site specific remedial targets for the development.

Appendix A

Photographic record of site walkover

Plate 1: Area east of Oil Berth 4 to be infilled



Plate 2: Dublin Port VTS building at the end of the old eastern breakwater (to be demolished)



Plate 3: Substation present along the northern boundary of Zone A (Figure 3)



Plate 4: Warehouses present in the north of the site



Plate 5: Garage area present in north of Zone A (Figure 3)



Plate 6: Fuel tank present in north of Zone A (Figure 3)



Plate 7: Fuel tank present in north of Zone A (Figure 3)



Plate 8: Substation present in southern portion of Seatruck terminal



Plate 9: Existing Stenaline terminal



Plate 10: Fuel tank present to north of Stenaline terminal building



Plate 11: Fuel tank present directly west of Irish Ferries terminal building



Plate 12: Substation/generator present to south west of Irish Ferries building



Plate 13: Oil storage present to west of Irish Ferries terminal building



Plate 14: Fuel tank present to west of Irish Ferries terminal building with obvious staining of surrounding ground



Appendix B

Relevant IED borehole logs

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.29	Dublin Port Company	01.RI15
	Location 720227.6 E 734325.5 N	**Dates** 05/02/2015-06/02/2015	**Engineer** RPS Consulting Engineers	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				Hydrocarbon type odours from strata as recovered		(0.35)	TOPSOIL.			
0.35	D1			between 3.6m and	2.94	0.35	MADE GROUND: Firm brown with grey and dark brown mottling slightly sandy silty CLAY containing red brick, slate and glass remnants.			
0.35-2.00	B1			3.9m depth.						
0.50	E1									
1.30	W2									
1.40	W1									
						(3.25)				
2.10	W3									
2.50	E2									
									▼1	
3.60	D2			Steady(1) at 3.60m,	-0.31	3.60	MADE GROUND: Soft grey slightly sandy slightly gravelly clayey SILT. Gravel is fine to medium, sub-angular to sub-rounded.		▽1	
				rose to 3.40m in		(0.30)				
3.90	D3			20 mins, sealed at	-0.61	3.90	MADE GROUND: Brown and dark brown silty gravelly fine to coarse SAND containing red brick and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.			
				9.00m.						
5.00-7.00	B2									
						(3.40)				
7.30	D4				-4.01	7.30	MADE GROUND: Black silty sandy fine to coarse GRAVEL containing red brick, concrete and cinder remnants. Gravel is sub-angular to sub-rounded.			
						(1.70)				
9.00	D5			Groundwater	-5.71	9.00	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.			
9.00	E3			perched on upper surface of silt stratum.						
9.00-10.00	B3			05/02/2015:3.40m		(1.00)				
				06/02/2015:3.20m						
					-6.71	10.00				

Remarks
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
W3/W4=Shallow and deep standpipe samples as taken 23rd March 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.29	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720227.6 E 734325.5 N	05/02/2015-06/02/2015	RPS Consulting Engineers	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.20	W4						Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.			
10.50-10.95	SPT N=11	10.50	3.40	2,2/3,2,3,3		(5.00)				
10.50-10.95	D6									
15.00	D7			06/02/2015:6.70m	-11.71	15.00	Complete at 15.00m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin

Borehole Number
BH6

Installation Type
Double Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Internal Diameter of Tube [B] = 50 mm
Diameter of Filter Zone = 230 mm

Client
Dublin Port Company

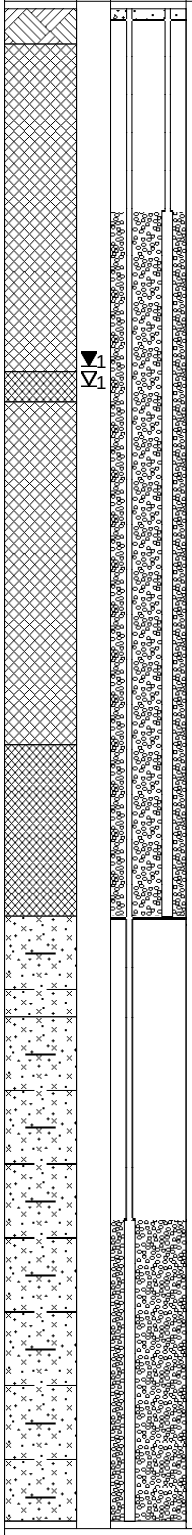
Job Number
01.RI15

Location

Ground Level (mOD)
3.29

Engineer
RPS Consulting Engineers

Sheet
1/1



Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
05/02/15		3.60	3.00	Steady				3.40	9.00

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
05/02/15		9.00	9.00	3.20	0.09		9.00	9.00	3.40	-0.11
06/02/15							15.00	15.00	6.70	-3.41

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe **Inst. [B] Type :** Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Instrument [B] Time	Instrument [B] Depth (m)	Instrument [B] Level (mOD)	Remarks
20/02/15		1.30	1.99		1.40	1.89	
23/03/15		2.10	1.19		3.80	-0.51	

Remarks
Flush lockable cover installed.
Geotextile filter sock surround to well screen section.

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.22	Dublin Port Company	01.RI15
	Location 720268.4 E 734507.6 N	**Dates** 10/02/2015	**Engineer** RPS Consulting Engineers	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.40)	TOPDOIL.			
0.40	D1				2.82	0.40	MADE GROUND: Firm dark brown and grey gravelly sandy CLAY containing red brick, mortar, slate, timber and tarmac remnants. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	E1									
1.00-3.00	B1									
1.56	W3									
1.60	W1									
						(3.00)				
3.00	W2									
3.40	D2			Steady(1) at 3.40m.	-0.18	3.40	Dark grey and black silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.		▽1	
3.50	E2									
4.17	W4									
5.00-6.00	B2									
						(6.60)				
					-6.78	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
W3/W4=Shallow and deep standpipe samples as taken 23rd March 2015.
Water added from 4.50m to 15.00m.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.22	Dublin Port Company	01.RI15
	Location 720268.4 E 734507.6 N	**Dates** 10/02/2015	**Engineer** RPS Consulting Engineers	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(1.70)	Dark grey and black silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
11.70	D3				-8.48	11.70				
12.00-12.45	SPT N=29	12.00	0.10	3,3/6,7,8,8			Medium dense grey silty fine SAND.			
12.00-12.45	D4									
12.00-13.00	B3									
						(3.75)				
15.00-15.45	SPT N=23	15.00	0.10	3,4/4,6,7,6						
15.00-15.45	D5									
				10/02/2015:0.10m	-12.23	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH7

Installation Type
Double Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Internal Diameter of Tube [B] = 50 mm
Diameter of Filter Zone = 230 mm

Client
Dublin Port Company

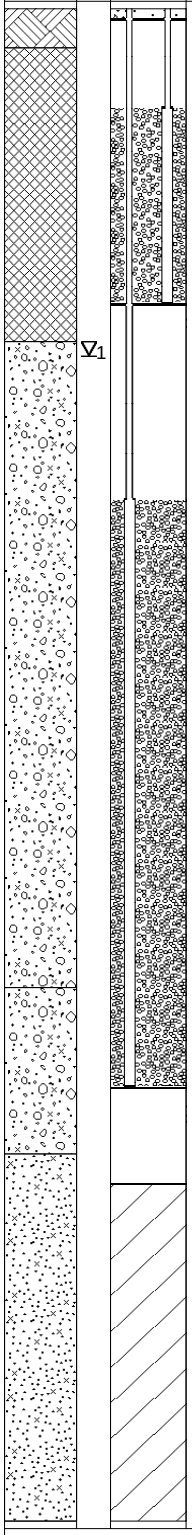
Job Number
01.RI15

Location

Ground Level (mOD)
3.22

Engineer
RPS Consulting Engineers

Sheet
1/1



Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
10/02/15		3.40	3.00	Steady					

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
10/02/15							15.45	15.00	0.10	3.12

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe **Inst. [B] Type :** Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Instrument [B] Time	Instrument [B] Depth (m)	Instrument [B] Level (mOD)	Remarks
20/02/15		3.00	0.22		1.60	1.62	
23/03/15		4.17	-0.95		1.56	1.66	

Remarks
Flush lockable cover installed.
Geotextile filter sock surround to well screen section.

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH8

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.11	Dublin Port Company	01.RI15
	Location 720275.5 E 734644.5 N	**Dates** 13/02/2015-16/02/2015	**Engineer** RPS Consulting Engineers	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					3.01	0.10	Pavior BRICK.			
					2.91	0.20	FILL: Quarry DUST.			
						(0.10)				
						(0.50)	CONCRETE.			
					2.41	0.70				
0.70	D1						MADE GROUND: Firm brown and dark brown slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded.			
0.85	E1									
1.00-3.00	B1									
						(3.10)				
2.60	W1								▼1	
				Steady(1) at 3.20m, rose to 3.20m in 20 mins.						
3.52	W4									
3.65	W3									
3.80	W2				-0.69	3.80				
3.80	D2						MADE GROUND: Soft to firm dark grey and black slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded.			
3.80-5.00	B2									
4.00	E2									
						(1.80)				
				13/02/2015:3.20m						
				16/02/2015:3.20m						
5.60	D3				-2.49	5.60	Soft to firm grey slightly sandy silty CLAY.			
6.00	E3									
6.00-7.00	B3									
						(1.90)				
7.50	D4				-4.39	7.50	Grey silty fine to medium SAND containing occasional bands of sandy fine to coarse GRAVEL. Gravel is fine to medium, sub-angular to sub-rounded.			
						(2.50)				
					-6.89	10.00				

Remarks

No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
W3/W4=Shallow and deep standpipe samples as taken 24th March 2015.
Water added from 5.60m to 15.00m.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH8

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH8

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.11	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720275.5 E 734644.5 N	13/02/2015-16/02/2015	RPS Consulting Engineers	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							Grey silty fine to medium SAND containing occasional bands of sandy fine to coarse GRAVEL. Gravel is fine to medium, sub-angular to sub-rounded.			
12.00	D5					(5.45)				
15.00-15.45	SPT N=16	15.00	2.30	2,2/3,4,5,4						
15.00-15.45	D6			16/02/2015:2.30m	-12.34	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH8

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin

Borehole Number
BH8

Installation Type
Double Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Internal Diameter of Tube [B] = 50 mm
Diameter of Filter Zone = 230 mm

Client
Dublin Port Company

Job Number
01.RI15

Location

Ground Level (mOD)
3.11

Engineer
RPS Consulting Engineers

Sheet
1/1

Legend	Water	Instr (A) (B)	Level (mOD)	Depth (m)	Description
			3.01	0.10	Concrete
					Bentonite Seal
			2.11	1.00	
					Piezometer Tip
	▼1				
			-1.89	5.00	
					Bentonite Seal
			-5.39	8.50	Gravel Filter
			-5.89	9.00	
					Piezometer Tip
			-11.89	15.00	Bottom Fill
			-12.34	15.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
13/02/15		3.20	3.00	Steady				3.20	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
13/02/15							5.00	5.00	3.20	-0.09
16/02/15		5.00	5.00	3.20	-0.09		15.45	15.00	2.30	0.81

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe **Inst. [B] Type :** Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Instrument [B] Time	Instrument [B] Depth (m)	Instrument [B] Level (mOD)	Remarks
20/02/15		3.80	-0.69		2.60	0.51	
24/03/15		3.52	-0.41		3.65	-0.54	

Remarks
Flush lockable cover installed.
Geotextile filter sock surround to well screen section.

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH10

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	230mm cased to 15.00m	3.26	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720448.6 E 734610.3 N	17/02/2015-18/02/2015	RPS Consulting Engineers	1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					3.11	0.15	TARMAC.			
					2.96	0.30	FILL: HARDCORE.			
						(0.30)	CONCRETE.			
					2.66	0.60				
						(0.30)	FILL: HARDCORE.			
0.90	D1				2.36	0.90	MADE GROUND: Grey silty slightly gravelly fine to coarse SAND containing shell remnants. Gravel is fine to medium, sub-angular to sub-rounded.			
1.00	E1					(0.50)				
1.40	D2				1.86	1.40	MADE GROUND: Soft to fiem brown and dark brown slightly sandy slightly gravelly CLAY with cobble content. Gravel is fine to coarse, sub-angular rto sub-rounded.			
1.40-2.90	B1					(1.50)				
2.90	D3			Steady(1) at 2.90m, rose to 2.90m in 20 mins.	0.36	2.90	MADE GROUND: Brown and grey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded.		▼1	
2.90-3.50	B2					(0.60)				
3.20	W1									
3.20	W2									
3.50	D4				-0.24	3.50	MADE GROUND: Soft black slightly sandy slightly gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded.			
4.00	E2					(0.70)				
4.20	D5				-0.94	4.20	Black silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
4.30	W3					(1.70)				
5.90	D6				-2.64	5.90	Firm dark grey slightly sandy clayey SILT with occasional interbedded silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
6.00	E3					(4.10)				
					-6.74	10.00				

Remarks

No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
W3=Deep standpipe sample as taken 24th March 2015 (shallow standpipe dry).

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH10

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	230mm cased to 15.00m	3.26	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720448.6 E 734610.3 N	17/02/2015-18/02/2015	RPS Consulting Engineers	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(1.70)	Firm dark grey slightly sandy clayey SILT with occasional interbedded silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
11.70	D7				-8.44	11.70				
12.00-12.45	D8			17/02/2015:0.60m			Medium dense grey and grey brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
12.00-12.45	SPT N=14	12.00	0.50	18/02/2015:1.40m 2,2/3,3,4,4						
						(3.75)				
15.00-15.45 15.00-15.45	SPT N=18 D9	15.00	0.60	2,2/3,5,5,5						
				18/02/2015:0.50m	-12.19	15.45	Complete at 15.50m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	**BH10**

Installation Type
Double Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Internal Diameter of Tube [B] = 50 mm
Diameter of Filter Zone = 230 mm

Client
Dublin Port Company

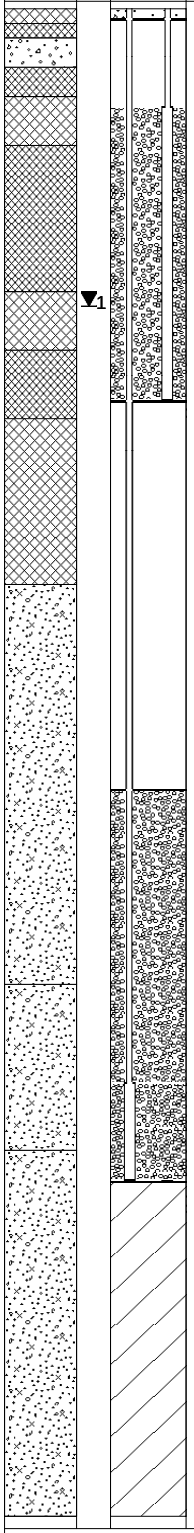
Job Number
01.RI15

Location

Ground Level (mOD)
3.26

Engineer
RPS Consulting Engineers

Sheet
1/1



Level (mOD)	Depth (m)	Description
3.16	0.10	Concrete
		Bentonite Seal
2.26	1.00	
		Piezometer Tip
-0.74	4.00	
		Bentonite Seal
-4.74	8.00	
		Gravel Filter
-7.74	11.00	
		Piezometer Tip
-8.74	12.00	
		Bottom Fill
-12.19	15.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
17/02/15		2.90	2.00	Steady				2.90	

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
17/02/15							12.00	12.00	0.60	2.66
18/02/15		11.20	12.00	1.40	1.86		15.45	15.00	0.50	2.76

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe **Inst. [B] Type :** Slotted Standpipe

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Instrument [B] Time	Instrument [B] Depth (m)	Instrument [B] Level (mOD)	Remarks
20/02/15		3.20	0.06		3.20	0.06	
24/03/15		4.30	-1.04		DRY		

Remarks
Flush lockable cover installed.
Geotextile filter sock surround to well screen section.

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH12

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	2.94	Dublin Port Company	01.RI15
	Location 720494 E 734401.1 N	**Dates** 11/02/2015	**Engineer** RPS Consulting Engineers	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					2.84	0.10	TARMAC.			
0.10	D1					(0.50)	MADE GROUND: Light grey brown sandy gravelly SILT with cobble content. Gravel is fine to medium, sub-angular to sub-rounded.			
0.50	E1									
0.60	D2				2.34	0.60	MADE GROUND: CONCRETE, red BRICK and HARDCORE.			
2.30	W1					(3.70)				
2.30	W2									
2.40	W4									
				Steady(1) at 2.90m.					▽1	
3.22	W3									
4.30	D3				-1.36	4.30	Grey silty slightly gravelly fine to medium SAND containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
5.00	E2									
6.00-7.00	B1					(5.10)				
9.40	D4				-6.46	9.40	Dark grey silty fine SAND.			
						(0.60)				
					-7.06	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
W3/W4=Shallow and deep standpipe samples as taken 23rd March 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH12

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH12

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	2.94	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720494 E 734401.1 N	11/02/2015	RPS Consulting Engineers	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.50-11.50	B2					(5.45)	Dark grey silty fine SAND.			
15.00-15.45	SPT N=13	15.00	2.60	2,3/2,4,4,3						
15.00-15.45	D5									
				11/02/2015:2.60m	-12.51	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH12

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin

Borehole Number
BH12

Installation Type
Double Installation

Dimensions
Internal Diameter of Tube [A] = 50 mm
Internal Diameter of Tube [B] = 50 mm
Diameter of Filter Zone = 230 mm

Client
Dublin Port Company

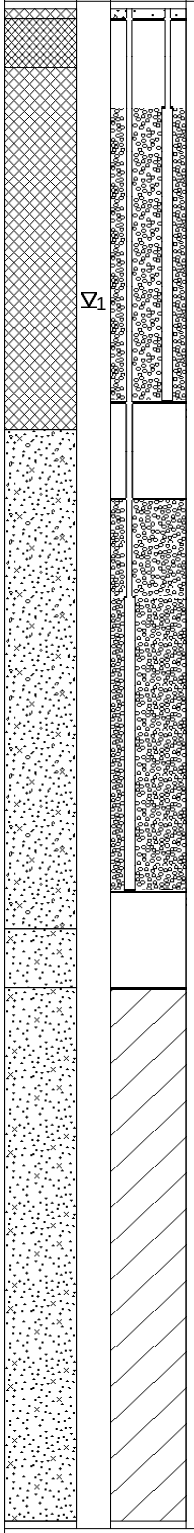
Job Number
01.RI15

Location

Ground Level (mOD)
2.94

Engineer
RPS Consulting Engineers

Sheet
1/1



Level (mOD)	Depth (m)	Description
2.84	0.10	Concrete
		Bentonite Seal
1.94	1.00	
		Piezometer Tip
-1.06	4.00	
		Bentonite Seal
-2.06	5.00	
		Gravel Filter
-3.06	6.00	
		Piezometer Tip
-6.06	9.00	
		Bentonite Seal
-7.06	10.00	
		Bottom Fill
-12.51	15.45	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)
11/02/15		2.90	2.00	Steady					

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
11/02/15							15.45	15.00	2.60	0.34

Instrument Groundwater Observations

Inst. [A] Type : Slotted Standpipe **Inst. [B] Type :** Slotted Standpipe

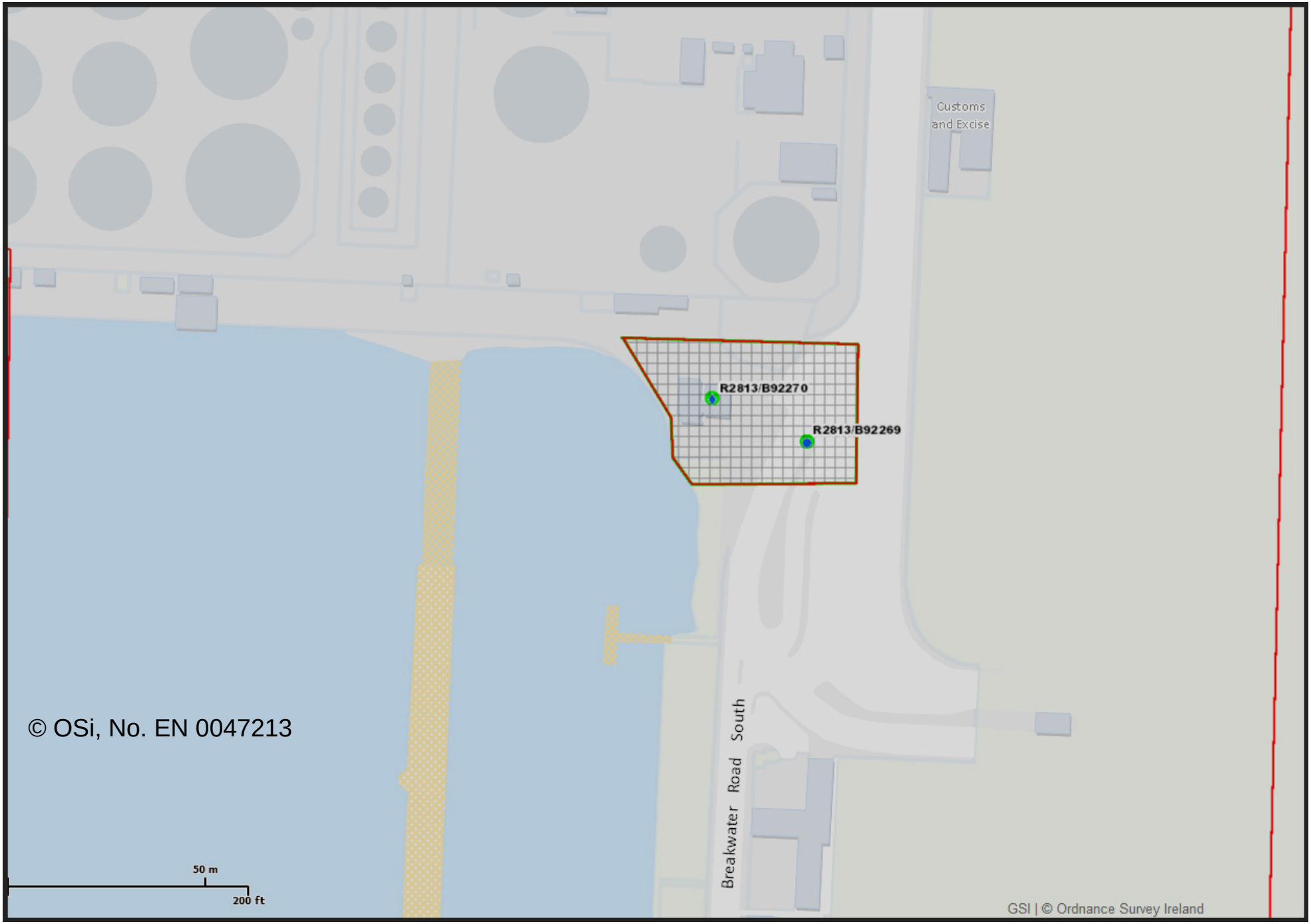
Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Instrument [B] Time	Instrument [B] Depth (m)	Instrument [B] Level (mOD)	Remarks
20/02/15		2.30	0.64		2.30	0.64	
23/03/15		2.40	0.54		3.22	-0.28	

Remarks
Flush lockable cover installed.
Geotextile filter sock surround to well screen section.

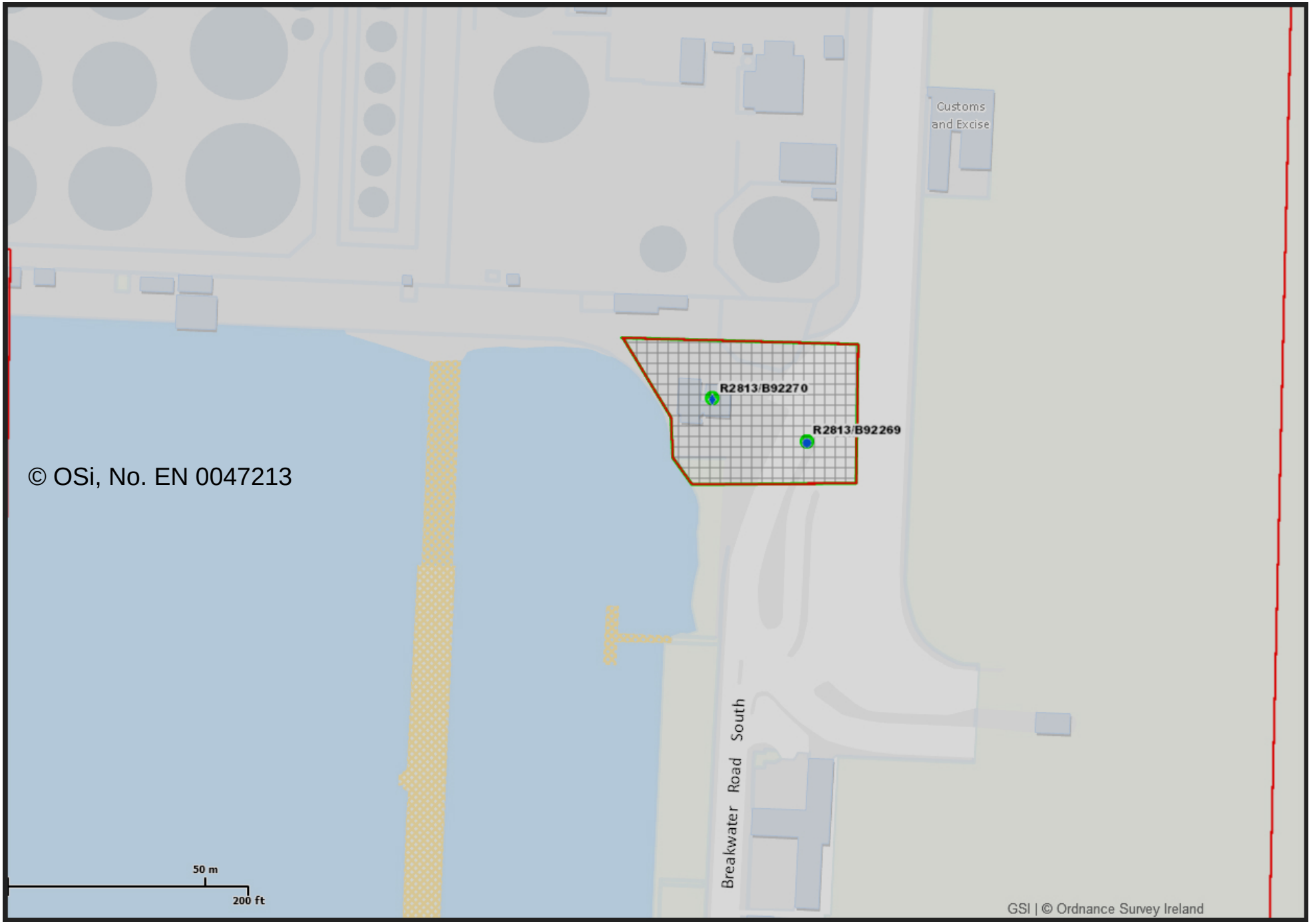
Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Appendix C

GSI Geotechnical viewer borehole logs



Overview Map for GSI Report 2813: ICI Jetty Quay
Dublin Port, Co. Dublin
Points Observed: 2


Customs
and Excise
R2813/B92270
R2813/B92269
© OSi, No. EN 0047213
Breakwater Road South
50 m
200 ft
GSI | © Ordnance Survey Ireland

GSI REPORT 2813

ICI Jetty Quay

Dublin Port, Co. Dublin

Borehole List:

Borehole	Name	Depth	DTB	ODMALIN	Easting	Northing	Description
92269	BH1	16.77		3.4	319716	234473	Cable Percussion (Shell and Auger)
92270	BH2	6.09		3.4	319692	234484	Cable Percussion (Shell and Auger)

GSI REPORT 2813

ICI Jetty Quay

LAYERS FOR BOREHOLE 92269 (Company Name: BH1)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226901	0	3.66			Clayey Sandy	Gravel	Gravel
9226902	3.66	6.71				Sand	Sand
9226903	6.71	7.32	Soft	Grey	Organic	Silt	Silt
9226904	7.32	8.54			Sandy	Gravel	Gravel
9226905	8.54	12.8				Sand	Sand
9226906	12.8	13.72	Soft	Grey		Silt	Silt
9226907	13.72	14.94			Sandy	Gravel	Gravel
9226908	14.94	16.11	Soft	Grey	Silty	Clay	Clay
9226909	16.11	16.77			Clayey	Gravel	Gravel

GSI REPORT 2813

ICI Jetty Quay

LAYERS FOR BOREHOLE 92270 (Company Name: BH2)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9227001	0	2.44				Sand	Sand
9227002	2.44	6.09	Very Soft	Dark Brown	Silty Stony	Clay	Clay

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226901 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	2.62	FIELD	Standard Penetration Test	64	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226902 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
2	3.84	FIELD	Standard Penetration Test	23	NBLOW
3	5.06	FIELD	Standard Penetration Test	21	NBLOW
4	6.28	FIELD	Standard Penetration Test	19	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226905 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
5	8.72	FIELD	Standard Penetration Test	22	NBLOW
6	9.94	FIELD	Standard Penetration Test	20	NBLOW
7	11.16	FIELD	Standard Penetration Test	22	NBLOW
8	12.38	FIELD	Standard Penetration Test	21	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226907 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
9	13.9	FIELD	Standard Penetration Test	22	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226908 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
10	15.43	FIELD	Standard Penetration Test	6	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9226909 IN BOREHOLE 92269 (Company Name: BH1)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
11	16.65	FIELD	Standard Penetration Test	21	NBLOW

GSI REPORT 2813

ICI Jetty Quay

TESTS FOR LAYER 9227001 IN BOREHOLE 92270 (Company Name: BH2)

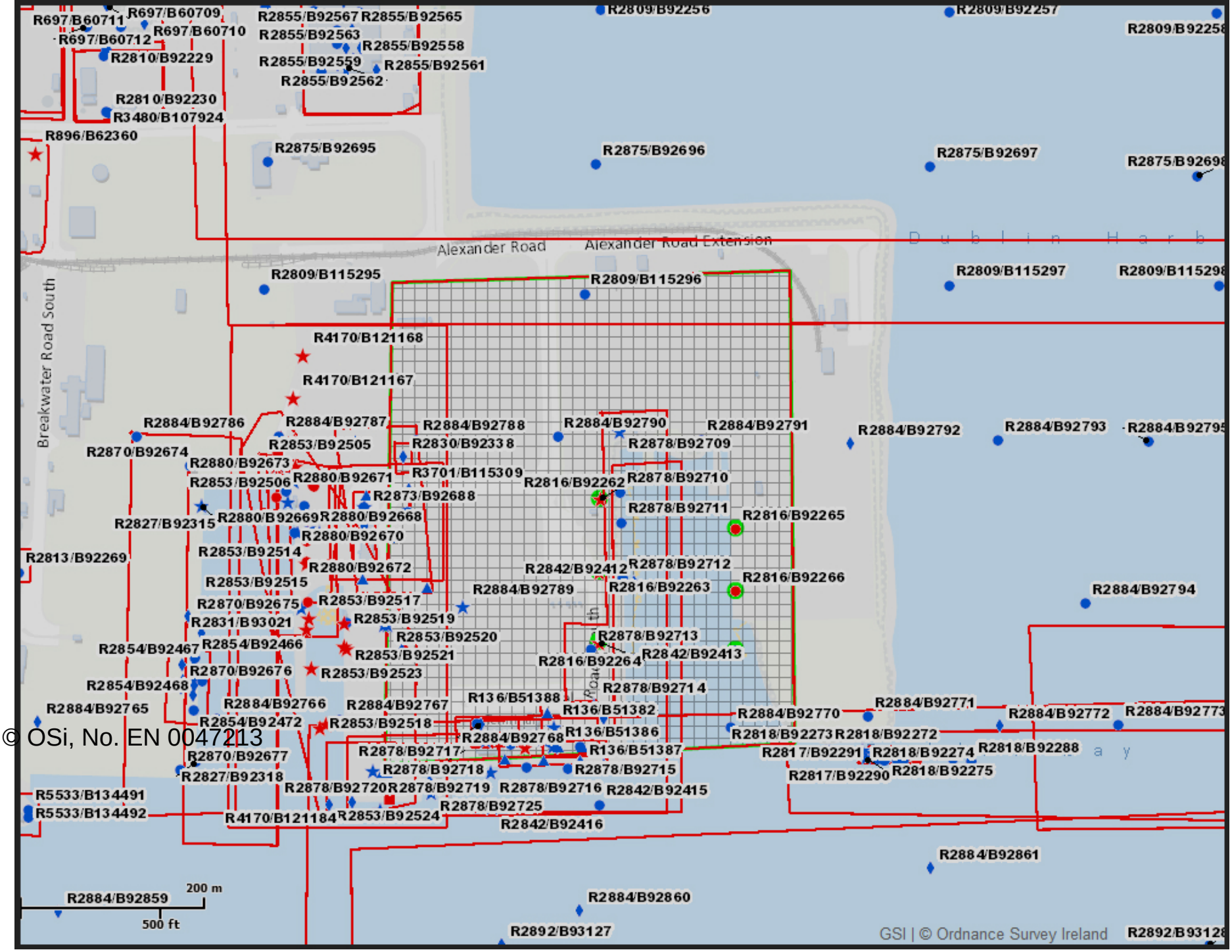
TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	.79	FIELD	Standard Penetration Test	6	NBLOW
2	1.4	FIELD	Standard Penetration Test	5	NBLOW
3	2.01	FIELD	Standard Penetration Test	6	NBLOW

GSI REPORT 2813

ICI Jetty Quay

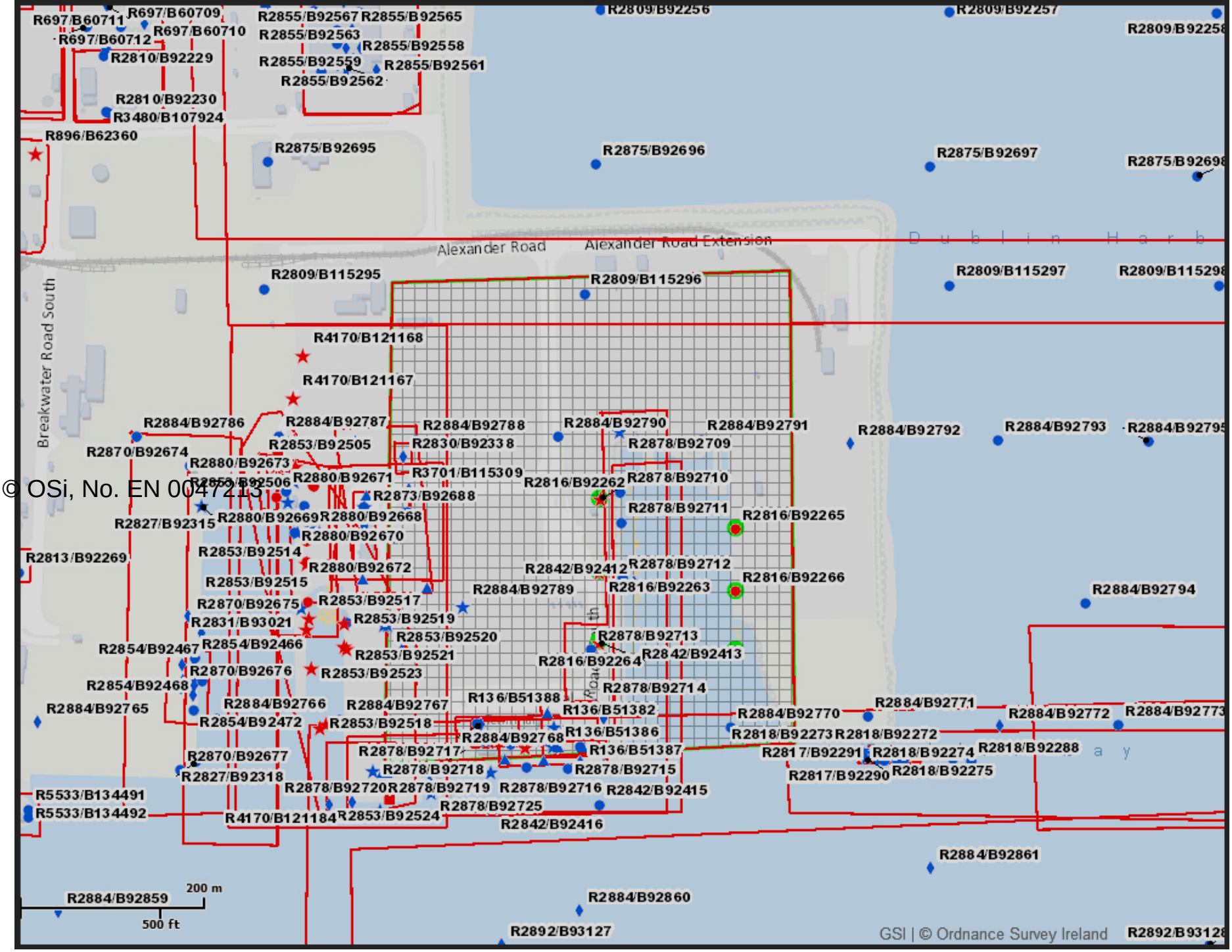
TESTS FOR LAYER 9227002 IN BOREHOLE 92270 (Company Name: BH2)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
4	3.84	FIELD	Standard Penetration Test	26	NBLOW
5	5.06	FIELD	Standard Penetration Test	30	NBLOW
6	6.09	FIELD	Standard Penetration Test	34	NBLOW



© OSi, No. EN 0047213

Overview Map for GSI Report 2816: Container Terminal (east of Car Ferry)
Dublin Port, Dublin , Co. Dublin
Points Observed: 7



© OSi, No. EN 0047213

GSI REPORT 2816

Container Terminal (east of Car Ferry)

Dublin Port, Dublin , Co. Dublin

Borehole List:

Borehole	Name	Depth	DTB	ODMALIN	Easting	Northing	Description
92262	BH253	22.74	18.78	-2.46	320349	234552	Cable Percussion(shell&auger) and Rotary Coring
92263	BH254	21.83	19.08	-2.46	320348	234473	Cable Percussion(shell&auger) and Rotary Coring
92264	BH255	25.51	21.86	-2.64	320348	234397	Cable Percussion(shell&auger) and Rotary Coring
92265	BH256	19.66	17.83	-2.67	320497	234520	Cable Percussion(shell&auger) and Rotary Coring
92266	BH257	19.08	15.43	-2.77	320497	234452	Cable Percussion(shell&auger) and Rotary Coring
92267	BH258	14.24		-1.45	320497	234388	Cable Percussion(shell&auger) and Rotary Coring
92268	BH258B	22.07	19.02	-3.62			Cable Percussion(shell&auger) and Rotary Coring

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92262 (Company Name: BH253)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226201	0	1.55			Organic	Clay	Clay
9226202	1.55	2.93			Organic	Clay And Gravel	Clay And Gravel
9226203	2.93	3.07			Gravelly	Sand	Sand
9226204	3.07	4.6				Sand	Sand
9226205	4.6	10.55			Sandy	Gravel	Gravel
9226206	10.55	11.77			Organic	Sand And Clay	Sand And Clay
9226207	11.77	12.38			Slightly Clayey	Sand	Sand
9226209	12.38	13.29	Coarse			Sand And Gravel	Sand And Gravel
9226210	13.29	14.82				Gravel	Gravel
9226211	14.82	15.42				Sand And Gravel	Sand And Gravel
9226212	15.42	15.73				Boulder Clay	Boulder Clay
9226213	15.73	16.95				Boulders	Boulders
9226214	16.95	19.08				Boulder Clay	Boulder Clay
9226215	19.08	22.74				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92263 (Company Name: BH254)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226301	0	1.4			Organic	Silt	Silt
9226302	1.4	2.47				Gravel	Gravel
9226303	2.47	3.08			Medium	Sand And Gravel	Sand And Gravel
9226304	3.08	3.69				Sand	Sand
9226305	3.69	5.52			Gravelly	Sand	Sand
9226306	5.52	10.55				Sand	Sand
9226307	10.55	12.38			Slightly Silty	Sand	Sand
9226308	12.38	12.99			Medium	Sand And Clay	Sand And Clay
9226309	12.99	13.6			Silty	Clay	Clay
9226310	13.6	13.75		Dark Grey	Silty	Clay	Clay
9226311	13.75	14.66				Sand	Sand
9226312	14.66	16.03		Dark Grey	Silty	Clay	Clay
9226313	16.03	16.34				Clay	Clay
9226314	16.34	16.95				Gravel	Gravel
9226315	16.95	17.56				Boulders	Boulders
9226316	17.56	19.08				Gravel	Gravel
9226317	19.08	21.83				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92264 (Company Name: BH255)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226401	0	.97			Organic	Sand	Sand
9226402	.97	1.28			Gravelly	Sand	Sand
9226403	1.28	1.76			Sandy	Gravel	Gravel
9226404	1.76	2.65			Gravelly	Sand	Sand
9226405	2.65	4.02				Sand	Sand
9226406	4.02	7.07				Sand	Sand
9226407	7.07	7.22				Sand	Sand
9226408	7.22	7.68			Very Silty	Clay	Clay
9226409	7.68	9.36			Silty	Sand	Sand
9226410	9.36	10.12				Sand	Sand
9226411	10.12	11.49			Silty	Clay	Clay
9226412	11.49	12.1			Slightly Silty	Sand	Sand
9226413	12.1	12.8				Sand And Gravel	Sand And Gravel
9226414	12.8	12.37			Silty	Clay	Clay
9226415	12.37	16.68			Silty	Clay	Clay
9226416	16.68	20.33				Boulder Clay	Boulder Clay
9226417	20.33	22.16				Boulder Clay	Boulder Clay
9226418	22.16	25.51				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92265 (Company Name: BH256)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226501	0	2.74			Organic	Silt	Silt
9226502	2.74	3.5			Fine to Medium	Sand	Sand
9226503	3.5	7.93			Fine	Sand	Sand
9226504	7.93	8.23			Fine to Medium	Sand	Sand
9226505	8.23	8.54			Fine to Medium	Sand	Sand
9226506	8.54	10.67			Fine to Medium	Sand	Sand
9226507	10.67	12.96			Silty	Clay	Clay
9226508	12.96	13.57			Clayey	Silt	Silt
9226509	13.57	15.1				Gravel	Gravel
9226510	15.1	17.83				Bedrock	Bedrock
9226511	17.83	19.6				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92266 (Company Name: BH257)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226601	0	1.4			Slightly Silty	Sand	Sand
9226602	1.4	3.08			Slightly Silty	Sand And Gravel	Sand And Gravel
9226603	3.08	3.84			Fine to Medium	Sand	Sand
9226604	3.84	4.6			Fine	Sand	Sand
9226605	4.6	5.36			Fine Silty	Sand	Sand
9226606	5.36	5.52			Fine Silty	Sand And Gravel	Sand And Gravel
9226607	5.52	6.89			Fine Silty	Sand	Sand
9226608	6.89	12.38			Fine Silty	Sand And Gravel	Sand And Gravel
9226609	12.38	12.99			Silty	Sand	Sand
9226610	12.99	13.6				Sand And Gravel	Sand And Gravel
9226611	13.6	15.73				Gravel	Gravel
9226612	15.73	19.08				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92267 (Company Name: BH258)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226701	0	2.04				Gravel	Gravel
9226702	2.04	3.26			Gravelly	Sand	Sand
9226703	3.26	3.87			Medium	Sand	Sand
9226704	3.87	4.48	Coarse			Sand	Sand
9226705	4.48	6.92			Fine to Medium	Sand	Sand
9226706	6.92	7.53			Fine	Sand	Sand
9226707	7.53	8.75			Fine Silty	Sand	Sand
9226708	8.75	9.36			Clayey Sandy	Silt	Silt
9226709	9.36	10.58			Sandy Clayey	Silt	Silt
9226710	10.58	11			Silty	Clay	Clay
9226711	11	11.95			Silty Sandy	Clay	Clay
9226712	11.95	13.62			Silty	Sand And Gravel	Sand And Gravel
9226713	13.62	13.63				Gravel	Gravel
9226714	13.63	14.24				Gravel And Clay	Gravel And Clay

GSI REPORT 2816

Container Terminal (east of Car Ferry)

LAYERS FOR BOREHOLE 92268 (Company Name: BH258B)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9226801	0	2.71			Gravelly	Sand	Sand
9226802	2.71	4.08			Medium	Sand	Sand
9226803	4.08	5.91			Fine to Medium	Sand	Sand
9226804	5.91	7.9			Fine	Sand	Sand
9226805	7.9	9.27			Clayey Sandy	Silt	Silt
9226806	9.27	15.06				Clay	Clay
9226807	15.06	15.52			Gravelly	Clay	Clay
9226808	15.52	17.2			Fine Sandy	Gravel	Gravel
9226809	17.2	19.02			Gravelly	Clay	Clay
9226810	19.02	22.07				Bedrock	Bedrock

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226202 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	2.47	FIELD	Standard Penetration Test	20	NBLOW
2	2.62	FIELD	Standard Penetration Test	31	NBLOW
22	2.01	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	50	%pass
23	2.01	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	64	%pass
24	2.01	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	72	%pass
25	2.47	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	34	%pass
26	2.47	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	70	%pass
27	2.47	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	80	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226204 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
3	4	FIELD	Standard Penetration Test	10	NBLOW
4	4.15	FIELD	Standard Penetration Test	14	NBLOW
28	3.23	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	46	%pass
29	3.23	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	60	%pass
30	3.23	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	67	%pass
31	3.99	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	32	%pass
32	3.99	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	49	%pass
33	3.99	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	60	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226205 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
5	5.52	FIELD	Standard Penetration Test	6	NBLOW
6	5.67	FIELD	Standard Penetration Test	8	NBLOW
7	5.97	FIELD	Standard Penetration Test	8	NBLOW
8	7.04	FIELD	Standard Penetration Test	11	NBLOW
9	8.57	FIELD	Standard Penetration Test	10	NBLOW
10	8.72	FIELD	Standard Penetration Test	21	NBLOW
11	10.1	FIELD	Standard Penetration Test	6	NBLOW
12	10.24	FIELD	Standard Penetration Test	10	NBLOW
34	4.76	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	11	%pass
35	4.76	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	18	%pass
36	5.52	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	15	%pass
37	5.52	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	23	%pass
38	5.52	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	42	%pass
39	7.04	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	2	%pass
40	7.04	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	9	%pass
41	9.33	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	3	%pass
42	9.33	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	9	%pass
43	9.33	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	16	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226207 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
14	11.92	FIELD	Standard Penetration Test	14	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226209 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
15	13.14	FIELD	Standard Penetration Test	10	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226210 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
17	13.9	FIELD	Standard Penetration Test	55	NBLOW
18	14.05	FIELD	Standard Penetration Test	22	NBLOW
19	14.66	FIELD	Standard Penetration Test	27	NBLOW
47	14.05	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	5	%pass
48	14.05	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	20	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226212 IN BOREHOLE 92262 (Company Name: BH253)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
21	15.58	FIELD	Standard Penetration Test	70	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226302 IN BOREHOLE 92263 (Company Name: BH254)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	2.01	FIELD	Standard Penetration Test	16	NBLOW
2	2.16	FIELD	Standard Penetration Test	62	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226305 IN BOREHOLE 92263 (Company Name: BH254)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
3	4.91	FIELD	Standard Penetration Test	4	NBLOW
4	5.06	FIELD	Standard Penetration Test	10	NBLOW
14	4.3	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	34	%pass
15	4.3	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	49	%pass
16	4.3	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	56	%pass
17	4.9	LABSOIL	Particle Size Distribution - Silt (0.06mm)	7	%pass
18	4.9	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	98	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226401 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
13	.36	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	40	%pass
14	.36	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	90	%pass
15	.36	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	92	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226404 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
19	2.04	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	67	%pass
20	2.04	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	84	%pass
21	2.04	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	88	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226405 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	2.8	FIELD	Standard Penetration Test	16	NBLOW
2	2.96	FIELD	Standard Penetration Test	54	NBLOW
22	3.41	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	85	%pass
23	3.41	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	91	%pass
24	3.41	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	92	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226406 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
3	4.18	FIELD	Standard Penetration Test	5	NBLOW
4	4.33	FIELD	Standard Penetration Test	24	NBLOW
5	5.7	FIELD	Standard Penetration Test	3	
6	5.85	FIELD	Standard Penetration Test	19	NBLOW
25	4.18	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	55	%pass
26	4.18	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	84	%pass
27	4.18	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	91	%pass
28	5.52	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	66	%pass
29	5.52	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	90	%pass
30	5.52	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	96	%pass
31	5.7	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	69	%pass
32	5.7	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	91	%pass
33	5.7	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	96	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226410 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
34	9.51	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	60	%pass
35	9.51	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	81	%pass
36	9.51	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	84	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226412 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
7	11.64	FIELD	Standard Penetration Test	15	NBLOW
8	11.8	FIELD	Standard Penetration Test	35	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226414 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
9	12.9	FIELD	Standard Penetration Test	27	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226415 IN BOREHOLE 92264 (Company Name: BH255)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
10	13.04	FIELD	Standard Penetration Test	78	NBLOW
11	13.47	FIELD	Standard Penetration Test	37	NBLOW
12	13.93	FIELD	Standard Penetration Test	7	NBLOW
37	12.56	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	2	%pass
38	12.56	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	20	%pass
39	12.56	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	41	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226501 IN BOREHOLE 92265 (Company Name: BH256)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
13	1.98	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	97	%pass
14	1.98	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	100	%pass
15	2.5	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	82	%pass
16	2.5	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	96	%pass
17	2.5	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	97	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226503 IN BOREHOLE 92265 (Company Name: BH256)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	3.66	FIELD	Standard Penetration Test	12	NBLOW
2	3.66	FIELD	Standard Penetration Test	33	NBLOW
3	5.03	FIELD	Standard Penetration Test	6	NBLOW
4	5.18	FIELD	Standard Penetration Test	32	NBLOW
5	6.55	FIELD	Standard Penetration Test	8	NBLOW
6	6.7	FIELD	Standard Penetration Test	25	NBLOW
18	3.16	LABSOIL	Particle Size Distribution - Silt (0.06mm)	24	%pass
19	3.16	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	99	%pass
20	3.16	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	100	%pass
21	5.18	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	84	%pass
22	5.18	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	99	%pass
23	5.18	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	100	%pass
24	6.7	LABSOIL	Particle Size Distribution - Silt (0.06mm)	15	%pass
25	6.7	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	74	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226504 IN BOREHOLE 92265 (Company Name: BH256)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
7	8.08	FIELD	Standard Penetration Test	12	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226508 IN BOREHOLE 92265 (Company Name: BH256)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
10	13.11	FIELD	Standard Penetration Test	96	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226509 IN BOREHOLE 92265 (Company Name: BH256)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
11	14.33	FIELD	Standard Penetration Test	12	NBLOW
12	14.5	FIELD	Standard Penetration Test	94	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226601 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
21	.49	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	95	%pass
22	.49	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	96	%pass
23	.49	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	98	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226602 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	1.86	FIELD	Standard Penetration Test	10	NBLOW
2	2.01	FIELD	Standard Penetration Test	26	NBLOW
27	2.47	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	64	%pass
28	2.47	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	80	%pass
29	2.47	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	82	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226603 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
3	3.23	FIELD	Standard Penetration Test	12	NBLOW
4	3.38	FIELD	Standard Penetration Test	31	NBLOW
30	3.23	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	92	%pass
31	3.23	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	98	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226604 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
32	4	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	93	%pass
33	4	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	99	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226605 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
5	4.76	FIELD	Standard Penetration Test	4	NBLOW
6	4.9	FIELD	Standard Penetration Test	12	NBLOW
34	4.79	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	95	%pass
35	4.79	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	98	%pass
36	4.79	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	99	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226607 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
7	6.28	FIELD	Standard Penetration Test	8	NBLOW
8	6.43	FIELD	Standard Penetration Test	20	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226608 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
9	7.19	FIELD	Standard Penetration Test	6	NBLOW
10	7.5	FIELD	Standard Penetration Test	18	NBLOW
11	7.65	FIELD	Standard Penetration Test	5	NBLOW
12	7.8	FIELD	Standard Penetration Test	11	NBLOW
13	9.02	FIELD	Standard Penetration Test	8	NBLOW
14	9.18	FIELD	Standard Penetration Test	20	NBLOW
15	11.31	FIELD	Standard Penetration Test	12	NBLOW
16	11.46	FIELD	Standard Penetration Test	23	NBLOW
40	8.26	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	94	%pass
41	8.26	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	98	%pass
42	8.26	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	99	%pass
43	11.16	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	45	%pass
44	11.16	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	72	%pass
45	11.16	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	96	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226609 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
17	12.53	FIELD	Standard Penetration Test	20	NBLOW
18	12.68	FIELD	Standard Penetration Test	48	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226610 IN BOREHOLE 92266 (Company Name: BH257)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
19	13.14	FIELD	Standard Penetration Test	28	NBLOW
20	13.29	FIELD	Standard Penetration Test	50	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226701 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
7	.82	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	10	%pass
8	.82	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	20	%pass
9	.82	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	32	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226702 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
10	1.43	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	21	%pass
11	1.43	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	42	%pass
12	1.43	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	48	%pass
16	2.65	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	55	%pass
17	2.65	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	88	%pass
18	2.65	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	93	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226705 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
26	5.09	LABSOIL	Particle Size Distribution - Silt (0.06mm)	38	%pass
27	5.09	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	95	%pass
28	5.09	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	100	%pass
29	5.7	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	85	%pass
30	5.7	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	97	%pass
31	5.7	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	99	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226709 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
35	9.97	LABSOIL	Particle Size Distribution - Silt (0.06mm)	65	%pass
36	9.97	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	97	%pass
37	9.97	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	99	%pass

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226711 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	11.34	FIELD	Standard Penetration Test	9	
2	11.5	FIELD	Standard Penetration Test	19	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226712 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
3	12.86	FIELD	Standard Penetration Test	6	NBLOW
4	13.02	FIELD	Standard Penetration Test	19	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226714 IN BOREHOLE 92267 (Company Name: BH258)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
5	13.78	FIELD	Standard Penetration Test	12	NBLOW
6	13.9	FIELD	Standard Penetration Test	75	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226806 IN BOREHOLE 92268 (Company Name: BH258B)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	10.18	FIELD	Standard Penetration Test	6	NBLOW
2	10.49	FIELD	Standard Penetration Test	13	NBLOW
3	11.25	FIELD	Standard Penetration Test	6	NBLOW
4	11.4	FIELD	Standard Penetration Test	27	NBLOW

GSI REPORT 2816

Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226807 IN BOREHOLE 92268 (Company Name: BH258B)

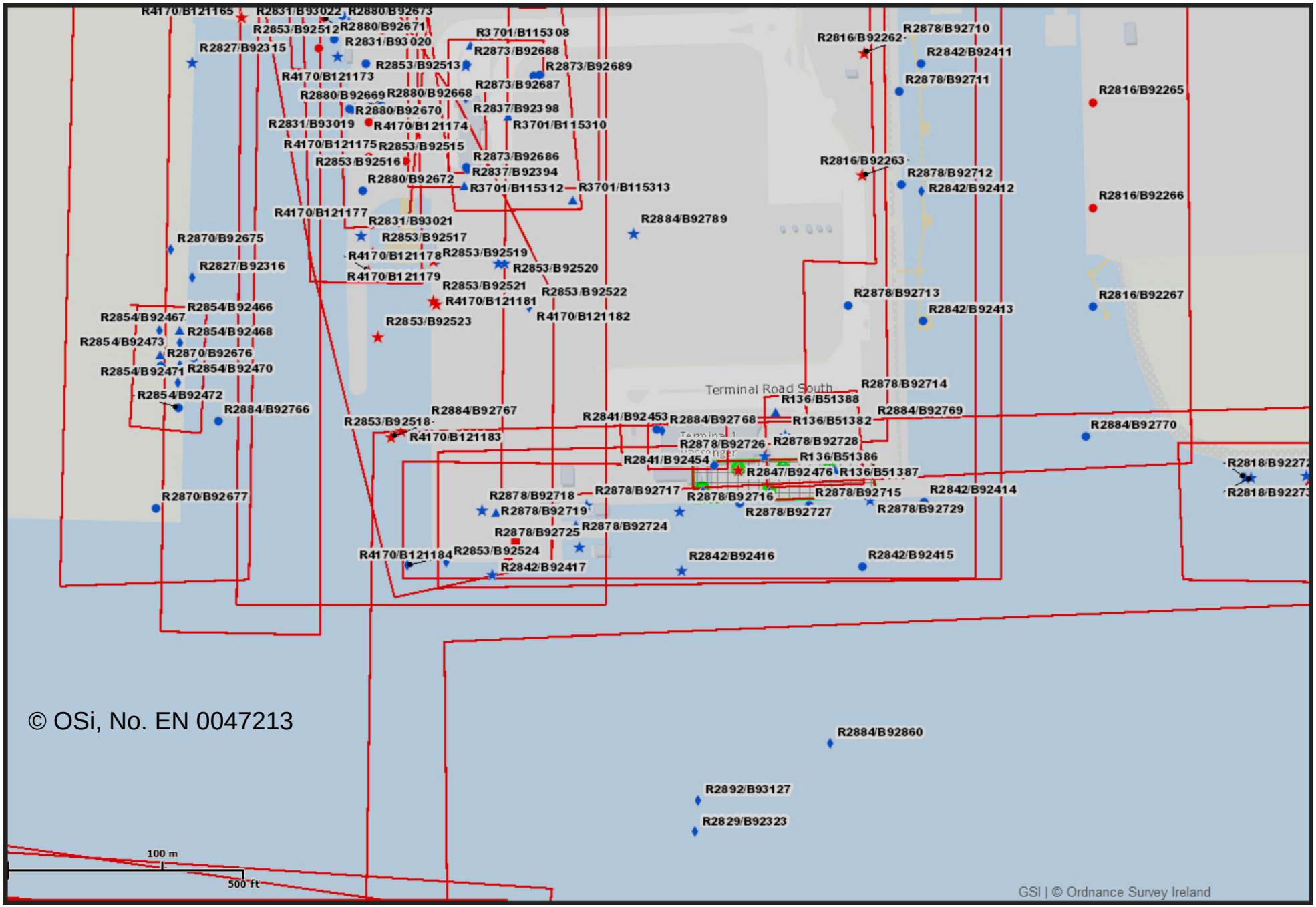
TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
6	15.21	FIELD	Standard Penetration Test	48	NBLOW

GSI REPORT 2816

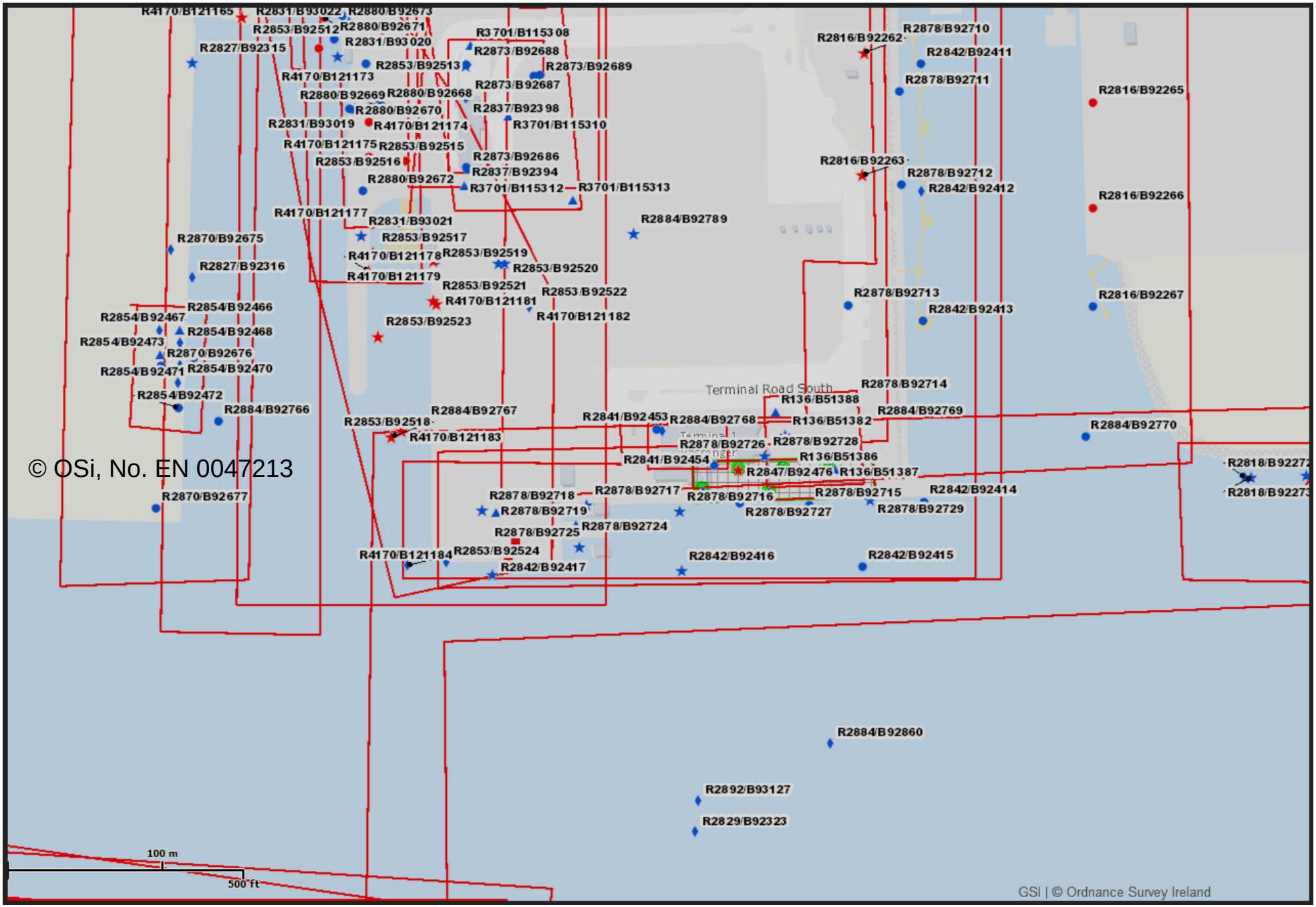
Container Terminal (east of Car Ferry)

TESTS FOR LAYER 9226808 IN BOREHOLE 92268 (Company Name: BH258B)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
8	15.67	FIELD	Standard Penetration Test	37	NBLOW
9	16.28	FIELD	Standard Penetration Test	14	NBLOW
10	16.43	FIELD	Standard Penetration Test	42	NBLOW



Overview Map for GSI Report 2847: Ferry Port Gangway
Dublin Port, Dublin, Co. Dublin
Points Observed: 7



© OSi, No. EN 0047213

GSI REPORT 2847

Ferry Port Gangway

Dublin Port, Dublin, Co. Dublin

Borehole List:

Borehole	Name	Depth	DTB	ODMALIN	Easting	Northing	Description
92476	BH408	28.5	28.35	6.01	320268	234283	Cable Percussion (Shell and Auger)
92477	BH409	23		6.05	320297	234283	Cable Percussion (Shell and Auger)
92478	BH410	12.5		5.88	320327	234283	Cable Percussion (Shell and Auger)
92479	BH410RB	29.3	29	5.88			Cable Percussion (Shell and Auger)
92480	BH411	3		5.95	320245	234270	Cable Percussion (Shell and Auger)
92481	BH412	3		5.92	320288	234269	Cable Percussion (Shell and Auger)
92482	BH413	3		5.9	320327	234268	Cable Percussion (Shell and Auger)

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92476 (Company Name: BH408)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9247601	0	5				Fill - Made Ground	Fill - Made Ground
9247602	5	10				Fill - Made Ground	Fill - Made Ground
9247603	10	15.3				Fill - Made Ground	Fill - Made Ground
9247604	15.3	16		Grey	Coarse	Sand	Sand
9247605	16	18.4			Fine to Coarse Sandy	Gravel And Cobbles	Gravel And Cobbles
9247606	18.4	20.5	Very Stiff	Dark Grey	Very Silty	Clay	Clay
9247607	20.5	21.5			Fine Sandy	Gravel	Gravel
9247608	21.5	28.35			Fine to Coarse	Gravel And Cobbles	Gravel And Cobbles
9247609	28.35	28.5				Bedrock	Bedrock

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92477 (Company Name: BH409)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92478 (Company Name: BH410)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9247801	0	4				Fill - Made Ground	Fill - Made Ground
9247802	4	7.5				Fill - Made Ground	Fill - Made Ground
9247803	7.5	11				Fill - Made Ground	Fill - Made Ground
9247804	11	12.5				Boulders	Boulders

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92479 (Company Name: BH410RB)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9247901	0	4				Fill - Made Ground	Fill - Made Ground
9247902	4	7.5				Fill - Made Ground	Fill - Made Ground
9247903	7.5	12.5				Fill - Made Ground	Fill - Made Ground
9247904	12.5	17				Fill - Made Ground	Fill - Made Ground
9247905	17	18	Firm	Grey	Slightly Sandy Gravelly	Silt	Silt
9247906	18	19	Medium Dense	Grey	Gravelly	Sand	Sand
9247907	19	24.5	Stiff	Grey	Very Silty	Clay	Clay
9247908	24.5	25.5	Stiff	Grey	Very Sandy	Silt	Silt
9247909	25.5	26.8	Dense	Brown Grey	Silty	Sand	Sand
9247910	26.8	28			Fine to Coarse Sandy	Gravel And Cobbles	Gravel And Cobbles
9247911	28	28.3				Boulders	Boulders
9247912	28.3	29			Fine to Coarse Sandy	Gravel And Cobbles	Gravel And Cobbles
9247913	29	29.3				Bedrock	Bedrock

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92480 (Company Name: BH411)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9248001	0	.15				Fill - Made Ground	Fill - Made Ground
9248002	.15	.35				Fill - Made Ground	Fill - Made Ground
9248003	.35	.9				Fill - Made Ground	Fill - Made Ground
9248004	.9	1.5				Fill - Made Ground	Fill - Made Ground
9248005	1.5	2.7				Fill - Made Ground	Fill - Made Ground
9248006	2.7	3				Fill - Made Ground	Fill - Made Ground

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92481 (Company Name: BH412)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9248101	0	.15				Fill - Made Ground	Fill - Made Ground
9248102	.15	.4				Fill - Made Ground	Fill - Made Ground
9248103	.4	1.6				Fill - Made Ground	Fill - Made Ground
9248104	1.6	2.6				Fill - Made Ground	Fill - Made Ground
9248105	2.6	3				Fill - Made Ground	Fill - Made Ground

GSI REPORT 2847

Ferry Port Gangway

LAYERS FOR BOREHOLE 92482 (Company Name: BH413)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
9248201	0	.25				Fill - Made Ground	Fill - Made Ground
9248202	.25	.4				Fill - Made Ground	Fill - Made Ground
9248203	.4	.8				Fill - Made Ground	Fill - Made Ground
9248204	.8	3				Fill - Made Ground	Fill - Made Ground

GSI REPORT 2847

Ferry Port Gangway

TESTS FOR LAYER 9247606 IN BOREHOLE 92476 (Company Name: BH408)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	19	LABSOIL	Unconfined Compressive Strength	465	kN/m(2)
2	19	LABSOIL	Triaxial Compression - Strain at Failure	145	%
2	19	LABSOIL	Triaxial Compression Drained	145	%
3	19	LABSOIL	Triaxial testing involving local strain measurement	123	kN/m(2)
3	19	LABSOIL	Triaxial Compression - Cohesion	123	kN/m(2)
4	19	LABSOIL	Triaxial Compression Undrained	26	?
4	19	LABSOIL	Triaxial Compression - Angle of Friction	26	?
5	19	LABSOIL	Bulk Density	2.21	Mg/m(3)
5	19	LABSOIL	Bulk Density Mg/m(3)	2.21	Mg/m(3)
6	19	LABSOIL	Moisture Content	20.9	%
7	19	LABSOIL	Unconfined Compressive Strength	580	kN/m(2)
8	19	LABSOIL	Triaxial Compression - Strain at Failure	20	%
8	19	LABSOIL	Triaxial Compression Drained	20	%
9	19	LABSOIL	Bulk Density Mg/m(3)	2.12	Mg/m(3)
9	19	LABSOIL	Bulk Density	2.12	Mg/m(3)
10	19	LABSOIL	Moisture Content	22	%
11	19	LABSOIL	Unconfined Compressive Strength	625	kN/m(2)
12	19	LABSOIL	Triaxial Compression Drained	20	%
12	19	LABSOIL	Triaxial Compression - Strain at Failure	20	%
13	19	LABSOIL	Bulk Density Mg/m(3)	2.13	Mg/m(3)
13	19	LABSOIL	Bulk Density	2.13	Mg/m(3)

14	19	LABSOIL	Moisture Content	19.5	%
15	19	LABSOIL	Liquid Limit	45	%
16	19	LABSOIL	Plastic Limit	19	%
17	19	LABSOIL	Plasticity Index	26	%
21	19	LABSOIL	Particle Size Distribution - Silt (0.06mm)	91	%pass
22	19	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	98	%pass
23	19	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	100	%pass

GSI REPORT 2847

Ferry Port Gangway

TESTS FOR LAYER 9247608 IN BOREHOLE 92476 (Company Name: BH408)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
24	22	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	7	%pass
25	22	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	12	%pass
26	22	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	29	%pass
27	27	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	2	%pass
28	27	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	6	%pass
29	27	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	17	%pass

GSI REPORT 2847

Ferry Port Gangway

TESTS FOR LAYER 9247907 IN BOREHOLE 92479 (Company Name: BH410RB)

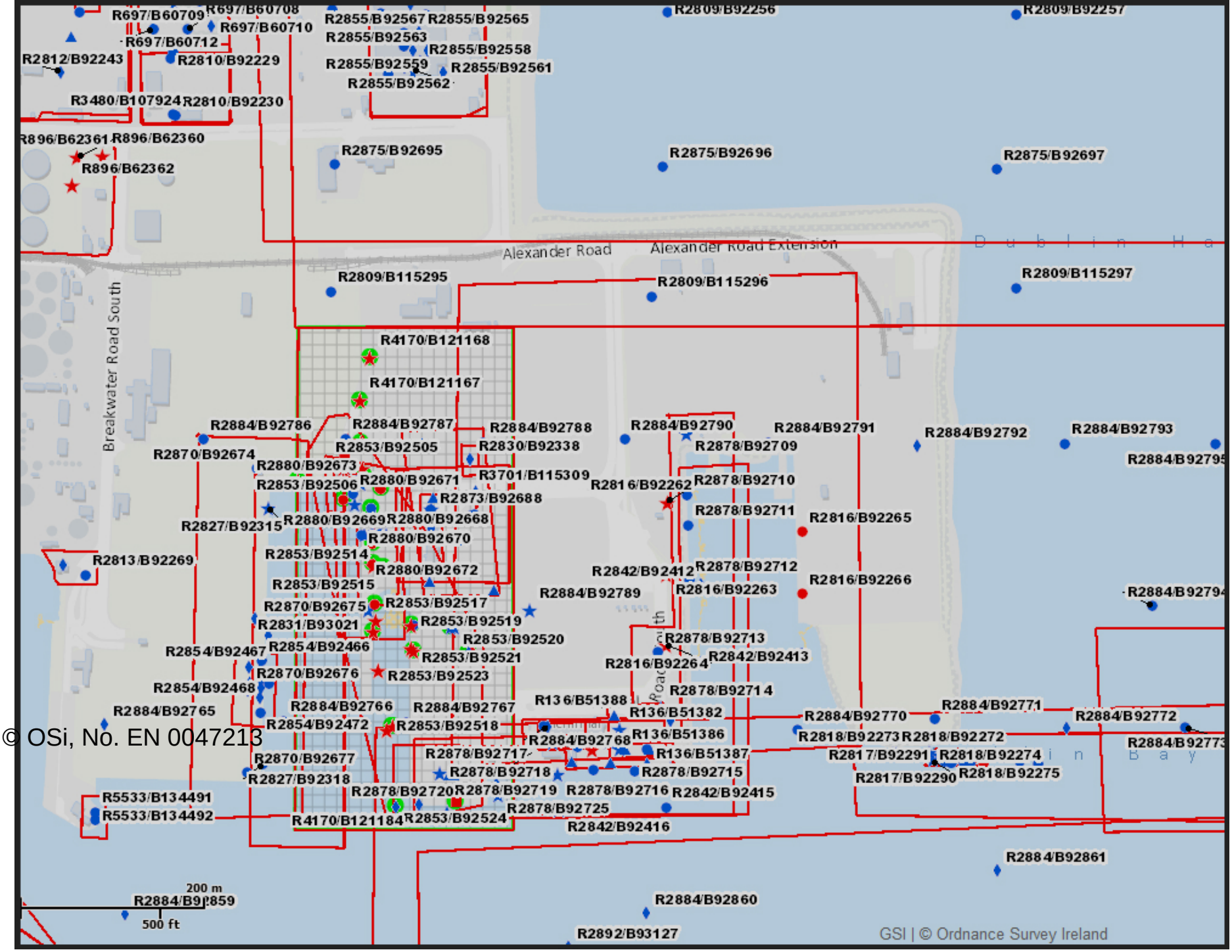
TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
1	21	LABSOIL	Particle Size Distribution - Silt (0.06mm)	83	%pass
2	21	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	98	%pass
3	21	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	99.5	%pass
4	21	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	100	%pass
5	21	LABSOIL	Particle Size Distribution - Clay (0.002mm)	31	%pass

GSI REPORT 2847

Ferry Port Gangway

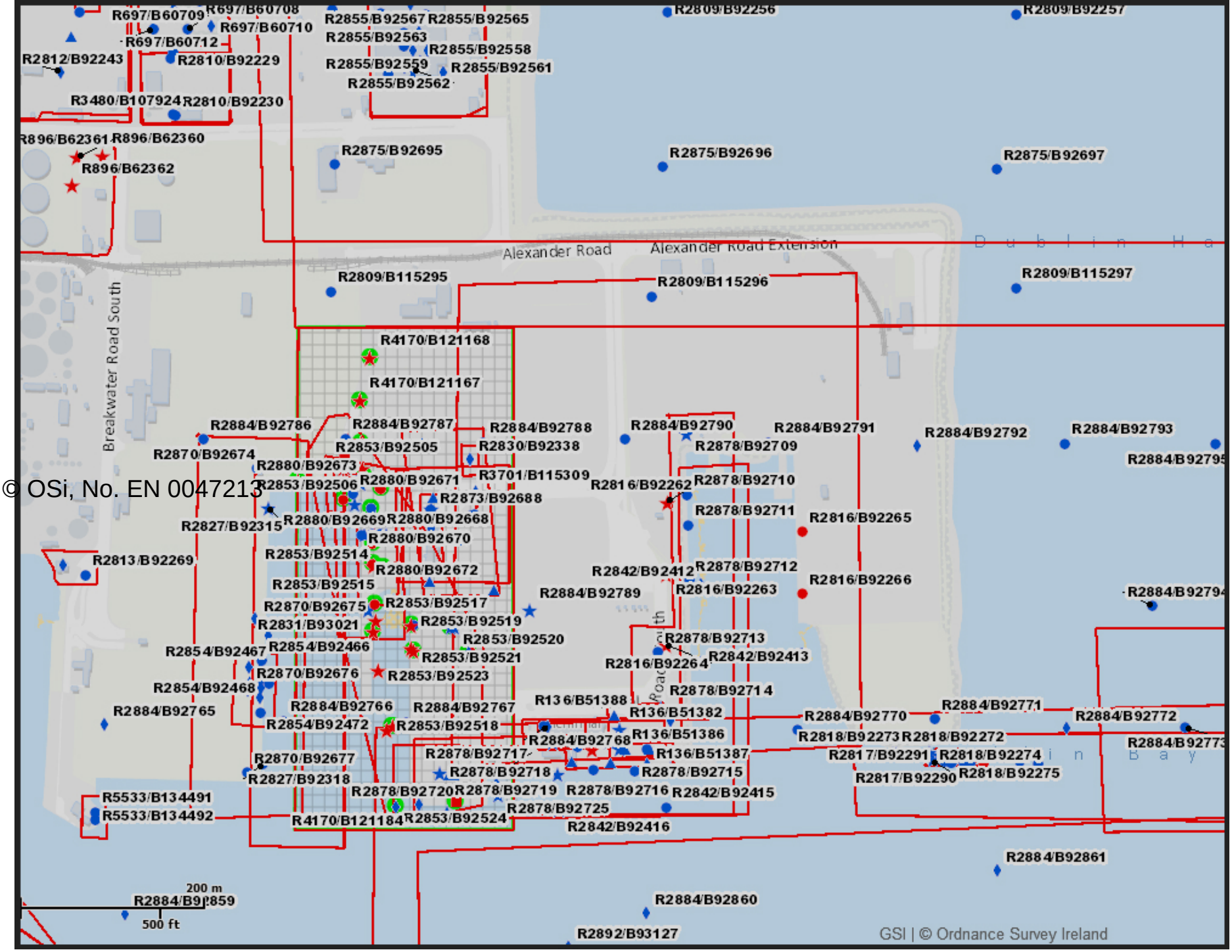
TESTS FOR LAYER 9247909 IN BOREHOLE 92479 (Company Name: BH410RB)

TEST	TOP	CLASS	DESCRIPTION	RESULT	UNITS
6	26.5	LABSOIL	Particle Size Distribution - Fine Sand (0.20mm)	55	%pass
7	26.5	LABSOIL	Particle Size Distribution - Medium Sand (0.60mm)	82	%pass
8	26.5	LABSOIL	Particle Size Distribution - Coarse Sand (2.00mm)	95	%pass



© OSi, No. EN 0047213

Overview Map for GSI Report 4170: Reconstruction of Berth 51
Berth 51, Dublin Port, Dublin
Points Observed: 21



© OSi, No. EN 0047213

GSI REPORT 4170

Reconstruction of Berth 51

Berth 51, Dublin Port, Dublin

Borehole List:

Borehole	Name	Depth	DTB	ODMALIN	Easting	Northing	Description
121165	101	25.3	25	5.7	319947	234575	Cable Percussion (Shell and Auger)
121166	102	20	19.3	5.49	319992	234591	Cable Percussion (Shell and Auger)
121167	103	22.8	22.6	5.87	320015	234662	Cable Percussion (Shell and Auger)
121168	104	25.5	23.5	6.03	320026	234709	Cable Percussion (Shell and Auger)
121169	105	23.4	23	6.28	320016	234616	Cable Percussion (Shell and Auger)
121170	106A	18.1	17.85	6.14	320019	234581	Cable Percussion (Shell and Auger)
121171	107	12	11.7	-2.26	320038	234567	Cable Percussion (Shell and Auger)
121172	108	11.9	11.7	-2.66	319997	234555	Cable Percussion (Shell and Auger)
121173	109	12		-2.56	320027	234545	Cable Percussion (Shell and Auger)
121174	111	14.6	14.5	-2.67	320029	234507	Cable Percussion (Shell and Auger)
121175	112	18.2	18	-1.26	320029	234485	Cable Percussion (Shell and Auger)
121176	113	18.6	18.4	-.06	320040	234481	Cable Percussion (Shell and Auger)
121177	114	19.1	18.8	-3.46	320031	234441	Cable Percussion (Shell and Auger)
121178	115	21.5	21.4	-3.66	320029	234411	Cable Percussion (Shell and Auger)
121179	116A	27	26.8	6.2	320071	234418	Cable Percussion (Shell and Auger)
121180	117	22.5		6.3	320113	234416	Cable Percussion (Shell and Auger)
121181	118	26.6	25.5	5.8	320073	234390	Cable Percussion (Shell and Auger)
121182	119B	5.5		6.2	320133	234388	Cable Percussion (Shell and Auger)
121183	120	21.5	20.8	2.76	320050	234308	Cable Percussion (Shell and Auger)
121184	121/A	8.2		7.66	320054	234221	Cable Percussion (Shell and Auger)
121185	122	33	32.5	6.3	320119	234226	Cable Percussion (Shell and Auger)

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121165 (Company Name: 101)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12116501	0	.2				Fill - Made Ground	Fill - Made Ground
12116502	.2	5.4				Fill - Made Ground	Fill - Made Ground
12116503	5.4	8.6	Soft to Firm	Grey		Silt	Silt
12116504	8.6	11	Soft	Grey		Silt	Silt
12116505	11	12.5	Soft	Grey		Silt	Silt
12116506	12.5	14.5	Soft	Grey		Silt	Silt
12116507	14.5	15.9	Soft	Brown		Peat	Peat
12116508	15.9	17			Fine to Coarse Sandy	Gravel	Gravel
12116509	17	19	Dense		Fine to Coarse	Gravel	Gravel
12116510	19	22	Stiff	Grey	Silty	Clay	Clay
12116511	22	23.5	Dense		Fine to Coarse Sandy	Gravel	Gravel
12116512	23.5	24.5	Dense		Fine to Coarse Sandy	Gravel	Gravel
12116513	24.5	25	Dense			Gravel, Cobbles And Boulders	Gravel, Cobbles And Boulders
12116514	25	25.3				Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121166 (Company Name: 102)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12116601	0	.6				Fill - Made Ground	Fill - Made Ground
12116602	.6	6				Fill - Made Ground	Fill - Made Ground
12116603	6	10.5	Soft to Firm	Grey Blue		Silt	Silt
12116604	10.5	17.4	Soft to Firm	Grey Blue		Silt	Silt
12116605	17.4	18	Dense		Fine to Coarse Sandy	Gravel	Gravel
12116606	18	18.6	Dense		Fine to Coarse	Gravel	Gravel
12116607	18.6	19.3	Stiff	Grey	Silty	Clay	Clay
12116608	19.3	20		Grey		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121167 (Company Name: 103)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12116701	0	5.6				Fill - Made Ground	Fill - Made Ground
12116702	5.6	6.2	Soft	Black	Silty	Clay	Clay
12116703	6.2	6.3			Fine Sandy	Gravel	Gravel
12116704	6.3	8	Firm	Grey Blue	Silty	Clay	Clay
12116705	8	12.5	Firm	Grey Blue	Silty	Clay	Clay
12116706	12.5	13			Fine to Coarse	Sand	Sand
12116707	13	14.4			Fine to Coarse	Sand	Sand
12116708	14.4	17.4	Firm	Grey	Silty	Clay	Clay
12116709	17.4	18.7	Dense		Fine to Coarse Sandy	Gravel	Gravel
12116710	18.7	22.3	Firm	Grey	Silty	Clay	Clay
12116711	22.3	22.6	Dense			Gravel	Gravel
12116712	22.6	22.8				Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121168 (Company Name: 104)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12116801	0	.3				Fill - Made Ground	Fill - Made Ground
12116802	.3	5.8				Fill - Made Ground	Fill - Made Ground
12116803	5.8	6.2	Soft	Grey		Silt	Silt
12116804	6.2	8	Medium Dense		Silty	Sand	Sand
12116805	8	15.5	Firm	Grey Blue		Silt	Silt
12116806	15.5	16.8		Brown	Fine	Sand	Sand
12116807	16.8	17.5			Sandy	Gravel	Gravel
12116808	17.5	19.4	Dense		Fine to Coarse	Gravel	Gravel
12116809	19.4	22.9	Stiff	Grey	Silty	Clay	Clay
12116810	22.9	23.5	Dense	Grey		Gravel	Gravel
12116811	23.5	25.5		Grey		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121169 (Company Name: 105)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12116901	0	5.8				Fill - Made Ground	Fill - Made Ground
12116902	5.8	15.5	Firm	Blue		Silt	Silt
12116903	15.5	17	Dense	Grey	Silty	Sand	Sand
12116904	17	18.5	Dense Coarse		Sandy	Gravel	Gravel
12116905	18.5	19.2	Dense Coarse		Sandy	Gravel	Gravel
12116906	19.2	20	Stiff	Grey	Silty	Clay	Clay
12116907	20	23	Compact			Gravel	Gravel
12116908	23	23.4		Grey		Bedrock	Bedrock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121170 (Company Name: 106A)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117001	0	3.35				Fill - Made Ground	Fill - Made Ground
12117002	3.35	7.05				Fill - Made Ground	Fill - Made Ground
12117003	7.05	11.2	Soft	Grey	Silty	Clay	Clay
12117004	11.2	11.7	Loose	Grey	Fine to Medium	Sand	Sand
12117005	11.7	14.5	Soft	Grey	Silty	Clay	Clay
12117006	14.5	17.3	Firm	Grey Brown	Silty	Clay	Clay
12117007	17.3	17.85	Medium Dense	Grey	Fine to Coarse Sandy	Gravel	Gravel
12117008	17.85	18.1		Grey		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121171 (Company Name: 107)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117101	0	3.2	Very Soft	Grey Black	Clayey	Silt	Silt
12117102	3.2	5			Fine to Coarse Sandy	Gravel	Gravel
12117103	5	8.3	Soft to Firm	Grey Brown	Silty	Clay	Clay
12117104	8.3	11.7			Fine to Coarse	Gravel	Gravel
12117105	11.7	12				Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121172 (Company Name: 108)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117201	0	1.9				Fill - Made Ground	Fill - Made Ground
12117202	1.9	3.4	Loose		Fine to Coarse Sandy	Gravel	Gravel
12117203	3.4	5.2	Soft	Grey	Silty	Clay	Clay
12117204	5.2	7.8	Soft to Firm	Brown	Silty	Clay	Clay
12117205	7.8	10	Dense		Fine to Coarse Sandy	Gravel	Gravel
12117206	10	11.7	Stiff	Grey	Silty	Clay	Clay
12117207	11.7	11.9	Hard	Grey		Bedrock	Bedrock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121173 (Company Name: 109)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117301	0	3.3				Top Soil	Top Soil
12117302	3.3	4.8			Fine Sandy	Gravel	Gravel
12117303	4.8	8.4	Soft to Firm	Grey Brown	Organic	Clay	Clay
12117304	8.4	10.8			Fine to Coarse Sandy	Gravel	Gravel
12117305	10.8	12	Firm	Grey	Silty	Clay	Clay

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121174 (Company Name: 111)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117401	0	3.2	Very Soft	Grey Black	Organic	Silt	Silt
12117402	3.2	4.8	Loose		Fine to Medium	Gravel	Gravel
12117403	4.8	7.5	Soft	Light Grey	Silty	Clay	Clay
12117404	7.5	8.7	Dense		Fine to Coarse Sandy	Gravel	Gravel
12117405	8.7	12.8	Stiff	Grey	Silty	Clay	Clay
12117406	12.8	14.5	Stiff	Grey	Silty	Clay	Clay
12117407	14.5	14.6		Black		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121175 (Company Name: 112)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117501	0	3.4	Soft	Black	Clayey	Silt	Silt
12117502	3.4	6.8			Fine to Coarse Sandy	Gravel	Gravel
12117503	6.8	8.1	Soft	Light Brownish Grey	Silty	Clay	Clay
12117504	8.1	16	Dense		Fine to Coarse Sandy	Gravel	Gravel
12117505	16	16.8	Dense	Grey	Medium to Coarse	Sand	Sand
12117506	16.8	18	Dense		Fine to Coarse Sandy	Gravel	Gravel
12117507	18	18.2				Presumed Rock	Presumed Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121176 (Company Name: 113)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117601	0	2.2	Soft	Grey Black	Clayey	Silt	Silt
12117602	2.2	10.9			Fine to Coarse Sandy	Gravel	Gravel
12117603	10.9	11.9				Cobbles And Boulders	Cobbles And Boulders
12117604	11.9	18.4	Firm to Stiff	Grey	Silty	Clay	Clay
12117605	18.4	18.6				Presumed Rock	Presumed Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121177 (Company Name: 114)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117701	0	2.6	Very Soft	Black	Organic	Silt	Silt
12117702	2.6	6	Medium Dense		Fine to Coarse	Gravel	Gravel
12117703	6	10	Dense		Fine to Coarse	Gravel	Gravel
12117704	10	10.2				Boulders	Boulders
12117705	10.2	18.8	Firm to Stiff	Grey	Silty	Clay	Clay
12117706	18.8	19.1		Grey		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121178 (Company Name: 115)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117801	0	3.6	Very Soft	Black	Organic	Silt	Silt
12117802	3.6	4.2				Fill - Made Ground	Fill - Made Ground
12117803	4.2	9.3			Fine to Coarse Sandy	Gravel	Gravel
12117804	9.3	10.2	Dense	Grey	Fine	Sand	Sand
12117805	10.2	21.4	Firm to Stiff	Grey	Silty	Clay	Clay
12117806	21.4	21.5		Grey Black		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121179 (Company Name: 116A)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12117901	0	.3				Fill - Made Ground	Fill - Made Ground
12117902	.3	3.3				Fill - Made Ground	Fill - Made Ground
12117903	3.3	5.7				Fill - Made Ground	Fill - Made Ground
12117904	5.7	6.2	Firm	Black	Silty	Clay	Clay
12117905	6.2	16.5			Sandy	Gravel	Gravel
12117906	16.5	17.8	Dense		Fine to Coarse Sandy	Gravel	Gravel
12117907	17.8	26.2	Stiff	Grey	Silty	Clay	Clay
12117908	26.2	26.8	Dense		Fine to Coarse	Gravel	Gravel
12117909	26.8	27		Grey		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121180 (Company Name: 117)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118001	0	6				Fill - Made Ground	Fill - Made Ground
12118002	6	7.3	Soft	Grey Black		Silt	Silt
12118003	7.3	9.5			Fine to Coarse Sandy	Gravel	Gravel
12118004	9.5	15.4	Dense		Fine to Coarse Sandy	Gravel	Gravel
12118005	15.4	16.5	Soft	Grey	Clayey	Silt	Silt
12118006	16.5	17.4	Dense		Fine to Coarse Sandy	Gravel	Gravel
12118007	17.4	18	Dense		Fine to Coarse	Gravel	Gravel
12118008	18	22.5	Stiff	Grey	Silty	Clay	Clay

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121181 (Company Name: 118)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118101	0	6.6				Fill - Made Ground	Fill - Made Ground
12118102	6.6	8.5	Soft	Grey Black	Organic	Silt	Silt
12118103	8.5	17.5			Sandy	Gravel	Gravel
12118104	17.5	25.5	Stiff	Grey	Silty	Clay	Clay
12118105	25.5	26.6		Black		Weathered Rock	Weathered Rock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121182 (Company Name: 119B)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118201	0	5.5				Fill - Made Ground	Fill - Made Ground

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121183 (Company Name: 120)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118301	0	3.5	Very Soft	Black	Organic	Silt	Silt
12118302	3.5	9.9			Fine to Coarse	Gravel	Gravel
12118303	9.9	20.8	Firm to Stiff	Grey	Silty	Clay	Clay
12118304	20.8	21.2		Grey		Weathered Rock	Weathered Rock
12118305	21.2	21.5		Grey		Bedrock	Bedrock

GSI REPORT 4170

Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121184 (Company Name: 121/A)

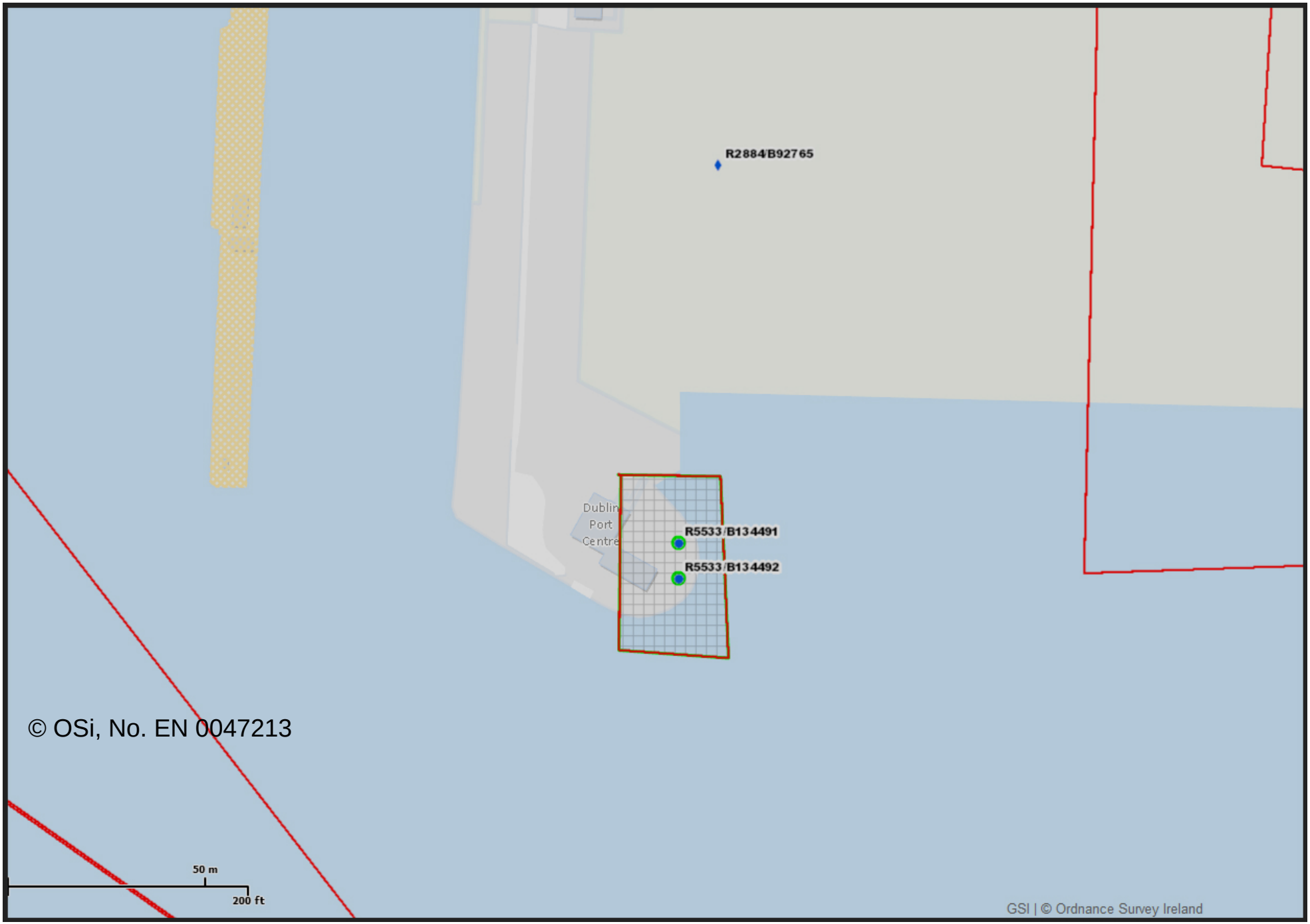
LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118401	0	3.7	Very Soft	Grey Black	Clayey	Silt	Silt
12118402	3.7	8.2			Fine to Coarse	Gravel	Gravel

GSI REPORT 4170

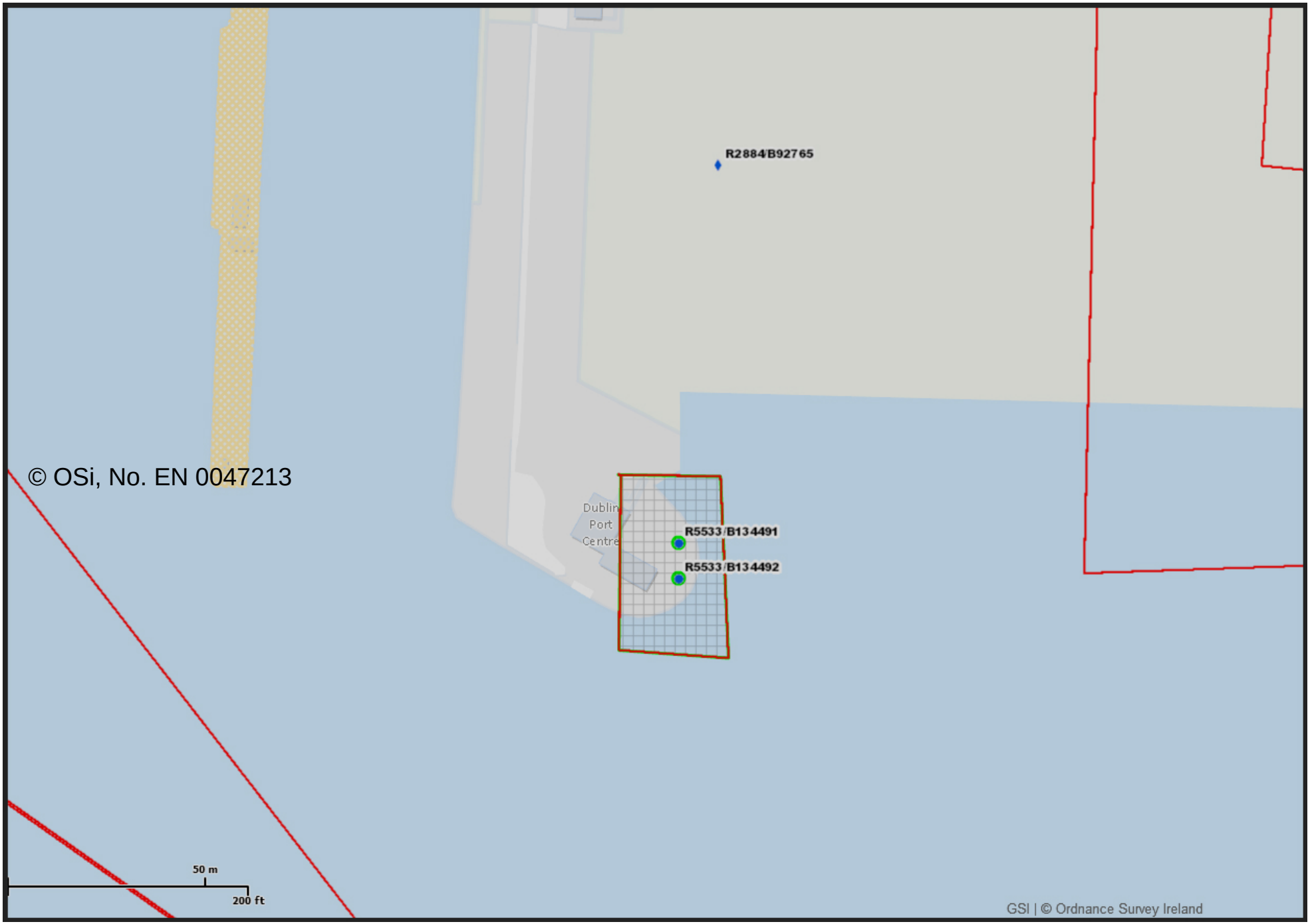
Reconstruction of Berth 51

LAYERS FOR BOREHOLE 121185 (Company Name: 122)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
12118501	0	4.9				Fill - Made Ground	Fill - Made Ground
12118502	4.9	10.6				Fill - Made Ground	Fill - Made Ground
12118503	10.6	11.5		Grey Brown	Sandy	Gravel	Gravel
12118504	11.5	12.1	Medium Dense	Dark Grey	Sandy	Gravel	Gravel
12118505	12.1	12.35	Soft	Grey	Silty	Clay	Clay
12118506	12.35	15.95	Medium Dense	Grey	Fine to Coarse Sandy	Gravel	Gravel
12118507	15.95	17.6	Medium Dense	Grey Brown	Fine to Medium	Sand	Sand
12118508	17.6	17.9	Firm	Grey	Silty	Clay	Clay
12118509	17.9	19.1	Medium Dense	Grey Brown	Fine to Medium	Sand	Sand
12118510	19.1	20.5	Firm	Grey	Silty	Clay	Clay
12118511	20.5	20.85	Firm	Grey	Silty	Clay	Clay
12118512	20.85	25.6	Firm to Stiff	Grey	Silty	Clay	Clay
12118513	25.6	30.5	Stiff	Grey	Silty	Clay	Clay
12118514	30.5	32.5	Dense Coarse			Gravel	Gravel
12118515	32.5	33				Weathered Rock	Weathered Rock



Overview Map for GSI Report 5533: Slipway
Berth 50-A, Dublin Port, Dublin 1, Co. Dublin
Points Observed: 2


R2884/B92765
© OSi, No. EN 0047213
Dublin
Port
Centre
R5533/B134491
R5533/B134492
50 m
200 ft
GSI | © Ordnance Survey Ireland

GSI REPORT 5533

Slipway

Berth 50-A, Dublin Port, Dublin 1, Co. Dublin

Borehole List:

Borehole	Name	Depth	DTB	ODMALIN	Easting	Northing	Description
134491	RC1	16		5.8	319727	234215	Rotary Core Drilling
134492	RC2	15		5.8	319727	234206	Rotary Core Drilling

GSI REPORT 5533

Slipway

LAYERS FOR BOREHOLE 134491 (Company Name: RC1)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
13449101	0	13.6				Fill - Made Ground	Fill - Made Ground
13449102	13.6	15				Gravel	Gravel
13449103	15	16				Gravel And Silt	Gravel And Silt

GSI REPORT 5533

Slipway

LAYERS FOR BOREHOLE 134492 (Company Name: RC2)

LAYER	TOP	BASE	STRENGTH	COLOUR	MINORLITH	MAJORLITH	INTERPRETATION
13449201	0	13.8				Fill - Made Ground	Fill - Made Ground
13449202	13.8	15				Gravel And Silt	Gravel And Silt

DUBLIN PORT – ALEXANDRA BASIN REDEVELOPMENT
ALEXANDRA ROAD, DUBLIN

CONTROLLED WATERS RISK ASSESSMENT

FOR

DUBLIN PORT COMPANY



March 2015

Our Ref: RCEI33367-001 R

RPS Health, Safety & Environment
Unit 12 Watersedge Business Park
Modwen Rd, Salford Quays
M5 3EZ

Report Status:	Final	
Project Reference:	RCEI33367	
	Name:	**Signature:**
Report Author:	Emily Morgan Environmental Consultant	
Technical Reviewer:	Aaron Cousins Principal Consultant	
Date:	June 2015	

This report has been prepared in the RPS Group Quality Management System to British Standard EN ISO 9001:2008

RPS Health, Safety & Environment is part of the RPS Group Plc with around 5,000 staff based at over 85 offices located throughout the UK, Ireland and the Netherlands and in the USA, Canada, the Russian Federation, Australia, Malaysia, Singapore and Abu Dhabi. RPS offers an unparalleled range of commercially focused services relating to property and land due-diligence, site development and geo-environmental investigations (including liability reviews, planning feasibility, EIAs and flood risk, energy & sustainability assessments).



CONTENTS

PAGE

1 INTRODUCTION 4
2 REGULATORY CONSULTATION 6
3 SITE SETTING 7
4 CONCEPTUAL SITE MODEL 11
5 QUANTITATIVE RISK ASSESSMENT 32
6 CONCLUSIONS AND RECOMMEDATIONS 38

FIGURE 1 Site Location Plan
FIGURE 2 Site Layout Plan
FIGURE 3 Borehole Location Plan
FIGURE 4 Cross section of Graving Dock No.2
FIGURE 5 Cross section of Berth 52/53

APPENDIX A Borehole Logs
APPENDIX B Untreated & Treated Dredgings Data
APPENDIX C Soil Analytical Data
APPENDIX D Water Analytical Data
APPENDIX E Hydraulic Conductivity Data and Tidal Hydrographs
APPENDIX F Geotechnical Data
APPENDIX G Model Input / Output Spreadsheets

1 INTRODUCTION

1.1 Preamble

RPS was commissioned by Dublin Port Company (DPC) to undertake a Controlled Waters Risk Assessment to consider the potential impact associated with using stabilised dredgings to infill two areas within Dublin Port as part of the proposed wider Port redevelopment. The areas are Graving Dock No.2 (Alexandra Basin) which occupies approximately 0.58 hectares and Berth 52/53 which occupies approximately 4.59 hectares. A site location plan is presented as Figure 1.

These areas are scheduled to be infilled during a wider schedule of works which includes:

1) Works at Alexandra Basin West including construction of new quays and jetties, remediation of contamination on the bed of the basin, capital dredging to deepen the basin and to achieve the specified depth of -10m Chart Datum (CD) at the new berths.

2) Infilling of Graving Dock No.2 and Berths 52/53 and construction of a new river berth with a double tiered Ro-Ro ramp at Berths 52/53.

3) Deepening of the fairway and approach to Dublin Port to increase the ruling depth from -7.8m CD to -10.0m CD.

The site has been designated for redevelopment under the Dublin Port Masterplan which sets out a redevelopment strategy for Dublin Port over the next thirty years. The redevelopment is required in order to provide the port with the facilities to process a larger volume of cargo and has been approved by the Board of the Dublin Port Company and the Irish Government in the National Ports Policy (2013).

As part of the redevelopment DPC will be taking steps to address a legacy contamination issue of the sediments within Alexandra Basin. The presence of the contaminated sediments restricts the DPC's ability to carry out essential maintenance and dredging of the basin. DPC propose to dredge Alexandra Basin and the River Liffey and where appropriate dispose of the dredgings at sea. Where contaminant concentrations do not enable disposal at sea it is proposed that dredgings would be treated and used to infill Graving Dock No.2 and Berths 52/53.

RPS produced the Alexandra Basin Redevelopment Project Environmental Impact Assessment (EIA) to support the planning application for the proposed redevelopment. The purpose of this assessment will be to support the proposed application for an Industrial Emissions Licence under the Environmental Protection Agency Act 1992, as amended. The principal activities to be covered by the licence will be the treatment of dredge spoil excavated from Alexandra Basin and deposition of the treated material to infill Graving Dock No.2 and Berths 52/53.

As part of this application, an assessment was required to demonstrate through detailed analysis that the use of the treated material to infill the two areas will not have a discernible impact on existing surface water quality through contaminants leaching from the treated material..

Consequently, a detailed quantitative risk assessment has been undertaken to assess the potential impact of contamination within the dredgings to the quality of controlled waters. The assessment will be completed by developing a conceptual site model based on site specific data and using a simple hydrogeological model (the UK Remedial Targets Spreadsheet) to estimate the potential impact. This model was developed by the Environment Agency (England & Wales) with the support of SEPA and NIHES and has been developed to meet the requirements of the European Union Water Framework Directive. It is therefore considered to be an appropriate tool for the assessment of the potential impact to controlled waters in Ireland.

2 REGULATORY CONSULTATION

RPS together with DPC personnel met with EPA personnel on 10th December 2014 to discuss amongst other subjects, the approach to be adopted during this assessment. The suggested approach was to assess the potential impact to controlled waters and human health receptors associated with the proposed use of stabilised dredgings to infill the Graving Dock and Berths. The overarching approach as proposed by RPS was accepted in principal. Specific points that were agreed during the meeting included:

- The use of a basic hydrogeological model, specifically the *Hydrogeological Risk Assessment for Land Contamination Remedial Targets Worksheet, Release 3.2.;*
- The River Liffey represents the primary receptor;
- Shallow groundwater does not represent a sensitive receptor in its own right (due to the salinity and likely contamination);
- The Aquifer associated with the Bedrock represents a sensitive receptor, however is protected by the low permeability Glacial Till; and,
- Acceptable to adopt the use of an arbitrary compliance point at the centre of the river channel.

It was agreed that a site investigation would be necessary to gather data including hydrogeological data (permeability of strata, tidal influence, etc) and baseline groundwater/surface water contaminant concentrations. It was also agreed that surface water and groundwater monitoring would continue throughout the redevelopment process and following completion. A detailed account of the site investigation is presented in Section 4 of this report.

3 SITE SETTING

Details of the environmental setting are outlined in the Alexandra Basin Redevelopment Project Environmental Impact Statement, and are summarised below.

3.1 Site Location and Description

The proposed development is located within Dublin Port Estate, Dublin, the largest Port in Ireland located on the East Coast of Ireland and within the navigation channel and fairway from Dublin Port into Dublin Bay.

Dublin Port Estate comprises an area of approximately 260 hectares spanning both North and South banks of the River Liffey. The proposed project comprises works to be undertaken on the north bank in Alexandra Basin and Berths 52/53. A site layout plan is presented as Figure 2. Alexandra Basin and Berths 52/53 lie entirely within the Dublin Port Estate and are used solely for Port related activities.

3.2 Site History

Legacy Contamination Issue

Alexandra Basin West is known to be contaminated by heavy metals and tributyl tin as a result of past ship building and ship repair activities. One effect of this contamination is to limit DPC's ability to carry out essential maintenance dredging operations. The berths in Alexandra Basin West will become increasingly busy in the future and it is important (both operationally and financially) that DPC is able to include these berths within routine maintenance dredging campaigns.

Graving Dock No.2

Graving Dock No.2 is a dry dock which has previously been used for ship repairs. In common with many ports, the availability of ship repair facilities in Dublin Port was traditionally an important part of the Port's overall offering of infrastructure and services. However, the operation of graving docks was always financially challenging and, while deemed to be an appropriate cost for Dublin Port & Docks Board to bear in the past, Dublin Port Company's view now is that the pressure on it to make best use of the Port's existing estate allied to the poor commercial returns from the Port's graving dock, combine to make Graving Dock No.2 redundant. DPC intends to close Graving Dock No. 2 to allow the westward extension of the adjacent Berth 29.

Berth 52/53

Berth 52 and 53 are both currently used as Ro/Ro (Roll on/ Roll off) berths. The DPC intends to infill these berths and create one Ro/Ro berth to the south of the current berths.

3.3 Geo-Environmental Setting

Published Geological Data

Geological Society of Ireland published mapping indicates the site is underlain by Estuarine deposits which generally comprise sandy gravelly silt overlying low permeability Glacial Till deposits which generally comprise variable lithology, usually sandy, silty clay with pebbles, but can contain gravel-rich, or laminated sand layers. These are further underlain by bedrock of Limestone from the Calp Formation.

Previous Site Investigation Data

The geology adjacent to and within Alexandra Basin had previously been assessed during a site investigation undertaken by IGSL Limited between December 2013 and February 2014 and stated in the Environmental Impact Assessment. The underlying geology was found to comprise Made Ground, underlain by Estuarine and Glacial Till, this was further underlain by Limestone bedrock.

A summary of geology encountered is presented below:

Made Ground deposits were encountered from 0.15m.bgl to a maximum depth of 10.6m.bgl. The Made Ground deposits generally comprised gravel/rubble fill with occasional sand and clays.

Beneath the Made Ground Estuarine deposits were encountered and comprised stiff, grey, black sandy silt, soft to firm, black sandy silt and stiff, brown, slightly gravelly, sandy silt. This horizon ranged in thickness from 0.5m to 4.9m in thickness.

The glacial deposits were generally encountered as Fluvio-Glacial Sands and Gravels with Clay at greater depth. The sands were encountered as; Grey silty sand with cobbles, loose brown/grey sand, Medium dense, grey/brown silty sand, dense black, slight gravelly sand with cobbles and Medium dense, grey sand with cobbles. The sand horizons ranged in thickness from 0.4m to 5.5m in thickness. The gravel was encountered as; dense, grey, slightly sandy gravel with cobbles, dense, grey angular gravel, dense, fine to coarse, grey, slightly clayey gravel, dense, fine to coarse, sandy, grey/brown gravel with cobbles and occasional boulders and Medium dense, grey, sandy gravel with cobbles and boulders. The gravel horizons ranged in thickness from 0.7m to 8.8m in thickness.

Possible Boulder Clay was encountered within one borehole only and comprised; hard, black, sandy gravelly clay with occasional cobbles. The clay layer was encountered from 19.50m.bgl until the end of the borehole at 24.80m.bgl and is unproven beyond this depth.

Ground investigations undertaken in Alexander Basin East have shown that the Limestone rock head level in the vicinity of the Alexandra Basin Redevelopment are at circa -35m Chart Datum (CD), 25m below the design dredge level of -10m CD.

Combining the information gathered from the IGSL investigation and the RPS site investigation indicates the presence of low permeability Glacial Till above the Limestone deposits. This low

permeability Glacial Till will offer significant protection to the underlying bedrock aquifer from vertical migration of any mobile contaminants in the Made Ground or Estuarine deposits.

Hydrogeology

The Environmental Impact Assessment indicates the Limestone bedrock is generally considered to be indurated and hence dominated by fissure permeability (e.g. joints and faults). Such permeability is likely to be low except where coarse, clean Limestone's where present, have been karstified, dolomitised or are highly fractured.

The Quaternary drift is considered the principal medium for groundwater movement in the area. The infiltration capacity of the Glacial Till would be limited due to its low permeability and hence groundwater movement is likely to be confined to the Made Ground, Estuarine and Fluvio-Glacial Sand and Gravel deposits that overlie the Glacial Till.

The Lower Carboniferous rocks that underlie the region have been classified by the Geological Survey of Ireland as "Locally Important Aquifer, bedrock which is moderately productive only in local zones". These locally productive zones are due to the presence of more permeable strata that are encountered in different parts of the outcrop area due to substantial faults, fractures or fissures. The limited groundwater movement within the rock tends to be restricted to the weathered horizons or to non-extensive fractured zones. These zones tend to have a limited hydraulic continuity, low storage capacity and low potential yield.

The potential importance of the Quaternary drift deposits as a groundwater resource is a function of their permeability, thickness and extent. The low permeable fine grained glacial clays represent aquitards that limit infiltration and restrict recharge to bedrock aquifers when sufficiently thick. The overlying fluvio-glacial sand and gravel deposits represent material with a significantly higher permeability. Consequently these deposits have a high potential recharge and storage capacity.

Groundwater levels beneath the site remain close to sea level and are affected by tidal variation. During the site investigation, groundwater was encountered during drilling at depths from 3.0m.bgl to 5.5m.bgl within the Made Ground, Sand and Gravel deposits. Groundwater fluctuation in boreholes located adjacent to Graving Dock No.2 was found to be approximately 0.3m and in boreholes adjacent to Berth 52/53 was found to be approximately 3.0m.

Groundwater at the site is expected to be brackish / saline and unsuitable for potable supply.

Hydrology

The site is located adjacent to the Liffey Estuary and Dublin Bay. The works are located within two water bodies: 'Liffey Estuary Lower' transitional water body and 'Dublin Bay'. The 'Liffey Estuary Upper' water body is situated upstream of the proposed works. These water bodies are within Hydrometric Area No. 09 which is within the Eastern River Basin District (ERBD). There are several rivers that discharge into the Liffey Estuary and Dublin Bay, principally the Liffey itself and the

Dodder, Camac & Poddle and Tolka. The Royal Canal and the Grand Canal also discharge to the Liffey. In addition several small streams flow from the surrounding areas directly into Dublin Bay.

The available monitoring information for the water bodies in the immediate vicinity of the project (i.e. the Liffey Estuary Lower and Dublin Bay water bodies) indicates that the overall WFD status of the water bodies is 'moderate' due to general components and morphology.

4 SITE INVESTIGATION

4.1 Objectives

The site investigation focussed on the land immediately adjacent to Graving Dock No. 2 and Berths52/53. The primary objectives of the site investigation were to confirm:

1. General ground conditions and geotechnical properties;
2. The presence of existing soil contamination in made ground and sediments;
3. The presence of existing groundwater and surface water contamination; and,
4. The hydrogeological setting including hydraulic conductivity of strata and the tidal influence on shallow groundwater.

4.2 Description of Intrusive works

The site investigation was carried out between 27th January 2015 and 11th February 2015 and comprised:

- Nine hollow stem auger boreholes advanced to a maximum depth of 18.45m.bgl (metres below ground level).
- Installation of nine monitoring wells; seven with dual installations totalling sixteen standpipes.
- Collection of representative soil samples for geotechnical and chemical analysis; and,
- Analysis of twelve soil samples for a wide range of contaminants at a UKAS accredited laboratory.

Monitoring wells BH2 and BH4 comprised a single 50mm HDPE installation of slotted standpipe surrounded by a gravel annulus and un-slotted standpipe surrounded by an impermeable bentonite seal above to prevent surface water migrating vertically via the gravel annulus. BH1, BH5, BH6, BH7, BH8, BH10 and BH12 comprised dual 50mm HDPE installations. The dual installations installed slotted standpipe with a gravel annulus surround through the Made Ground and the Estuarine Deposits. An impermeable bentonite layer was installed –at the top to prevent surface water migration and more bentonite was installed between the two layers to prevent groundwater mixing via the gravel annulus between the two screened areas (screening details of the monitoring wells is presented in Table 4.1 and construction details of the installed monitoring wells is provided on the boreholes logs presented in Appendix A).

On completion of the site investigation, return visits were made to collect groundwater samples for chemical analysis by a UKAS accredited laboratory.

Exploratory holes were located adjacent to either side of Graving Dock No.2 and Berth 52/53. Four boreholes (BH1, BH2, BH4, and BH5) were advanced adjacent to Graving Dock No.2 and five boreholes (BH6, BH7, BH8, BH10 and BH12) were advanced adjacent to Berth 52/53

A borehole location plan is presented as Figure 3 and borehole logs are presented as Appendix A.

4.3 Chemical Laboratory Testing

A total of twelve representative soil samples were collected from exploratory hole arisings in clean containers and forwarded to a UKAS accredited laboratory for analysis. Selected samples were analysed for the following analytes:

Inorganic Determinands:

pH, arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, sulphide, total cyanide, thiocyanate, sulphate, sulphur, selenium, zinc and asbestos.

Organic Determinands:

Polyaromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE), speciated total petroleum hydrocarbons (TPH CWG), phenols, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs).

Fifteen groundwater samples and two surface water samples (upstream and downstream) were collected from monitoring wells on 20th February 2015 and submitted to a UKAS accredited laboratory and analysed for:

Inorganic Determinands:

pH, aluminium, arsenic, cadmium, chromium, copper, lead, lithium, mercury, nickel, total cyanide, thiocyanate, sulphate, and zinc.

Organic Determinands:

Polyaromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), methyl tert-butyl ether (MTBE), speciated total petroleum hydrocarbons (TPH CWG), tributyl tin (TBT), polychlorinated biphenyls (PCBs) and phenols.

A discussion relating to the chemical analytical data is presented in Section 5 of this report.

4.4 Geotechnical Laboratory Testing

Six samples were submitted to a UKAS accredited geotechnical testing laboratory and tested for bulk density and moisture content. The purpose of this analysis was to provide baseline information for the hydrogeological modelling process.

4.5 Encountered Strata

The geology encountered around Graving Dock No. 2 consisted of Made Ground, underlain by Estuarine deposits. The Glacial Till and Limestone were not encountered during the RPS site investigation.

The Made Ground generally comprised silty, gravelly sand and was between 1.6 – 3.3m in thickness with the exception of BH1 which encountered 5.2m of Made Ground. BH1 is located in the area of former graving Dock 1 which has already been infilled; it is considered this Made Ground is fill material. The Estuarine deposits were encountered below the Made Ground and generally comprised gravelly sand, sandy gravel and occasional laminated silts. These deposits were encountered to the maximum depth of all the boreholes between 14.45m.bgl to 18.45m.bgl.

The geology encountered around Berth 52/53 consisted of Made Ground, underlain by Estuarine deposits. The Glacial Till and Limestone were not encountered during the RPS site investigation.

The Made Ground generally comprised gravelly sandy clay, sandy gravel and cobbles of brick and concrete, it was between 3.4 – 5.6m in thickness. The Superficial Deposits encountered below the Made Ground generally comprised silty sandy gravel and silty sand. These deposits were encountered to the maximum depth of all the boreholes between 15.0m.bgl to 15.45m.bgl

4.6 Encountered Groundwater

Groundwater was encountered in all nine boreholes during excavation at depths of between 3.3m.bgl and 4.0m.bgl adjacent to Graving Dock No.2 and between 2.9m.bgl and 3.4m.bgl adjacent to Berth 52/53. Groundwater strikes are illustrated on the borehole logs in Appendix A.

Hydraulic Conductivity

Hydraulic conductivity testing was undertaken in twelve of the sixteen standpipes. Water was displaced by introducing a plastic ‘slug’ to the water column causing an instantaneous rise in water levels (head) within the boreholes, the water levels were then monitored back to their original water levels using electronic data loggers (falling head test). Subsequently, the ‘slug’ was rapidly removed causing an instantaneous drop in water levels, and the recovery was monitored as it rose back to its original water levels (rising head test).

The rate at which the water levels recover can be used to calculate the hydraulic conductivity using the Hvorslev Method of calculation. Appendix E presents a series of hydrographs of the slug tests and the calculation of the hydraulic conductivity for the 12 standpipes. Testing could not be completed in BH5 Shallow or BH7 Shallow due to the standpipes being dry; BH6 Shallow could not be tested due to an obstruction or slight curvature of the standpipe and BH10 Shallow tidal influence of the data outweighed the effects of testing so calculations could not be undertaken. At several locations data was impacted by the effect of tidal influence.

The table below summarises the results of the hydraulic conductivity testing (with hydraulic conductivities presented in m/day):

Table 4.1 Results of Hydraulic Conductivity Testing

Area	Borehole	Strata screened through	Hydraulic Conductivity Average (m/day)	Area Average (m/day)
Graving Dock	BH1 – Shallow	Made Ground	-	1.73E-01
	BH1 – Deep	Superficial	0.152064	
	BH2	Superficial	0.107136	
	BH4	Superficial	0.0255744	
	BH5 – Deep	Superficial	0.40608	
Berth 52/53	BH6 – Deep	Superficial	0.661824	5.95E-01
	BH7 – Deep	Superficial	0.248832	
	BH8 – Shallow	Made Ground	-	
	BH8 – Deep	Superficial	0.514944	
	BH10 – Deep	Superficial	1.296	
	BH12 – Shallow	Made Ground	-	
	BH12 - Deep	Superficial	0.253152	

The hydraulic conductivity within the superficial deposits varied between Graving Dock No.2 and Berth 52/53. The calculations indicate that groundwater recharged at a faster rate in boreholes adjacent to Berth 52/53. This indicates a higher rate of permeability in strata in this area.

Tidal Influence on Groundwater

The overall effect of tidal influence was measured using in-situ groundwater monitoring loggers in both boreholes screened in the Made Ground and boreholes screened through the superficial deposits. Loggers were installed in monitoring wells including BH1 and BH5 adjacent to Graving Dock No.2 and BH6, BH7, BH8, BH10 and BH12 adjacent to Berth 52/53. These data loggers were left in situ for nine days to assess the tidal influence over time. Results of the hydraulic conductivity testing and tidal hydrographs results are presented in Appendix E.

In-situ monitoring of tidal fluctuations using level loggers installed for a 9 day period confirmed that tidal variations are greater in the vicinity of Berth 52/53. Highly variable groundwater levels were recorded in groundwater within Made Ground and Superficial deposits adjacent to Berth 52/53. Groundwater fluctuations within Made Ground varied between approximately 1.0m and 2.5m in BH6, BH7, BH8, BH10 and BH12. Monitoring of groundwater within Superficial deposits indicated a fluctuation of groundwater of approximately 3.0m in BH6, BH7, BH8, BH10 and BH12.

Monitoring data collected for the same amount of time in the groundwater within Made Ground adjacent to Graving Dock No. 2 was not highly affected by tidal variations. The groundwater within BH1, BH2 and BH4 varied a maximum of approximately 0.1m over the monitoring period. Monitoring data from groundwater within Superficial deposits adjacent to Graving Dock No.2 indicated that

similar tidal influence does not highly affect groundwater levels; fluctuations of groundwater within superficial strata in BH1 and BH5 was approximately 0.3m in monitoring wells.

The variation in hydraulic conductivity and tidal fluctuations may be related to the position of Berth 52/53 compared to the position of Graving Dock No.2. Graving Dock No.2 is located to the north of Alexandra Basin and is protected by the sea walls and quays within Alexandra Basin. Berth 52/53 is located to the east of Alexandra Basin and is offered less protection from port walls and other physical structures.

The geological and hydrogeological data gained during the site investigation is used to develop the conceptual site model that is discussed in Section 6 of the report and provides critical baseline data for the modelling process which is discussed in Section 7 of the report.

5 BASELINE CONDITIONS

Analytical data associated with the 2015 site investigation and previous site investigations/sampling programmes has been collated and reviewed to establish baseline environmental conditions in relation to background concentrations of contaminants in sediments within Alexandra Basin, soils adjacent to the areas proposed to be infilled, shallow groundwater and surface water (River Liffey).

5.1 Sediment Analysis - Alexandra Basin

In 2014 RPS produced a report titled Sediment Contamination of Alexandra Basin West (Ref: BE0918) with the following objectives:

- To collate sediment quality results for Alexandra Basin West. These comprised recent data from 2013 collected for the ABR Project and historical data from sediment quality surveys undertaken in 2002 and 2009,
- To map the concentration of contaminants within Alexandra Basin West,
- To estimate the quantity of contaminants to be removed through dredging to -10.0m CD;
- To estimate the quantity of contaminants to be removed through dredging from -10.0m CD to - 12.0m CD if required in the future; and
- To review potential sources of the contamination.

The sediment quality data included samples collected from the seabed and below the seabed which are summarised in table 5.1 below:

Table 5.1: Dredging Sample depths

	2013 Survey	2009 Survey	2002 Survey
No. of samples taken at surface of seabed	-	14	20
No. of samples taken from 0.5m to 1.0m below the seabed	14	10	-
No. of samples taken from 1.5m to 2.0m below the seabed.	12	-	-

The determinants analysed included aluminium, arsenic, cadmium, chromium, copper, dibutyl tin (DBT), dieldrin, hexacholorbenzene (HCB), lead, lithium, mercury, nickel, zinc, total extractable hydrocarbons (TEH), tributyl tin (TBT), PCBs, and PAHs.

The results of the analysis were compared to the published Marine Institute Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters (2006). These guidelines characterise contamination into two levels. Level 1 defines a concentration of a contaminant in sediment below which biological effects would not be anticipated; Level 2 defines a concentration of a contaminant above which biological effects are anticipated to occur. Using these levels the sediment was categorised into three classes:

Class 1: Contaminant concentrations below Level 1 i.e. no biological effects will occur.

Class 2: Contamination concentrations between Levels 1 and 2 i.e. marginally contaminated.

Class 3: Contamination concentrations above Level 2 i.e. heavily contaminated and likely to cause biological effects to marine organisms.

Contaminants which were categorised as Class 3 included metals (nickel, lead, zinc, cadmium, copper, and mercury), tributyl tin (TBT), dibutyltin (DBT), and total extractable hydrocarbons (TEH). Contaminants which were categorised as Class 2 were Polycyclic Aromatic Hydrocarbons (PAHs) and Polychlorinated Biphenyls (PCBs).

The spatial distribution of contamination within Alexandra Basin based on the results of the sediment analysis showed the greatest concentrations of copper, nickel and TBT in the north west corner of the basin adjacent to the mouth of Graving Dock No.2. The concentrations of copper in samples of sediment taken from the seabed surface and up to 1.5m below the seabed in 2002 found sediments with maximum concentration of copper of 156mg/kg were adjacent to the former Graving Dock No.1. In 2013 the volume of sediments with a copper concentration of 156mg/kg covers a greater surface area and high levels of copper contamination within sediment is shown across the mouth of Graving Dock No.2 and moving south east across Alexandra Basin.

In 2013 the maximum concentration of Nickel contamination in sediment was found to be approximately 157mg/kg. Elevated levels of nickel were found at the mouth of Alexandra Basin and the report stated that elevated levels of Nickel were recorded within the main River Liffey channel. This would indicate that sediment contamination within Alexandra Basin is already having a detrimental effect on the wider surface water within the River Liffey.

TBT results showed that elevated levels of TBT were highest adjacent to the mouth of Graving Dock No. 2. The 2009 and 2013 sediment results identified maximum concentrations of 400ug/mg and 11,200ug/kg respectively.

The levels of contamination recorded in sediment within Alexandra Basin have been monitored and compared over a 10 year period. Levels of contamination in sediment has not decreased over time and the spatial distribution of contamination is shown to be highest adjacent to Graving Dock No.2 but to be gradually reducing across Alexandra Basin.

5.2 *Soil Analytical Data – 2015 site investigation*

The soil analytical data associated with samples collected during the 2015 site investigation has been assessed using generic soil assessment criteria (GAC) derived using CLEA v1.06 using appropriate contaminant and exposure data published by the EA and LQM to determine whether the identified contaminant concentrations represent a potential risk to human health receptors.

The assessment has been based upon proposed commercial/industrial land uses and is protective of human health receptors via chronic exposure scenarios. A complete copy of the GAC data is presented Appendix E.

A total of twelve representative soil samples were collected during the advancement of nine boreholes during the 2015 RPS site investigation. Six samples were collected from boreholes adjacent to Graving Dock No.2 and six samples were collected from boreholes adjacent to berth 52/53.

Soil pH varied in samples from boreholes adjacent to Graving Dock No.2 from 7.8 to 8.9 with an average of 8.5; and in boreholes adjacent to berth 52/53 from 8.4 to 10.5 with an average of 9.12.

Soil Organic Matter in samples from boreholes adjacent to Graving Dock No.2 varied from 1.3% to 2.7% with an average of 1.7%; and in boreholes adjacent to Berth 52/53 from 0.24% to 4.7% with average 2.26%.

The samples were analysed for a wide range of inorganic and organic determinants including; metals, hydrocarbons, PAHs, PCB, phenols, SVOCs and VOCs. Of the twelve samples collected six were representative of Made Ground and six were representative of superficial deposits.

Identified contaminant concentrations in soils were generally low and none of the samples were found to contain contaminant concentrations that exceeded the GAC for a commercial/Industrial land use.

5.3 *Groundwater Analytical Data – 2015 site investigation*

Groundwater samples were obtained from boreholes installed during the 2015 site investigation on two occasions (20/02/2015 and 23/03/2015). The borehole locations are illustrated by Figure 2. The results of the groundwater monitoring are enclosed in Appendix D.

The results of the groundwater analysis have been compared to EU Surface Water Objectives from the European Communities Environmental Objectives (Surface Waters) Regulations 2010. Where such values are not available, the EU Groundwater Water Objectives from the European Communities Environmental Objectives (Groundwater) Regulations 2010 have been used.

Metals

All samples were analysed for a broad range of metallic determinants including; arsenic, aluminium, cadmium, chromium (total and hexavalent), copper, lithium, lead, mercury, nickel, and zinc.

Arsenic exceeded the EU Surface Water Objective of 20µg/l in all groundwater samples during both monitoring rounds except BH1 – shallow, BH2 and BH4 (Round 2 only). Cadmium exceeded the EU Surface Water Objective of 0.2µg/l in three groundwater samples collected from adjacent to Graving Dock No.2 and one sample collected from adjacent to Berth 52/53 during monitoring round. Zinc exceeded the EU Surface Water Objective of 40µg/l in groundwater samples taken from BH4 and BH6 – deep both adjacent to Graving Dock No.2 in monitoring round one.

Petroleum Hydrocarbons and PAHs

EU Surface Water Objective values do not exist for Petroleum Hydrocarbons or PAHs. A screening value for Petroleum Hydrocarbons of 10ug/l is generally accepted as an acceptable concentration protective of controlled waters. PAH screening values protective of controlled waters in the UK vary but are all generally no higher than 0.1ug/l. Using these as a baseline, elevated concentrations of hydrocarbons are present in boreholes adjacent to Graving Dock No.2 and Berth 52/53 during both monitoring rounds. Elevated levels of PAHs are present in three boreholes all adjacent to Berth 52/53 in monitoring round one and elevated PAHs are present in one borehole adjacent to Graving Dock No.2 and four boreholes adjacent to Berth 52/53 in monitoring round two.

Tributyl Tin

The EU Surface Water Objective for Tributyl Tin of 0.0002ug/l was exceeded in three samples collected from adjacent to Graving Dock No.2 and six samples from boreholes adjacent to Berth 52/53 during monitoring round one and three samples collected from Graving Dock No.2 and three samples from Berth 52/53 during monitoring round two.

5.4 Surface Water Analytical Data –2015 site investigation

Surface Water samples were collected from the river Liffey at locations upstream and downstream of Alexandra Basin on two occasions (20/02/2015 and 23/03/2015). The results of the surface water monitoring are enclosed in Appendix D.

The results of the surface water analysis have been compared to EU Surface Water Objectives from the European Communities Environmental Objectives (Surface Waters) Regulations 2010.

Metals

All samples were analysed for a broad range of metallic determinants including; arsenic, aluminium, cadmium, chromium (total and hexavalent), copper, lithium, lead, mercury, nickel, and zinc.

Arsenic exceeded the EU Surface Water Objective in surface water samples collected during both monitoring rounds upstream and downstream of Alexandra Basin. The concentrations of Arsenic detected upstream and downstream were relatively similar during monitoring round one, in monitoring round two arsenic concentrations increased downstream.

Tributyl Tin

The EU Surface Water Objective for Tributyl Tin of 0.0002ug/l was exceeded in surface water samples collected from upstream and downstream of Alexandra Basin. The concentration in the upstream sample was 0.0032ug/l and downstream was 0.0008ug/l. Neither of the samples exceeded the EU Surface Water Objective for Tributyl Tin in the second round of monitoring.

Summary

A review of historic sampling of sediments within Alexandra Basin was undertaken by RPS in 2014. The concentrations of contamination were compared to Irish Marine Institute Guidelines of dredged sediment for disposal at sea to determine if the sediment could be disposed of in the Irish Sea. Contaminants which were determined to be at levels unsuitable for sea disposal were heavy metals (Nickel, Lead, Zinc, Cadmium, Copper, and Mercury), Tributyl Tin (TBT), Dibutyltin (DBT), Total Extractable Hydrocarbons (TEH), Polycyclic Aromatic Hydrocarbons (PAHs) and Polychlorinated Biphenyls (PCBs).

A 2015 site investigation conducted by RPS found these contaminated sediments were having both a detrimental effect on groundwater adjacent to Graving Dock No.2 and Berth 52/53 and in surface water within Alexandra Basin. Groundwater samples collected from boreholes advanced during the investigation indicated groundwater contamination in the form of arsenic, hydrocarbons, PAHs and Tributyl Tin. Surface water samples collected from upstream and downstream of Alexandra Basin identified elevated levels of Arsenic and Tributyl Tin both upstream and downstream. The concentrations of contamination did not vary significantly between upstream and downstream. It is likely these elevated contamination levels are the result of leaching of contamination from sediment within the vicinity of Alexandra Basin.

6 CONCEPTUAL SITE MODEL

The development of a simple yet accurate conceptual hydrogeological model is a vital component of the risk assessment process. The data and information gathered in the RPS Environmental Impact Assessment has been used to identify the Source – Pathway – Receptor linkages that form the basic framework for all environmental risk assessments.

For a risk to be present a complete Source – Pathway – Receptor linkage must be present. Should one or more of the components be missing, then the linkage is not complete and there is no associated risk. The previous chapter established that contamination in the form of metals, tributyl tin (TBT), dibutyltin (DBT), total extractable hydrocarbons (THE), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) are present at relatively high concentrations within sediments in Alexandra Basin.

The groundwater analysis identified elevated concentrations of metals (arsenic, cadmium and zinc), petroleum hydrocarbons, PAHs, and TBT in shallow groundwater in the immediate vicinity of Graving Dock 2 and Berths 52/53. Analysis of surface water samples collected from the River Liffey identified elevated concentrations of arsenic, cadmium and TBT.

The analytical data suggests that historical use of the area has had a significant impact on the quality of sediments within Alexandra Basin, shallow groundwater and the River Liffey.

This conceptual model considers the post-development source of contamination, i.e. leachable contamination associated with the source area ("treated dredgings"). It will also include an appraisal of treatment options and how these may influence the source. The predicted leachate concentrations can be considered in relation to published water quality targets and existing baseline levels of surface water/groundwater contamination to establish if the treated dredgings are likely to have a discernible impact on water quality.

The exposure pathways assessed include typical hydrogeological pathways and additional factors such as the physical nature of the treated dredging, the hydrogeological setting taking into account the tidal fluctuations, reduced surface water infiltration (owing to the proposed hardstanding cover), existing physical structures (e.g. dock walls, etc) and proposed physical structures (e.g. cofferdam and sheet pile walls).

The receptors assessed include shallow groundwater associated with the Made Ground and Superficial Deposits, the deeper groundwater associated with the Limestone and surface water quality associated with Alexandra Basin and the River Liffey.

6.1 Contamination Source

At present, it is likely that contaminated sediments present within Alexandra Basin are having a significant impact on the quality of surface water within Alexandra Basin and the River Liffey, hence the identified contamination in surface water samples collected from the River Liffey.

Dredged material from Alexandra Basin will be treated using a solidification/stabilisation approach. Solidification/stabilisation is a technology that relies on the reaction between hydraulic binders and sediment to reduce the mobility of contaminants. A decrease in mobilisation of contamination is achieved by the reaction of contaminants with hydraulic binders to promote sorption, precipitation or incorporation into crystal lattices, and/or by physically encapsulating the contaminants.

In order to produce tangible site specific data the trial mixes were developed using a homogenised mix of the sediment samples that contained the highest contaminant concentrations (as identified by laboratory analysis of the sediment samples). The homogenised sediment was mixed with various hydraulic binders and monolith test blocks were formed. Nine monoliths of varied mixes were created.

Batch Leachate Analysis

Granular batch leachate analysis was undertaken on each of the monoliths according to BS EN12457 Part 2, with a liquid to solids ratio of 10:1, which represents a worst case environmental stress scenario. The sample is broken up into a granular form and subject to digestionusing an acid/mineralised water ratio to establish the potential leachable concentrations.

The batch leachate analysis of the treated dredgings indicated a significant reduction of leachable contaminant concentrations when compared to contaminant concentrations identified in the untreated dredgings. The majority of contaminants identified were reduced to concentrations below the EU Surface Water/Groundwater Objectives and full results are provided in Appendix B. This provides strong evidence that the solidification/stabilisation approach has the potential to reduce the leachable concentration of contaminants to acceptable concentrations.

The only increase in concentrations associated with the stabilisation process was in nickel which increased in some of the mixes. The concentration of leachable nickel appears to correlate to the volume of Portland Cement (OPC) used in the mix (when the volume of OPC is less than approximately 4.4% the nickel concentration is acceptable).

Based on the batch leachate analytical data three contaminants of potential concern (COPCs) were identified at concentrations exceeding the relevant assessment criteria; these were aluminium, nickel and tributyl tin (TBT). Copper remained above the assessment criteria in mix 9 only.

Aluminium concentrations were identified above the EU Groundwater Objective which was used for an initial screen in the absence of an EU Surface Water Objective. Surface water objectives do not exist for aluminium according to a report issued by Scottish and Northern Ireland Forum for Environmental Research (SNIFFER), the Environment Agency and the Scottish Environmental Protection Agency (SEPA):

> *"'Total' aluminium is an unsuitable way of describing aluminium toxicity because little of the aluminium present is likely to be in a toxicologically active form."*

The report goes onto state:

> *"From a toxicological perspective, it is more relevant to express toxicity in terms of concentrations of inorganic monomeric aluminium. However, this precludes the use of toxicity data that are expressed as total aluminium. Such data cannot be used to predict toxicity in the field without additional information on the water chemistry to estimate aluminium speciation which is rarely available."*

The concentrations of aluminium that have been identified above the EU Groundwater Objectives are the total aluminium concentration. Based on the information above very little of this is likely to be in the toxicological form.

Aluminium solubility is probably being controlled through the dissolution reaction of alumino-silicate clay minerals present within the sediment matrix due to enhanced solubility under the prevailing alkaline conditions associated with the application of hydraulic binders.

Aluminium is not categorised as a sediment contaminant in the Marine Institute Guidelines for the disposal of dredged sediment, it is not considered quantifiable in the total aluminium concentration identified in this data; it will therefore not be considered as a chemical of potential concern during the modelling process.

Table 6.1 below shows the composition of the test mixes and the maximum leachable concentration of nickel and tributyl tin.

Table 6.1: Solidification/ Stabilisation Monolith Mixes and leachate levels

Trial Mix Composition	1	2	3	4	5	6	7	8	9
Sediment (wet)	**84.6**	**84.6**	**84.6**	**84.6**	**84.6**	**84.6**	**84.6**	**84.6**	**79.2**
Water	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6.4**
OPC	**3.1**	**7.7**	**4.4**	**3.1**	**7.7**	**4.4**	**10.3**	**10.3**	**9.6**
Quicklime	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4.8**
PFA	**12.3**	**7.7**	**11.0**	**-**	**-**	**-**	**5.1**	**-**	**-**
GGBS	**-**	**-**	**-**	**12.3**	**7.7**	**11.0**	**-**	**5.1**	**-**
Leachable Concentrations of COPCs (mg/l)									
Nickel	**0.0069**	**0.07**	**0.02**	**0.0091**	**0.048**	**0.011**	**0.079**	**0.083**	**0.069**
TBT	**$8.6E10^{-6}$**	**ND**	**$6.9x10^{-6}$**	**$4.4x10^{-6}$**	**$4.4x10^{-6}$**	**$3.3x10^{-6}$**	**$6.9x10^{-6}$**	**$1.6x10^{-5}$**	**$2.2x10^{-6}$**

Concentrations exceeding EU Surface Water/ Groundwater Objectives are shown in **red**
OPC – Ordinary Portland cement
PFA – Pulverised Fuel Ash
GGBS – Granulated Ground Blast Furnace Slag

The batch leachate data indicates that the majority of contaminant concentrations including metals, PAHs, and PCBs would be reduced to concentrations below the EU Surface Water/ Groundwater

Objectives. Mix 2 and Mix 4 appeared to provide the best results and a significant reduction from the baseline concentrations of TBT was noted across all the mixes. Mix 2 produced the best level of reduction of TBT, however good reduction was also noted in mixes 4, 5, 6 and 9.

When compared to the surface water monitoring data discussed in the baseline conditions chapter, the leachable TBT values are only marginally greater than the current concentrations of TBT present in the surface water within the River Liffey. To date surface water analytical data for Alexandra Basin is not available but TBT concentrations in surface water within the basin is likely to be significantly higher than in the River Liffey due to the high concentrations of TBT in sediments within the basin.

The fact that the leachable contaminant concentrations in the trial mixes are significantly lower than the concentrations in the untreated dredgings, suggests that the dredging and stabilisation/solidification process will result in a significant betterment of overall environmental conditions.

Tank Testing Analysis

In order to assess the potential leachable concentrations of contaminants from the stabilised dredgings in greater detail Mix 2 and Mix 4 were subject to tank testing analysis in general accordance with the approach presented in NEN 7375:2004.

This is a diffusion test to simulate the leaching of inorganic compounds from monolith materials under aerobic conditions as a function over a period of time. For materials that are monolithic, release to the liquid phase is controlled by mass transfer or diffusion, rather than by percolation. A mass transfer controlled scenario occurs when infiltrating water is diverted around a low permeability fill or monolithic material. Mass transfer rate tests are used to measure the release of contaminants from monolithic material and the output of the test is an estimate of observed diffusivity which expresses cumulative release as a function of time (mass flux).

6.2 Specialist Geochemical Review of Preliminary Stabilisation Trials

RPS commissioned CE Geochem to undertake a specialist geochemical review of the preliminary tank testing trials which is summarised in the following Section. The primary purpose of the geochemical review of the tank test data was to assess the retarded contaminant flux from stabilised materials based on the observed mass transfer rates from semi-dynamic tank testing undertaken as part of stabilisation trials and associated tank test data.

Key geochemical behaviour observations are summarised as follows:

> *Aluminium solubility is probably being controlled through the dissolution reaction of alumino-silicate clay minerals present within the sediment matrix due to enhanced solubility under the prevailing alkaline conditions associated with the application of hydraulic binders. Beyond circa. pH 11.2 we tentatively ascribed the reduction in Al solubility to the formation of*

Calcium-Alumino Hydrate (CAH) gels through reaction of Al with free Ca from the dissolution buffering reaction of portlandite. This appears to be consistent with the observed lower Al solubility observed for mix design (MD) 9 which is the only specimen manufactured using lime (CaO) at 4.8 %.

Nickel solubility would appear to be governed by the production of soluble solution species at high pH which may be in partial equilibrium with insoluble Ni(OH)2, however as the tendency for HNiO2- solution species begin to dominate above pH 11, aqueous Ni concentrations increase.

In general there appears to be a reduction in leachable TBT under increasingly alkaline conditions with MD9 showing the lowest level of TBT leaching. These observations appear consistent with the possible enhanced TBT leachability observed in one of the untreated sediment samples (1000 ng/l at pH 8.1) submitted for BS EN 12457 batch leachate testing.

There would appear to be a trade-off between controlling the solubility of Al and TBT, and retarding the solubility of Ni, with the former contaminants showing lowest solubility under the most alkaline conditions created by the incorporation of lime in MD9.

A site specific detailed Conceptual Design Model (CDM) was developed to assess the performance of candidate mix designs in the context of environmental compliance for groundwater. Upper leaching limits (ULL) were estimated and experimentally derived partition coefficients (Kd) and diffusion coefficients (De) were derived to facilitate the assessment. The CDM is based on computing the predicted mass flux rates from effective diffusion coefficients (De) determined from semi-dynamic tank testing datasets.

The process is summarised as follows:

The mass transfer model is based on deriving absolute mass leaching rates (mg/m2). These are subsequently dimensionalised to the site specific geometric surface area of the stabilised monolith which for this application is based on a rectangular geometry for each of the stabilisation zones present at the subject site. The absolute mass flux, in terms of total contaminant mass leached per unit time, is diluted by the effective infiltration rate to provide the contact leachate volume and hence calculate an effective leachate concentration (mg/l) ignoring any solubility control. The predicted effective leachate concentrations are then scaled with respect to the difference between leachate volume:surface area conditions used in laboratory leaching assessments and leachate volume:monolith surface areas at the subject site by defining a scale correction factor. This accounts for discrepancies that arise in terms of absolute mass flux (mg/m2 x m2) when translating experimentally derived mass transfer rates from tank testing to field scale modelling simulations. This provides approach provides the effective leachate source term. The resultant calculations provide a prediction of

time averaged contaminant concentrations within the aquifer below the source zone by taking into account the discharge (Q) below the stabilised monolith source area.

The findings are summarised as follows:

Predicted time averaged groundwater concentrations demonstrate declining source term leaching behaviour due to the influence of diffusion processes on the cumulative mass transfer rate predicted to occur at the stabilised surface.

The diffusive flux CDM model predicts initial peak source term leaching concentrations comparable to analytical concentrations determined during semi-dynamic leaching trials. These peak concentrations decline at a rate proportional to the magnitude of the De parameter with respect to the initial source term mass.

Predicted time averaged groundwater concentrations below the stabilised source areas for both the Graving Dock No.2 and Berth 52/53 are of similar magnitude.

Mix 4 appears to provide the best contaminant retardation for Nickel and TBT. Assessment of leaching trajectories for these compounds has demonstrated that TBT release appears to be under diffusion control for both mix designs investigated. Predicted peak concentrations of Nickel are below the screening criteria.

TBT was found to be under diffusion control in all semi-dynamic tank reported here. Peak groundwater concentrations below the stabilisation source area were found to be greater than the screening criteria in mix designs except Mix 2 test B which reported non-detectable levels of TBT in all tank test fractions analysed.

Successful mix designs for retarding TBT leaching are likely to require generating leachable TBT concentrations near or below analytical detection limits. This makes confident predictions regarding leaching mechanisms difficult., Datasets presented here however, all provide evidence for diffusion based mass transfer for TBT, providing a robust basis for developing diffusive flux models for TBT even in the absence of measurable TBT concentrations.

The Review concluded that:

This interpretive report and modelling study has been undertaken to assess the potential for mass flux from stabilised contaminated marine sediments dredged from Alexandra Basin, Dublin, Ireland. Diffusive flux models have been prepared based on semi-dynamic leaching trials conducted by HBR as part of a preliminary stabilisation trial.

Geochemical interpretations from batch leaching datasets have identified possible pH dependant solubility controls that may aid in subsequent phases of mix design development.

Stabilisation trials leaching datasets demonstrate that the application of hydraulic binders provide a potentially satisfactory remedial technique to enable the reuse of contaminated sediments to infill Graving Dock No. 2 and Berth 52/53. (i.e. it is considered likely that the leachable concentration of contaminants in treated dredgings can be suitably controlled by development of a suitable mix design).

Contaminant groundwater concentrations directly below the source area have been predicted using a diffusive flux model based on experimentally derived effective diffusion coefficients. The interpretation of semi-dynamic tank testing datasets has enabled the determination of leaching mechanisms for the release of contaminants of concern from candidate mix designs.

6.3 Exposure Pathways

The solidification/stabilisation process will significantly reduce the leachability of contaminants present within dredgings and limit potential impact on the controlled water receptors. It cannot completely immobilise contamination and the rate at which leaching occurs needs to be assessed in terms of:

1) Physical nature of the treated material;

2) Rate and timescale of contaminant release.

3) Hydrogeological setting; and,

4) Existing and proposed physical structures (e.g. dock walls, cofferdam and sheet pile wall).

Physical nature of the Treated Material

The potential leachable concentrations that will be assumed in the modelling process have been determined using batch leachate analysis (as described in Section 4.1). Batch testing represents the worst case environmental scenario in terms of contaminated leaching potential as the monolith is crushed during the test to allow a greater surface area. The extraction is undertaken using a 10:1 water: acid elute and the concentration of leachable contaminants is typically over estimated. In reality the leaching of contaminants is not instantaneous and would occur over a long period of time (as indicated in the independent review section 6.2).

The proposed infilling would be undertaken using stabilised monoliths with a low permeability and good structural integrity. The area of the monolith that will be exposed to groundwater and therefore leaching will be limited to the external surface area. The batch leachate data therefore represents an extremely conservative approach and in reality the concentrations of contaminants leaching from the source area is likely to be much lower. Using this data adds a significant degree of conservatism to the risk assessment.

Rate and timescale of contaminant release

The rate of leaching of contaminants from the infilled areas would be gradual and in the long term is likely to decrease over time (as indicated in the independent review section 6.2). The batch testing data reflects an instantaneous total leachable concentration from the monolith and does not take into account the gradual nature of leaching. The model has been run using steady state conditions (Domenico steady state) as it is difficult to quantify the long term leaching rate at this stage and therefore assumes that the source will not reduce/degrade over time.

Hydrogeological Setting

Groundwater levels at the fill areas vary due to tidal influence. Graving Dock No.2 varied less than Berth 52/53. Graving Dock No.2 had a tidal variation of approximately 0.3m and Berth 52/53 has a tidal variation of approximately 3.0m. Based on the available data the groundwater appears to flow to the south at hydraulic gradient of approximately 0.002 (fraction).

Post stabilisation the primary mechanism by which contaminants will impact groundwater is via leaching from the treated dredgings through physical structures and into groundwater within the Made Ground/Superficial deposits where it will be subject to attenuation before entering the surface water of the River Liffey.

The infilled docks will comprise three zones of groundwater interaction:

1) Unsaturated Zone – treated dredgings above high tide;

2) Zone of varying saturation depending on the tide – treated dredgings between low tide and high tide; and,

3) Saturated Zone – treated dredgings below low tide level.

The treated dredgings within the unsaturated zone will not be affected by the tidal fluctuation. Surface water which infiltrates through the concrete capping layer and migrates through the unsaturated zone could potentially leach contaminants. Post development the entire area will be covered in a hardstanding capping layer which will significantly limit surface water infiltration rates and therefore likely reduce the mobilisation of contamination in the unsaturated zone.

The area exposed to leaching within the zone of varying saturation and the saturated zone will be limited to the external surface area of the monolith and the surface immediately around any cracks within it. The zone of varying saturation will be submerged depending on the tide, this zone and the saturated zone has the potential to leach contaminants to groundwater at a slow rate. Groundwater level fluctuation data shows the tidal influence on groundwater is different between Graving Dock No.2 and Berth 52/ 53. The groundwater level fluctuation around Graving Dock No.2 observed in boreholes BH1, BH2, BH4 and BH5 is approximately 0.3m from low tide to high tide. The groundwater level fluctuation around Berth 52/53 observed in boreholes BH6, BH7, BH8, BH10 and BH12 is approximately 3.0m from low tide to high tide. Tidal Hydrographs for boreholes BH1, BH5, BH6, BH7, BH8, BH10 and BH12 are presented as part of Appendix E. These differences in groundwater fluctuation are likely down to two factors; the physical structure of the dock/berth walls and the degree of protection that is provided by their position in relation to the port infrastructure.

The low permeability of the stabilised dredgings will significantly limit tidal influence on the internal area of the monolith. Only external surface areas will be subject to tidal actions.

Existing Physical Structures

Graving Dock No.2 Current Structure

The permeability of the walls and base of Graving Dock No.2 will have an effect on the amount of water passing though from the infilled dock to groundwater within the Estuarine deposits. Graving Dock No.2 is of mass concrete construction of approximately 5ft (approximately 1.5m) thick at the base with approximately 5ft thick walls constructed in jointed block sections. A cross section of Graving Dock No. 2 is presented as Figure 4. The Graving Dock No.2 was constructed in circa 1950 and its integrity is not known. Based on this information a conservative estimate of the permeability of the concrete walls is that of a jointed igneous rock. Using values from Freeze and Cherry (1979) the permeability value of jointed igneous rock is approximately 10^{-8}m/s or 0.007m/day. Not only is this likely to limit tidal influence but will also physically protect the face of the monolith. The presence of concrete will further limit the potential for physical break-up of the monolith. Upon completion of the redevelopment the current concrete walls and base will provide a significant amount of protection to the treated sediment.

Berth 52/53 Current Structure

Berth 52/53 is constructed of Rip-rap revetment. Rip-rap is rock or other material used to armour shorelines against erosion, the class of rip rap depends on the diameter of the stone, generally the smaller the diameter of the stone the higher the grade of rip rap. A cross section of Berth 52/53 is presented as Figure 5. It comprises 750mm of Class A rip-rap, over a 500mm layer of Class B rip-rap before a reinforcing fabric layer and a 500mm layer of class c crushed gravel. While rip rap won't prevent tidal influence or limit contaminant mobilisation, it will provide a degree of physical protection to the monolith.

Proposed Physical Structures - Post Development

Graving Dock No.2 is a dry dock; prior to infilling it will be lined with a geotextile before the southern end is closed using a steel combi wall consisting of king piles extending between intermittent steel H-sections or tubular steel sections. The tidal influence of River Liffey following infilling is likely to be significantly reduced by the presence of the steel combi wall.

The southern end of the berth 52/53 will be closed off with a cellular cofferdam; cells will be constructed sequentially from east to west using interlocking sheet piles. Water will remain within the walls of the cofferdam whilst a suitable granular material is used to infill it.

It is assumed that no sealant is to be used between the pile joints and therefore a degree of permeability through the wall will remain. A conservative estimate of the permeability of both the king pile wall and the cellular cofferdam can be taken from the Arcelor Mittal (2005) Piling Handbook 8th Edition. This handbook indicates the permeability of the walls is likely to be approximately 10^{-7} m/s or 0.0605m/day.

6.4 *Receptors*

Analytical data suggests that the leachable concentrations of contaminants will be reduced significantly by the solidification/stabilisation process however, the assessment undertaken thus far indicates that there is the potential for Nickel and TBT to leach from the treated dredgings at concentrations that exceed EU surface water/groundwater regulations.

The shallow groundwater is considered to be a low sensitivity receptor as it is saline in nature and has been impacted by contamination in the form of metals and TBT. Preliminary discussion with the EPA resulted in agreement that this does not represent a sensitive receptor in its own right. It does however represent a potential pathway for contaminants to migrate to deeper groundwater and surface water.

A deeper groundwater body is expected to be present at depth within the Limestone bedrock. This is considered to be a sensitive receptor. Regulatory consultation with the EPA determined that the low permeability Glacial Till deposits underlying the estuarine deposits will offer significant protection to the underlying Limestone deposits by reducing vertical migration of any mobile contamination.

Analysis of the sediment samples from within Alexandra Basin indicated high contaminant concentrations including metals, TBT and organics which is likely to have had an impact on surface water quality associated with Alexandra Basin. Surface water associated with Alexandra Basin itself is not considered to represent a particularly sensitive receptor but it does represent a pathway for the migration of dissolved phase contaminants to the River Liffey. The River Liffey represents a sensitive receptor and is considered to represent the primary receptor of concern.

Analytical data of samples collected from the River Liffey upstream and downstream of Alexandra basin in February and March 2015 identified elevated concentrations of arsenic, cadmium and TBT. The presence of TBT in these samples suggests that the quality of the River Liffey has been impacted by contamination associated with historical use of Port. It is likely that the primary source of TBT in the River Liffey is contamination in sediments associated with Alexandra Basin.

6.5 *Summary*

The potential source, pathways and receptors have been considered in relation to Graving Dock No.2 and Berth 52/53. Sediments within Alexandra Basin are proposed to be dredged and treated before being used to infill Graving Dock No. 2 and Berth 52/53.

The batch leachate analysis of the treated dredgings indicated a significant reduction in the leachable concentrations of contaminants compared to background concentrations in the untreated sediments. Nickel and TBT were the only contaminants which remained at concentrations above the relevant assessment criteria.

The geochemical review of the batch analysis and tank test data showed the hydraulic binders have a significant effect on various geochemical parameters and this in turn affects the leachable levels of aluminium, nickel, and TBT. The assessment concluded that stabilisation trials leaching datasets demonstrate that the application of hydraulic binders provides a potentially suitable technique to

enable the reuse of contaminated sediments to infill Graving Dock No. 2 and Berth 52/53. (i.e. it is considered likely that the leachable concentration of contaminants in treated dredgings can be suitably controlled by development of a suitable mix design).

Baseline concentrations of contamination in surface water (River Liffey) and shallow groundwater were assessed and levels of TBT were found to be above the EU Surface Water Objectives in surface water samples from upstream and downstream of Alexandra Basin. Reviewing baseline levels of contamination indicates that removal of sediment from Alexandra Basin will likely result in significant betterment of environmental conditions. The conditions will be monitored via a programme of groundwater and surface water monitoring which can be undertaken during and post development.

An assessment of exposure pathways indicated that there are several important factors that are likely to reduce the migration of leached contaminant concentrations in addition to the stabilisation process itself. Such factors include the physical structure and low permeability of the monoliths, the presence of existing physical structures (e.g.dock walls) and the presence of proposed physical structures (e.g. cofferdam and sheet pile walls). These factors cannot be accurately reproduced within a hydrogeological model and therefore the reduced contaminant migration cannot be quantified, but in reality are likely to decrease the rate of contaminant leaching and decrease the migration potential from the source area.

7 QUANTITATIVE RISK ASSESSMENT

7.1 General

A site-specific DQRA of the likely source – pathway – receptor pollutant linkages has been undertaken in line with guidance and best practice in order to quantify the significance of leachable contamination identified in the treated dredged material, upon the quality of controlled waters, specifically the River Liffey as agreed with the EPA.

A quantitative risk assessment has been carried out based on leachate testing of the treated dredged material, background soil and groundwater quality data available for the site and site specific hydrogeological data. Soil data, Hydraulic Conductivity Data and Geotechnical data are presented in Appendix C, E and F, respectively. The assessment has been carried out using the UK Environment Agency's Remedial Targets Worksheet (Release 3.1, issued October 2006). This model was developed by the Environment Agency (England & Wales) with the support of SEPA and NIHES and has been developed to meet the requirements of the European Union Water Framework Directive. It is therefore considered to be an appropriate tool for the assessment of the potential impact to controlled waters in Ireland.

7.2 Input Parameters

The assessment has been carried out for the Graving Dock No.2 and Berth 52/53 separately (due to differences in size, structure and hydrogeological conditions). The basic hydrogeological input assessment parameters for each of the two areas are presented in the tables below. Some parameters are based upon published data, the source of which has been quoted where appropriate. The models are presented using what are considered to be conservative values.

The receptor of concern is the River Liffey. Preliminary discussions with the Environmental Protection Agency agreed it was practical to set the arbitrary compliance point at the centre of the channel of the River Liffey. A conservative arbitrary compliance point of 150m from the edge of the dredgings has been selected for both areas. The Graving Dock No.2 compliance point is within Alexandra Basin and the Berth 52/53 compliance point is within the channel of the River Liffey. The low permeability treated material within the monolith is not likely to leach at the modelled concentrations; the compliance point is therefore considered to be conservative.

The Remedial Target Concentrations (RTC's) have been set based on EU Surface water Objectives for nickel and tributyl tin. These were the most conservative values and are considered to be protective of Shellfish.

The model has been run using steady state conditions (Domenico steady state) and therefore assumes that the source is still present and will not reduce/degrade over time. The results of the model are therefore considered to be conservative with regard to the treated and the monolithic nature of the material.

Table7.1: Graving Dock No.2 Basic Input Parameters

Parameter	Value	Units	Justification
Water filled soil porosity	0.2	fraction	Conservative estimate
Air filled soil porosity	0.1	fraction	Conservative estimate
Bulk Density of Soil	1.87	g/m^3	Laboratory derived; based on geotechnical data
Infiltration	0.00044	m/d	Effective rainfall based on 20% annual infiltration of 29 year avg. annual rainfall 789.64mm/yr.
Area of Contaminant Source	5800	m^2	Area of Graving Dock No. 2
Length of contaminant source	200	m	Length of Graving Dock No.2
Width of contaminant source	29	m	Width of Graving Dock No.2
Saturated Aquifer Thickness	12.325	m	Measured from borehole logs of boreholes adjacent to Graving Dock No.2
Hydraulic Conductivity of Aquifer	0.173	m/day	Calculated using hydraulic conductivity testing in wells
Hydraulic gradient of Aquifer	0.001	Fraction	Conservative Estimate
Effective Porosity	0.33	fraction	Estimated based upon literature McWorter and Sunada 1977[1])
Distance to Compliance Point	150	m	Arbitrary compliance point (agreed by EPA)

Table7.2: Berth 52/53 Basic Input Parameters

Parameter	Value	Units	Justification
Water filled soil porosity	0.2	fraction	Conservative estimate
Air filled soil porosity	0.1	fraction	Conservative estimate
Bulk Density of Soil	1.87	g/m^3	Laboratory derived based on geotechnical data
Infiltration	0.00044	m/d	Effective rainfall based on 20% annual infiltration of 29 year avg. annual rainfall 789.64mm/yr
Area of Contaminant Source	45980	m^2	Area of Berth 52/52
Length of contaminant source	330	m	Length of Berth 52/53
Width of contaminant source	122	m	Width of Berth 52/53
Saturated Aquifer Thickness	12.36	m	Measured from borehole logs of

			boreholes adjacent to Berth 52/53
Hydraulic Conductivity of Aquifer	0.595	m/day	Calculated using hydraulic conductivity testing in wells
Hydraulic gradient of Aquifer	0.001	fraction	Conservative Estimate
Effective Porosity	0.33	fraction	Estimated based upon literature McWorter and Sunada 1977[1])
Distance to Compliance Point	150	m	Arbitrary compliance point (agreed with EPA)

[1] *McWhorter, D.B. and D.K. Sunada. 1977. Ground-Water Hydrology and Hydraulics. Water Resources Publications, Colorado.*

The two COPC's (nickel and tributyl tin) which have been identified above the assessment criteria levels will be assessed individually for mix 2 and mix 4 (refer to Section 6.1). The contaminant specific hydrogeological parameters that will be used in the models are presented below.

Table 7.3: Contaminant Specific Hydrogeological Parameters

Nickel

Parameter	Value	Units	Justification
Henry's Law	Zero	Dimension-less	Non-Volatile
Soil Water partition coefficient	295	l/kg	Environment Agency (2009e) Thorne et al (2005)

Tributyl Tin

Parameter	Value	Units	Justification
Henry's Law	0.00000013	Dimension-less	Environment Agency (2009e) Thorne et al (2005)
Soil Water partition coefficient	N/A	l/kg	N/A as organic

The modelling process used site specific hydrogeological data (conductivity, permeability etc) to estimate the attenuation of the contaminants (in this case the maximum leachable concentrations associated with the trial mixes) within groundwater.

The modelling process has been used to derive target concentrations for the COPC's which were above the EU Surface Water Objectives within the treated dredgings. The models have been altered to represent the different size and hydrogeological parameters of the two areas that are proposed for infilling.

The models produced were of a conservative nature. The modelling process cannot account for the existing physical structures such as dock walls and the proposed structures such as the cofferdam

and the sheet pile wall. The source area of contamination has been calculated for the entire volume of the infilled areas. In reality the structural integrity of the monolith will mean only the external surface area and the area immediately adjacent to any joints would be subject to leaching due to the low permeability of the monolith. These parameters cannot be quantified within the model and are likely to significantly decrease the leachable contaminant concentrations estimated by the batch analysis.

The models assumed steady state conditions (i.e. no declining contaminant source term); as it is difficult to quantify the rate of leaching from the monoliths. The tank leachate testing has indicated that the contaminant source would decline over time.

7.3 Modelling Results

The results of the modelling process and the derived Remedial Target Concentrations (RTCs) are presented in full within Appendix G and summarised in the following table.

Table 7.4: Modelling Results

Area	Mix	Contaminant	Predicted Leachable concentration (Batch) (mg/l)	Max predicted average aquifer Conc. (10 Years) (mg/l)	EU Surface Water Assessment Criteria (mg/l)	Derived Remedial Target Criteria (mg/l)
G Dock No.2	2	Nickel	7.00E-02	1.49E-03	2.00E-02	2.76E-02
	4	Nickel	9.10E-03	3.37E-04	2.00E-02	2.76E-02
	2	TBT	ND	1.54E-07	2.00E-07	2.76E-07
	4	TBT	4.40E-06	1.01E-08	2.00E-07	2.76E-07
Berth 52/53	2	Nickel	7.00E-02	1.49E-03	2.00E-02	2.11E-02
	4	Nickel	9.10E-03	3.37E-04	2.00E-02	2.11E-02
	2	TBT	ND	1.54E-07	2.00E-07	2.11E-07
	4	TBT	4.40E-06	1.01E-08	2.00E-07	2.11E-07

The maximum predicted average aquifer concentrations (10 years) as derived by the Conceptual Design Model developed by CE Geochem based on the preliminary tank test analytical data are less than the derived Remedial Target Criteria (RTCs). This provides evidence to suggest that the predicted time averaged concentrations of TBT and nickel will be less than published assessment criteria and the RTCs derived by RPS.

The RTCs are derived by adding effects of contaminant dilution and dispersal within groundwater during migration to the compliance point (surface water receptor) to the adopted surface water quality target (in this case the EU Surface Water Objectives).

In this situation the derived RTCs were only marginally greater than the EU Surface Water Objectives. The primary reasons for this are considered to be the high hydraulic conductivity and steep groundwater table which results in rapid migration to the compliance point with little time for the dilution and dispersal of contaminants prior to it reaching the compliance point.

The RTC values were higher for Graving Dock No. 2 than Berth 52/53. These differences are likely caused by Graving Dock No.2 being smaller and therefore having a smaller source area within the model and a lower hydraulic conductivity which would allow more time for natural attenuation to occur.

Given the fact that surface water associated with the River Liffey is known to have been impacted by TBT (likely to be due to the presence of high contaminant concentrations within sediments), achieving the EU surface water target concentration of $2.0x10^{-7}$ is unlikely to have an overall betterment in existing contaminant conditions in the receptor. The following Table compares the baseline surface water concentration of TBT identified in the River Liffey to the derived Remedial Target Concentrations. The results are presented in table 7.5 below.

Table 7.5: Models with baseline surface water concentrations as target value

Area	Mix	Contaminant	Predicted Leachable concentration (Batch) (mg/l)	Max predicted average aquifer Conc. (10 Years) (mg/l)	Mean Baseline Surface Water Concentration (mg/l)	Derived Remedial Target Criteria (mg/l)
G Dock 2	2	TBT	ND	1.54E-07	2.00E-06	2.76E-07
	4	TBT	4.40E-06	1.01E-08	2.00E-06	2.76E-07
Berth 52/53	2	TBT	ND	1.54E-07	2.00E-06	2.11E-07
	4	TBT	4.40E-06	1.01E-08	2.00E-06	2.11E-07

This comparison indicates that the predicted average aquifer concentrations(10 years) are less than the current back ground concentrations of TBT in surface water within the Liffey Estuary.

7.4 Appraisal of Test Mixes based on Derived RTCs

The batch leachate analysis and tank testing analysis of the test mixes indicates that a reduction in the concentration of all contaminants (including TBT and nickel) below the EU Surface water

objectives (or derived RTCs in the case of TBT and nickel) is achievable through the stabilisation process. The batch leachate data indicates that TBT concentrations for Mix 2 were reduced below the derived RTC values and the nickel concentrations for Mix 4 were reduced below the derived RTC values.

As TBT levels are already elevated within surface water in Alexandra Basin, Mix 4 was remodelled to produce RTCs with existing baseline surface water levels of TBT as the target concentration. The RTC values produced were only marginally greater than the leachable concentrations identified in the batch leachable testing for Mix 4.

The only increase in concentrations associated with the stabilisation process was in nickel which increased in some of the mixes. The concentration of leachable nickel appears to correlate to the volume of Portland Cement (OPC) used in the mix (when the volume of OPC is less than approximately 4.4% the nickel concentration is acceptable).

The tank testing and associated CDM suggest that the time averaged aquifer concentrations for TBT and nickel will be less than the RTC for both mixes.

The RTC's derived during this modelling process will be used as target concentrations for the maximum leachable concentrations of nickel and TBT in future test mixes. A test mix based on the existing Mix2/Mix4 will be developed that will achieve leachable contaminant concentrations less than the derived RTCs (or where RTC have not been derived EU Surface Water Objectives).

8 CONCLUSIONS AND RECOMMEDATIONS

8.1 Conclusions

A detailed quantitative risk assessment has been carried out to assess the potential impacts the infilling of Graving Dock No.2 and Berth 52/53 may have the on the River Liffey. The risk assessment was carried out using the UK Remedial Targets Worksheet (in absence of an equivalent Irish Model), which was used to determine if the levels of contaminants which may leach from treated dredgings into the River Liffey were acceptable.

An assessment of site specific conditions were carried out using data acquired from recent site investigations and published data. Models were produced which derived acceptable levels (i.e. below the EU Surface Water Objectives - for the majority of contaminants) of contamination that could be leached from the infilled areas into the River Liffey. Analytical data of samples collected from the River Liffey upstream and downstream of Alexandra basin identified elevated concentrations of arsenic, cadmium and TBT. The presence of TBT in these samples suggests that the quality of the River Liffey has been impacted by contamination associated with historical use of Port. It is likely that the primary source of TBT in the River Liffey is contamination in sediments associated with Alexandra Basin.

The model assumes leaching of the entire source area and does not take into account the structural integrity of the treated sediments, in reality leaching of the infilled areas will be confined to the surface area and the area around the cracks. The models were run with steady state conditions (i.e. no declining source term); this does not reflect reality as leaching would occur gradually over time.

The models do not account for existing physical structures i.e. the Graving Dock Walls, or physical structures that will be present post development i.e. steel combi wall and cofferdam that will close off the areas. The modelling process is therefore considered to have a high level of conservatism and in reality it is considered that these parameters are likely to reduce the amount of contaminant that leaches and the rate of leaching from the source area.

The batch leachate data indicates that the stabilisation process significantly reduces the leachable concentrations of the vast majority of contaminants including metals, TBT, PAHs and PCBs. This suggests that the process will result in a significant betterment of conditions.

The maximum predicted average aquifer concentrations (10 years) as derived by the Conceptual Design Model developed based on the preliminary tank test analytical data are less than the derived Remedial Target Criteria (RTCs). This provides evidence to suggest that the predicted time averaged concentrations of TBT and nickel will be less than published assessment criteria and the RTCs derived by RPS. Based on this assessment the predicted impact on surface waters (the River Liffey) is less than the published and site specific derived target concentrations.

8.2 *Detailed Test Mix Design*

The RTC's derived during this modelling process will be used as target concentrations for the maximum leachable concentrations of nickel and TBT in the final test mix. A test mix based on the data from current will be developed that will achieve leachable contaminant concentrations less than the derived RTCs (or where RTC have not needed to be derived - EU Surface Water Objectives). The final test mix will be subject to leachate analysis to enable comparison of data to the EU Surface Water Objectives and derived RTCs. The final test mix would also be subject to Tank Test analysis in accordance with NEN7375:2004 to assess the leaching in greater detail.

This data will be used to derive upper leaching limits, partition coefficients (Kd) and diffusion coefficients (De) to facilitate the development of a final conceptual design model to predict mass flux rates and time averaged concentrations of contaminants in groundwater below the source area.

8.3 *Field Trials*

Upon selection of a final test mix that meets the RTCs a field trial would be undertaken. It is proposed to use a batch of the final solidification/stabilisation mix to infill a portion of Graving Dock No. 2 (dry dock). This would then be partially filled with saline water and analysis undertaken to determine the actual impact on the water quality and the impact of chlorine intrusion of the long term structural integrity of the monolith.

8.4 *Monitoring/Validation*

Surface water and groundwater monitoring has been undertaken on two occasions since the site investigation and additional monitoring is proposed to be undertaken prior to the onsite works to gain a clearer understanding of the background contaminant concentrations. During the stabilisation/infilling works groundwater and surface water will be monitored on a monthly basis. This will continue for at least 3 months on completion of the works. At this stage the data will be reviewed in detail and discussions with the Environmental Protection Agency would be undertaken to determine a reduced monitoring frequency likely to be 3-6 months. Samples would be analysed for metals and TBT.

Please note that the contaminant concentrations in surface water and groundwater are likely to be subject to significant natural fluctuations due to the complex hydrological and hydrogeological setting (e.g. tidal influence on groundwater). Therefore data associated with a single round of monitoring is unlikely to give an indication of changing contaminant conditions and therefore it will be necessary to assess longer term trends.

Appendix A

Borehole Logs

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH1

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	280mm cased to 18.00m	3.50	Dublin Port Company	01.RI15
	Location 718287.3 E 734727.9 N	**Dates** 27/01/2015-28/01/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.25)	TARMAC.			
					3.25	0.25	CONCRETE.			
						(0.70)				
0.95-2.20	B1				2.55	0.95	MADE GROUND: Light brown silty gravelly fine to coarse SAND containing occasional pockets of brown sandy CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00	E1					(1.25)				
					1.30	2.20	MADE GROUND: Light grey brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
2.50	D1					(1.60)				
3.70	W2				-0.30	3.80	MADE GROUND: Brownish grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.		▼1	
3.90	D2									
4.00	E2			Steady(1) at 4.00m, rose to 4.00m in 20 mins, sealed at 16.50m.		(1.10)				
4.60	W1									
5.00	D3				-1.40	4.90	MADE GROUND: Grey silty sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.			
5.30	D4				-1.70	(0.30) 5.20				
5.50	D5				-1.90	5.40	Soft to firm slightly sandy slightly gravelly silty CLAY containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
6.00	E3					(1.60)	Brown silty gravelly fine to coarse SAND containing occasional shells. Gravel is fine to coarse, sub-angular to sub-rounded.			
7.00-8.00	B2				-3.50	7.00	Dark brownish grey silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
						(3.00)				
					-6.50	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH1

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH1

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	280mm cased to 18.00m	3.50	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	718287.3 E 734727.9 N	27/01/2015-28/01/2015	RPS	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							Dark brownish grey silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
12.00-13.00	B3									
						(6.50)				
				27/01/2015:4.00m						
				28/01/2015:4.00m						
16.50	D6			Groundwater perched on upper surface of silt stratum.	-13.00	16.50	Stiff dark grey slightly sandy clayey thinly laminated SILT containing occasional thinly interbedded grey silty fine SAND layers.			
						(1.95)				
18.00-18.45	SPT N=19	18.00	10.90	4,3/3,4,6,6						
18.00-18.45	D7									
				28/01/2015:10.90m	-14.95	18.45	Complete at 18.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH1

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin

Borehole Number
BH2

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	280mm cased to 15.00m	3.35	Dublin Port Company	01.RI15
	Location 718287.2 E 734839.4 N	**Dates** 29/01/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				Hydrocarbon type odours from strata as recovered between 0.26m and 2.8m depth.		(0.26)	TARMAC.			
0.30	D1				3.09	0.26	MADE GROUND: Dark grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	E1					(0.84)				
1.10-1.90	B1				2.25	1.10	MADE GROUND: Light brownish grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
						(0.80)				
2.00	D2				1.45	1.90	MADE GROUND: Brownish grey and orange brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
2.00	E2					(0.90)				
3.00	D3				0.55	2.80	Soft to firm grey brown with orange brown mottling slightly sandy silty CLAY containing decayed roots and rootllets and shells.			
						(0.40)				
3.50	D4				0.15	3.20	Brown and dark grey silty sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.			
3.50	W1					(0.55)				
3.80	D5				-0.40	3.75	Soft to firm slightly sandy slightly gravelly silty CLAY containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
						(0.25)				
4.00	E3			Steady(1) at 4.00m, sealed at 13.50m.	-0.65	4.00	Brown silty gravelly fine to coarse SAND containing occasional shells. Gravel is fine to coarse, sub-angular to sub-rounded.		▽1	
4.00-6.00	B2									
						(3.50)				
7.50	D6				-4.15	7.50	Soft grey slightly sandy silty CLAY containing shells.			
8.00-9.00	B3					(2.00)				
9.50	D7				-6.15	9.50	Dark brownish grey silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
						(0.50)				
					-6.65	10.00				

Remarks
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1=Standpipe sample as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No.
01.RI15.BH2

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH2

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	280mm cased to 15.00m	3.35	Dublin Port Company	01.RI15
	Location 718287.2 E 734839.4 N	**Dates** 29/01/2015	**Engineer** RPS	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00-11.00	B4					(3.50)	Dark brownish grey silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
13.50	D8			Groundwater perched on upper surface of silt stratum.	-10.15	13.50	Stiff dark grey slightly sandy clayey thinly laminated SILT containing occasional thinly interbedded grey silty fine SAND layers.			
15.00-15.45	SPT N=18	15.00	7.30	3,4/5,4,4,5		(1.95)				
15.00-15.45	D9			29/01/2015:7.30m	-12.10	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH2

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH4

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 14.0m depth.	230mm cased to 14.00m	3.43	Dublin Port Company	01.RI15
	Location 718415.4 E 734843.3 N	**Dates** 31/01/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				Hydrocarbon type odours from strata as recovered between 3.4m and 12.1m depth.	3.23	0.20	FILL: HARDCORE.			
0.20	D1						MADE GROUND: Firm brown with grey and dark brown mottling slightly sandy silty CLAY containing occasional shells.			
0.20-0.80	B1					(0.60)				
0.50	E1									
0.80	D2				2.63	0.80	MADE GROUND: Brown and dark brown silty gravelly fine to coarse SAND containing interbedded brown slightly sandy CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.			
						(0.80)				
1.60	D3				1.83	1.60	Soft grey and dark grey slightly sandy slightly gravelly silty CLAY containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
1.60-2.80	B2									
2.00	E2									
						(1.25)				
2.85	D4			Steady(1) at 2.85m, rose to 12.10m in 20 mins.	0.58	2.85	Grey and mottled orange brown silty sandy fine to coarse GRAVEL. Gravel is sub-angular to sub-rounded.		▽1	
2.95	D5				0.48	2.95				
						(0.45)				
3.40	D6				0.03	3.40	Soft to firm slightly sandy slightly gravelly silty CLAY containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
3.60	W1									
4.00	E3						Grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
6.00-7.00	B3			31/01/2015:3.30m						
				02/02/2015:3.30m						
						(5.90)				
9.30	D7				-5.87	9.30	Grey brown silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
						(0.70)				
					-6.57	10.00				

Remarks
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1=Standpipe sample as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH4

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH4

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 14.0m depth.	230mm cased to 14.00m	3.43	Dublin Port Company	01.RI15
	Location 718415.4 E 734843.3 N	**Dates** 31/01/2015	**Engineer** RPS	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(2.10)	Grey brown silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
12.10	D8			Groundwater perched on upper surface of silt stratum.	-8.67	12.10	Stiff dark grey slightly sandy clayey thinly laminated SILT containing occasional thinly interbedded grey silty fine SAND layers.		▼1	
						(2.35)				
14.00-14.45 14.00-14.45	SPT N=17 D9	14.00	6.10	2,2/3,4,5,5 02/02/2015:6.10m	-11.02	14.45	Complete at 14.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH4

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH5

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	280mm cased to 15.00m	3.53	Dublin Port Company	01.RI15
	Location 718400.2 E 734697 N	**Dates** 03/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					3.43	0.10	TARMAC.			
						(0.25)	CONCRETE.			
					3.18	0.35	FILL: HARDCORE.			
						(0.50)				
0.90	D1				2.68	0.85	MADE GROUND: Brown and dark brown silty gravelly fine to coarse SAND with cobble content. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.00	E1									
1.00-2.00	B1									
						(2.45)				
2.20	D2									
2.20-3.30	B2									
3.00	E2									
3.30	W1			Steady(1) at 3.30m, rose to 3.30m in 20 mins, sealed at 12.00m.	0.23	3.30	Grey and grey brown silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.		▼1	
6.00-8.00	B3									
						(6.70)				
					-6.47	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1=Deep standpipe sample as taken 20th February 2015 (shallow standpipe dry).

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH5

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH5

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	280mm cased to 15.00m	3.53	Dublin Port Company	01.RI15
	Location 718400.2 E 734697 N	**Dates** 03/02/2015	**Engineer** RPS	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.50)	Grey and grey brown silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
10.50	D3			Groundwater perched on upper surface of silt stratum.	-6.97	10.50	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.			
12.00-12.45 12.00-12.45	SPT N=13 D4	12.00	6.00	2,2/3,3,4,4,3		(4.50)				
15.00	D5			03/02/2015:6.00m	-11.47	15.00	Complete at 15.00m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH5

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.29	Dublin Port Company	01.RI15
	Location 720227.6 E 734325.5 N	**Dates** 05/02/2015-06/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				Hydrocarbon type odours from strata as recovered		(0.35)	TOPSOIL.			
0.35	D1			between 3.6m and	2.94	0.35	MADE GROUND: Firm brown with grey and dark brown mottling slightly sandy silty CLAY containing red brick, slate and glass remnants.			
0.35-2.00	B1			3.9m depth.						
0.50	E1									
1.30	W2									
1.40	W1									
						(3.25)				
2.50	E2									
									▼1	
3.60	D2			Steady(1) at 3.60m,	-0.31	3.60	MADE GROUND: Soft grey slightly sandy slightly gravelly clayey SILT. Gravel is fine to medium, sub-angular to sub-rounded.		▽1	
				rose to 3.40m in		(0.30)				
3.90	D3			20 mins, sealed at	-0.61	3.90	MADE GROUND: Brown and dark brown silty gravelly fine to coarse SAND containing red brick and concrete remnants. Gravel is fine to coarse, sub-angular to sub-rounded.			
				9.00m.						
5.00-7.00	B2									
						(3.40)				
7.30	D4				-4.01	7.30	MADE GROUND: Black silty sandy fine to coarse GRAVEL containing red brick, concrete and cinder remnants. Gravel is sub-angular to sub-rounded.			
						(1.70)				
9.00	E3			Groundwater	-5.71	9.00	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.			
9.00	D5			perched on upper surface of silt stratum.						
9.00-10.00	B3			05/02/2015:3.40m		(1.00)				
				06/02/2015:3.20m						
					-6.71	10.00				

Remarks
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.29	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720227.6 E 734325.5 N	05/02/2015-06/02/2015	RPS	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.50-10.95 10.50-10.95	SPT N=11 D6	10.50	3.40	2,2/3,2,3,3		(5.00)	Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.			
15.00	D7			06/02/2015:6.70m	-11.71	15.00	Complete at 15.00m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.22	Dublin Port Company	01.RI15
	Location 720268.4 E 734507.6 N	**Dates** 10/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.40)	TOPDOIL.			
0.40	D1				2.82	0.40	MADE GROUND: Firm dark brown and grey gravelly sandy CLAY containing red brick, mortar, slate, timber and tarmac remnants. Gravel is fine to coarse, sub-angular to sub-rounded.			
0.50	E1									
1.00-3.00	B1									
1.60	W1					(3.00)				
3.00	W2									
3.40	D2			Steady(1) at 3.40m.	-0.18	3.40	Dark grey and black silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.		▽1	
3.50	E2									
5.00-6.00	B2					(6.60)				
					-6.78	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
Water added from 4.50m to 15.00m.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.22	Dublin Port Company	01.RI15
	Location 720268.4 E 734507.6 N	**Dates** 10/02/2015	**Engineer** RPS	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(1.70)	Dark grey and black silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.			
11.70	D3				-8.48	11.70				
12.00-12.45	SPT N=29	12.00	0.10	3,3/6,7,8,8			Medium dense grey silty fine SAND.			
12.00-12.45	D4									
12.00-13.00	B3									
						(3.75)				
15.00-15.45	SPT N=23	15.00	0.10	3,4/4,6,7,6						
15.00-15.45	D5									
				10/02/2015:0.10m	-12.23	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH8

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.11	Dublin Port Company	01.RI15
	Location 720275.5 E 734644.5 N	**Dates** 13/02/2015-16/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					3.01	0.10	Pavior BRICK.			
					2.91	0.20	FILL: Quarry DUST.			
						(0.10)				
						(0.50)	CONCRETE.			
					2.41	0.70				
0.70	D1						MADE GROUND: Firm brown and dark brown slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded.			
0.85	E1									
1.00-3.00	B1									
						(3.10)				
2.60	W1								▼1	
				Steady(1) at 3.20m, rose to 3.20m in 20 mins.						
3.80	W2				-0.69	3.80				
3.80	D2						MADE GROUND: Soft to firm dark grey and black slightly sandy slightly gravelly CLAY containing red brick, concrete and timber remnants. Gravel is fine coarse, sub-angular to sub-rounded.			
3.80-5.00	B2									
4.00	E2									
						(1.80)				
				13/02/2015:3.20m						
				16/02/2015:3.20m						
5.60	D3				-2.49	5.60	Soft to firm grey slightly sandy silty CLAY.			
6.00	E3									
6.00-7.00	B3									
						(1.90)				
7.50	D4				-4.39	7.50	Grey silty fine to medium SAND containing occasional bands of sandy fine to coarse GRAVEL. Gravel is fine to medium, sub-angular to sub-rounded.			
						(2.50)				
					-6.89	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.
Water added from 5.60m to 15.00m.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH8

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH8

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	3.11	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720275.5 E 734644.5 N	13/02/2015-16/02/2015	RPS	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							Grey silty fine to medium SAND containing occasional bands of sandy fine to coarse GRAVEL. Gravel is fine to medium, sub-angular to sub-rounded.			
12.00	D5					(5.45)				
15.00-15.45	SPT N=16	15.00	2.30	2,2/3,4,5,4						
15.00-15.45	D6			16/02/2015:2.30m	-12.34	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH8

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH10

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	230mm cased to 15.00m	3.26	Dublin Port Company	01.RI15
	Location As Plan.	**Dates** 17/02/2015-18/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					3.11	0.15	TARMAC.			
					2.96	0.30	FILL: HARDCORE.			
						(0.30)	CONCRETE.			
					2.66	0.60				
						(0.30)	FILL: HARDCORE.			
0.90	D1				2.36	0.90	MADE GROUND: Grey silty slightly gravelly fine to coarse SAND containing shell remnants. Gravel is fine to medium, sub-angular to sub-rounded.			
1.00	E1					(0.50)				
1.40	D2				1.86	1.40	MADE GROUND: Soft to fiem brown and dark brown slightly sandy slightly gravelly CLAY with cobble content. Gravel is fine to coarse, sub-angular rto sub-rounded.			
1.40-2.90	B1					(1.50)				
2.90	D3			Steady(1) at 2.90m, rose to 2.90m in 20 mins.	0.36	2.90	MADE GROUND: Brown and grey sandy fine to coarse GRAVEL with cobble content. Gravel is sub-angular to sub-rounded.		▼1	
2.90-3.50	B2					(0.60)				
3.20	W1									
3.20	W2									
3.50	D4				-0.24	3.50	MADE GROUND: Soft black slightly sandy slightly gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded.			
4.00	E2					(0.70)				
4.20	D5				-0.94	4.20	Black silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
						(1.70)				
5.90	D6				-2.64	5.90	Firm dark grey slightly sandy clayey SILT with occasional interbedded silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
6.00	E3					(4.10)				
					-6.74	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH10

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 18.0m depth.	230mm cased to 15.00m	3.26	Dublin Port Company	01.RI15
	Location: As Plan.	**Dates**: 17/02/2015-18/02/2015	**Engineer**: RPS	**Sheet**: 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(1.70)	Firm dark grey slightly sandy clayey SILT with occasional interbedded silty gravelly fine to coarse SAND. Gravel is fine to medium, sub-angular to sub-rounded.			
11.70	D7				-8.44	11.70				
12.00-12.45	D8			17/02/2015:0.60m			Medium dense grey and grey brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.			
12.00-12.45	SPT N=14	12.00	0.50	18/02/2015:1.40m 2,2/3,3,4,4						
						(3.75)				
15.00-15.45	SPT N=18	15.00	0.60	2,2/3,5,5,5						
15.00-15.45	D9									
				18/02/2015:0.50m	-12.19	15.45	Complete at 15.50m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH12

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	2.94	Dublin Port Company	01.RI15
	Location 720494 E 734401.1 N	**Dates** 11/02/2015	**Engineer** RPS	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					2.84	0.10	TARMAC.			
0.10	D1					(0.50)	MADE GROUND: Light grey brown sandy gravelly SILT with cobble content. Gravel is fine to medium, sub-angular to sub-rounded.			
0.50	E1									
0.60	D2				2.34	0.60	MADE GROUND: CONCRETE, red BRICK and HARDCORE.			
2.30	W2									
2.30	W1					(3.70)				
				Steady(1) at 2.90m.					▽1	
4.30	D3				-1.36	4.30	Grey silty slightly gravelly fine to medium SAND containing occasional shells. Gravel is fine to medium, sub-angular to sub-rounded.			
5.00	E2									
6.00-7.00	B1									
						(5.10)				
9.40	D4				-6.46	9.40	Dark grey silty fine SAND.			
						(0.60)				
					-7.06	10.00				

Remarks
No obvious visual or olfactory evidence of contamination.
E=Environmental soil sample comprising 1x400g capacity plastic tub, 1x250g capacity amber glass jar, 1x60g capacity amber glass vial.
W=Environmental groundwater sample comprising 1x1L plastic bottle, 1x500ml capacity clear glass bottle, 3x250ml capacity clear glass bottles, 1x125ml capacity azlon bottle, 2x40ml capacity clear glass vials.
W1/W2=Shallow and deep standpipe samples as taken 20th February 2015.

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH12

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Site	Borehole Number
Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin	BH12

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
CME-55 Drill. Hollow stem auger (HSA) drilling and percussion sampling to 15.0m depth.	230mm cased to 15.00m	2.94	Dublin Port Company	01.RI15
	Location	**Dates**	**Engineer**	**Sheet**
	720494 E 734401.1 N	11/02/2015	RPS	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.50-11.50	B2					(5.45)	Dark grey silty fine SAND.			
15.00-15.45	SPT N=13	15.00	2.60	2,3/2,4,4,3						
15.00-15.45	D5									
				11/02/2015:2.60m	-12.51	15.45	Complete at 15.45m			

Remarks

Scale (approx)	Logged By
1:50	JC

Figure No. 01.RI15.BH12

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Appendix B

Untreated and Treated Dredging’s Data

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

Priority Geotechnical Ltd
Unit 12
Owenacurra Business Park
Midleton
Co Cork
Co Cork

Attention: Colette Kelly

CERTIFICATE OF ANALYSIS

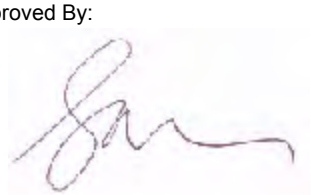
Date:	23 August 2013
Customer:	D_PRIORGEOT_CRK
Sample Delivery Group (SDG):	130810-55
Your Reference:	PH13003B
Location:	Dublin Port
Report No:	239267

We received 14 samples on Friday August 09, 2013 and 14 of these samples were scheduled for analysis which was completed on Friday August 23, 2013. 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.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

ALcontrol Laboratories is a trading division of ALcontrol UK Limited
Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No.

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7912617	19		0.50 - 1.00	08/08/2013
7912621	20		1.50 - 2.00	08/08/2013
7912634	23		0.50 - 1.00	08/08/2013
7912632	24		1.50 - 2.00	08/08/2013
7912616	27		0.50 - 1.00	08/08/2013
7912615	28		1.50 - 2.00	08/08/2013
7912619	32		0.50 - 1.00	08/08/2013
7912627	35		0.50 - 1.00	08/08/2013
7912622	36		1.50 - 2.00	08/08/2013
7912618	40		1.50 - 2.00	08/08/2013
7912630	43		0.50 - 1.00	08/08/2013
7912614	47		0.50 - 1.00	08/08/2013
7912623	51		0.50 - 1.00	08/08/2013
7912625	52		1.50 - 2.00	08/08/2013

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

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X Test

N No Determination Possible

Lab Sample No(s)	7912617	7912621	7912634	7912632	7912616	7912615	7912619	7912627	7912622	7912618	7912630	7912614	7912623	7912625
Customer Sample Reference	19	20	23	24	27	28	32	35	36	40	43	47	51	52
AGS Reference														
Depth (m)	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00
Container	250g Amber Jar (AL)	400g Tub (ALE214)	60g VOC (ALE215)

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X Test

N No Determination Possible

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
Sample description	All	NDPs: 0 Tests: 14	7912617	19		0.50 - 1.00	250g Amber Jar (AL)
			7912621	20		1.50 - 2.00	400g Tub (ALE214)
			7912634	23		0.50 - 1.00	60g VOC (ALE215)
			7912632	24		1.50 - 2.00	250g Amber Jar (AL)
			7912616	27		0.50 - 1.00	400g Tub (ALE214)
			7912615	28		1.50 - 2.00	60g VOC (ALE215)
			7912619	32		0.50 - 1.00	250g Amber Jar (AL)
			7912627	35		0.50 - 1.00	400g Tub (ALE214)
			7912622	36		1.50 - 2.00	60g VOC (ALE215)
			7912618	40		1.50 - 2.00	250g Amber Jar (AL)
			7912630	43		0.50 - 1.00	400g Tub (ALE214)
			7912614	47		0.50 - 1.00	60g VOC (ALE215)
			7912623	51		0.50 - 1.00	250g Amber Jar (AL)
			7912625	52		1.50 - 2.00	60g VOC (ALE215)
Total Dissolved Solids	All	NDPs: 0 Tests: 14					
Total Organic Carbon	All	NDPs: 0 Tests: 14					

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
			7912625	52		1.50 - 2.00	400g Tub (ALE214)	60g VOC (ALE215)
Anions by Kone (w)	All	NDPs: 0 Tests: 14					X	
CEN 2:1 Readings	All	NDPs: 0 Tests: 14					X	
CEN 8:1 Readings	All	NDPs: 0 Tests: 14					X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 14					X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 14					X	
Fluoride	All	NDPs: 0 Tests: 14					X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 14						X
Mercury Dissolved	All	NDPs: 0 Tests: 14					X	
pH	All	NDPs: 0 Tests: 14					X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 14					X	
Total Dissolved Solids	All	NDPs: 0 Tests: 14					X	

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
7912617	19	0.50 - 1.00	Black	Loamy Sand	0.1 - 2 mm	None	Stones
7912621	20	1.50 - 2.00	Black	Sandy Loam	0.1 - 2 mm	None	None
7912634	23	0.50 - 1.00	Grey	Silt Loam	0.063 - 0.1 mm	None	None
7912632	24	1.50 - 2.00	Grey	Silt Loam	0.063 - 0.1 mm	None	None
7912616	27	0.50 - 1.00	Black	Silt Loam	0.063 - 0.1 mm	None	None
7912615	28	1.50 - 2.00	Dark Brown	Sandy Silt Loam	0.1 - 2 mm	None	None
7912619	32	0.50 - 1.00	Dark Brown	Sandy Silt Loam	0.1 - 2 mm	None	None
7912627	35	0.50 - 1.00	Black	Clay Loam	0.063 - 0.1 mm	None	None
7912622	36	1.50 - 2.00	Black	Sandy Clay Loam	0.1 - 2 mm	Stones	None
7912618	40	1.50 - 2.00	Dark Brown	Sandy Loam	0.1 - 2 mm	None	None
7912630	43	0.50 - 1.00	Grey	Silt Loam	0.063 - 0.1 mm	None	None
7912614	47	0.50 - 1.00	Dark Brown	Silty Clay Loam	0.063 - 0.1 mm	Stones	None
7912623	51	0.50 - 1.00	Black	Stone/Soil	2 - 10 mm	Stones	None
7912625	52	1.50 - 2.00	Dark Brown	Loamy Sand	0.063 - 0.1 mm	None	None

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	19	20	23	24	27	28
			Depth (m)	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013
			SDG Ref	130810-55	130810-55	130810-55	130810-55	130810-55	130810-55
			Lab Sample No.(s)	7912617	7912621	7912634	7912632	7912616	7912615
			AGS Reference						
Loss on ignition	<0.7 %	TM018		1.89 M	2 M	12.5 M	2.32 M	10.4 M	3.39 M
Mineral oil >C10-C40	<1 mg/kg	TM061		32.3 #	38.2 #	811 #	48.5 #	793 #	244 #
Organic Carbon, Total	<0.2 %	TM132		0.459 #	0.617 #	2.42 #	0.81 #	2.01 #	0.856 #
pH	1 pH Units	TM133		8.38 M	8.27 M	8.47 M	8.4 M	8.4 M	8.25 M
PCB congener 28	<3 µg/kg	TM168		<3 M	<3 M	10.9 M	<3 M	15.1 M	4.65 M
PCB congener 52	<3 µg/kg	TM168		<3 M	<3 M	6.46 M	<3 M	6.5 M	<3 M
PCB congener 101	<3 µg/kg	TM168		<3 M	<3 M	3.62 M	<3 M	<3 M	<3 M
PCB congener 118	<3 µg/kg	TM168		<3 M	<3 M	3.14 M	<3 M	<3 M	<3 M
PCB congener 138	<3 µg/kg	TM168		<3 M	<3 M	4.63 M	<3 M	3.12 M	<3 M
PCB congener 153	<3 µg/kg	TM168		<3 M	<3 M	3.89 M	<3 M	3.39 M	<3 M
PCB congener 180	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21	<21	32.6	<21	28.1	<21
ANC @ pH 4	<0.03 mol/kg	TM182		2.61	2.13	1.91	3.33	2.05	2.04
ANC @ pH 6	<0.03 mol/kg	TM182		0.563	0.525	0.342	0.515	0.447	0.463
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	<10	<10	<10	<10	<10

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	32	35	36	40	43	47
			Depth (m)	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013
			SDG Ref	130810-55	130810-55	130810-55	130810-55	130810-55	130810-55
			Lab Sample No.(s)	7912619	7912627	7912622	7912618	7912630	7912614
			AGS Reference						
Loss on ignition	<0.7 %	TM018		3.69 M	8.12 M	2.3 M	1.85 M	4.88 M	6.03 M
Mineral oil >C10-C40	<1 mg/kg	TM061		119 #	538 #	124 #	27.4 #	203 #	620 #
Organic Carbon, Total	<0.2 %	TM132		0.676 #	1.89 #	0.532 #	0.351 #	1.18 #	1.44 #
pH	1 pH Units	TM133		8.15 M	8.86 M	8.77 M	8.71 M	8.53 M	8.64 M
PCB congener 28	<3 µg/kg	TM168		<3 M	22.7 M	<3 M	<3 M	4.58 M	28.9 M
PCB congener 52	<3 µg/kg	TM168		<3 M	8.78 M	<3 M	<3 M	<3 M	11.2 M
PCB congener 101	<3 µg/kg	TM168		<3 M	3.38 M	<3 M	<3 M	<3 M	6.16 M
PCB congener 118	<3 µg/kg	TM168		<3 M	3.3 M	<3 M	<3 M	<3 M	4.9 M
PCB congener 138	<3 µg/kg	TM168		<3 M	3.9 M	<3 M	<3 M	<3 M	7.8 M
PCB congener 153	<3 µg/kg	TM168		<3 M	3.99 M	<3 M	<3 M	<3 M	7.69 M
PCB congener 180	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	5.5 M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21	46.1	<21	<21	<21	72.2
ANC @ pH 4	<0.03 mol/kg	TM182		2.49	2.23	3.01	2.21	2.24	2.77
ANC @ pH 6	<0.03 mol/kg	TM182		0.6	0.438	0.431	0.469	0.547	0.488
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	19.8	<10	<10	<10	<10

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R: 51	52
			Depth (m): 0.50 - 1.00	1.50 - 2.00
			Sample Type: Soil/Solid	Soil/Solid
			Date Sampled: 08/08/2013	08/08/2013
			Sampled Time: .	.
			Date Received: 09/08/2013	09/08/2013
			SDG Ref: 130810-55	130810-55
			Lab Sample No.(s): 7912623	7912625
			AGS Reference:	
Loss on ignition	<0.7 %	TM018	0.971 #	1.53 M
Mineral oil >C10-C40	<1 mg/kg	TM061	73.5 #	35.7 #
Organic Carbon, Total	<0.2 %	TM132	0.237 #	0.444 #
pH	1 pH Units	TM133	9.16 #	8.64 M
PCB congener 28	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 52	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 101	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 118	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 138	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 153	<3 µg/kg	TM168	<3 #	<3 M
PCB congener 180	<3 µg/kg	TM168	<3 #	<3 M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21	<21
ANC @ pH 4	<0.03 mol/kg	TM182	3.01	2.28
ANC @ pH 6	<0.03 mol/kg	TM182	0.625	0.457
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213	<10	<10

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	19	20	23	24	27	28
			Depth (m)	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013
			SDG Ref	130810-55	130810-55	130810-55	130810-55	130810-55	130810-55
			Lab Sample No.(s)	7912617	7912621	7912634	7912632	7912616	7912615
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		24	77	83	6	55	13
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 M	<100 M	<5 M	<5 M	<5 M	<5 M
Benzene	<10 µg/kg	TM089		<10 M	<200 M	<10 M	<10 M	<10 M	<10 M
Toluene	<2 µg/kg	TM089		<2 M	<40 M	<2 M	<2 M	<2 M	<2 M
Ethylbenzene	<3 µg/kg	TM089		<3 M	<60 M	<3 M	<3 M	<3 M	<3 M
m,p-Xylene	<6 µg/kg	TM089		<6 M	<120 M	<6 M	<6 M	<6 M	<6 M
o-Xylene	<3 µg/kg	TM089		<3 M	<60 M	16.7 M	<3 M	<3 M	<3 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9	16.7	<9	<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24	<24	<24	<24	<24

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	32	35	36	40	43	47
			Depth (m)	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013	09/08/2013
			SDG Ref	130810-55	130810-55	130810-55	130810-55	130810-55	130810-55
			Lab Sample No.(s)	7912619	7912627	7912622	7912618	7912630	7912614
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		96	66	5	60	15	62
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 M	<5 M	<5 M	<5 M	<5 M	<5 M
Benzene	<10 µg/kg	TM089		<10 M	<10 M	<10 M	<10 M	<10 M	<10 M
Toluene	<2 µg/kg	TM089		<2 M	<2 M	<2 M	<2 M	<2 M	<2 M
Ethylbenzene	<3 µg/kg	TM089		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
m,p-Xylene	<6 µg/kg	TM089		<6 M	<6 M	<6 M	<6 M	<6 M	<6 M
o-Xylene	<3 µg/kg	TM089		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9	<9	<9	<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24	<24	<24	<24	<24

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	51	52
			Depth (m)	0.50 - 1.00	1.50 - 2.00
			Sample Type	Soil/Solid	Soil/Solid
			Date Sampled	08/08/2013	08/08/2013
			Sampled Time	.	.
			Date Received	09/08/2013	09/08/2013
			SDG Ref	130810-55	130810-55
			Lab Sample No.(s)	7912623	7912625
			AGS Reference		
GRO Surrogate % recovery**	%	TM089		116	15
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 #	<5 M
Benzene	<10 µg/kg	TM089		<10 #	<10 M
Toluene	<2 µg/kg	TM089		2 #	<2 M
Ethylbenzene	<3 µg/kg	TM089		4 #	<3 M
m,p-Xylene	<6 µg/kg	TM089		<6 #	<6 M
o-Xylene	<3 µg/kg	TM089		<3 #	<3 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.300	**Moisture Content Ratio (%)**	71.4
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	58.3
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912614
Sampled Date	08-Aug-2013
Customer Sample Ref.	47
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	1.44	3	5	6
Loss on Ignition (%)	6.03	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	0.0722	1	-	-
Mineral Oil (mg/kg)	620	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.64	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.488	-	-	-
ANC to pH 4 (mol/kg)	2.77	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0155	0.0043	0.031	0.0513	0.5	2	25
Barium	0.143	0.0311	0.285	0.394	20	100	300
Cadmium	0.0069	0.000242	0.0138	0.00737	0.04	1	5
Chromium	0.0235	0.00764	0.047	0.0882	0.5	10	70
Copper	0.0034	0.00187	0.0068	0.0199	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.485	0.101	0.969	1.3	0.5	10	30
Nickel	0.00483	0.00359	0.00966	0.0368	0.4	10	40
Lead	0.00767	0.000471	0.0153	0.0101	0.5	10	50
Antimony	0.0144	0.0133	0.0288	0.134	0.06	0.7	5
Selenium	0.0462	0.00826	0.0924	0.111	0.1	0.5	7
Zinc	0.018	0.00203	0.0359	0.0321	4	50	200
Chloride	7090	766	14200	12400	800	15000	25000
Fluoride	2.57	2.31	5.14	23.3	10	150	500
Sulphate (soluble)	615	294	1230	3180	1000	20000	50000
Total Dissolved Solids	16600	2310	33100	33700	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	57.2	25.7	114	280	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.066	7.813
Conductivity (µS/cm)	18.79	2,910.00
Temperature (°C)	22.70	21.90
Volume Leachant (Litres)	0.225	1.400
Volume of Eluate VE1 (Litres)	0.130	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.256	**Moisture Content Ratio (%)**	46.4
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	68.3
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912615
Sampled Date	08-Aug-2013
Customer Sample Ref.	28
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.856	3	5	6
Loss on Ignition (%)	3.39	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	244	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.25	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.463	-	-	-
ANC to pH 4 (mol/kg)	2.04	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0121	0.00367	0.0243	0.0456	0.5	2	25
Barium	0.167	0.0322	0.334	0.464	20	100	300
Cadmium	0.0092	0.000184	0.0184	0.0114	0.04	1	5
Chromium	0.0141	0.00627	0.0282	0.071	0.5	10	70
Copper	0.00361	0.00223	0.00722	0.0238	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.493	0.0784	0.986	1.22	0.5	10	30
Nickel	0.00537	0.00442	0.0107	0.0452	0.4	10	40
Lead	0.00406	0.000728	0.00812	0.0108	0.5	10	50
Antimony	0.0204	0.0184	0.0407	0.186	0.06	0.7	5
Selenium	0.0391	0.00676	0.0782	0.102	0.1	0.5	7
Zinc	0.0147	0.00345	0.0294	0.0464	4	50	200
Chloride	4840	440	9690	9050	800	15000	25000
Fluoride	2.99	2.6	5.98	26.4	10	150	500
Sulphate (soluble)	366	116	732	1420	1000	20000	50000
Total Dissolved Solids	11800	1310	23600	24200	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	38.2	14.5	76.5	170	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.036	7.952
Conductivity (µS/cm)	13.48	1,684.00
Temperature (°C)	22.70	21.70
Volume Leachant (Litres)	0.269	1.400
Volume of Eluate VE1 (Litres)	0.185	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.339	**Moisture Content Ratio (%)**	93.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	51.6
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912616
Sampled Date	08-Aug-2013
Customer Sample Ref.	27
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	2.01	3	5	6
Loss on Ignition (%)	10.4	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	0.0281	1	-	-
Mineral Oil (mg/kg)	793	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.4	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.447	-	-	-
ANC to pH 4 (mol/kg)	2.05	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0252	0.00531	0.0504	0.0684	0.5	2	25
Barium	0.053	0.0253	0.106	0.274	20	100	300
Cadmium	0.0148	0.000553	0.0296	0.0165	0.04	1	5
Chromium	0.0487	0.01	0.0973	0.13	0.5	10	70
Copper	0.00402	0.00189	0.00803	0.0206	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.675	0.171	1.35	2.1	0.5	10	30
Nickel	0.00554	0.00408	0.0111	0.0419	0.4	10	40
Lead	0.00935	0.000676	0.0187	0.0135	0.5	10	50
Antimony	0.0192	0.0127	0.0384	0.132	0.06	0.7	5
Selenium	0.0637	0.0108	0.127	0.149	0.1	0.5	7
Zinc	0.0386	0.00274	0.0771	0.055	4	50	200
Chloride	9890	1100	19800	17800	800	15000	25000
Fluoride	2.16	2.37	4.33	23.5	10	150	500
Sulphate (soluble)	445	221	891	2380	1000	20000	50000
Total Dissolved Solids	24700	3010	49300	46900	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	72.8	35.5	146	383	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.028	7.858
Conductivity (µS/cm)	24.50	3,750.00
Temperature (°C)	22.90	22.20
Volume Leachant (Litres)	0.186	1.400
Volume of Eluate VE1 (Litres)	0.135	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.217	**Moisture Content Ratio (%)**	23.8
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	80.8
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912617
Sampled Date	08-Aug-2013
Customer Sample Ref.	19
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.459	3	5	6
Loss on Ignition (%)	1.89	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	32.3	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.38	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.563	-	-	-
ANC to pH 4 (mol/kg)	2.61	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00705	0.00137	0.0141	0.0213	0.5	2	25
Barium	0.0316	0.00686	0.0631	0.102	20	100	300
Cadmium	0.00513	0.000126	0.0103	0.00798	0.04	1	5
Chromium	0.00347	0.00194	0.00693	0.0215	0.5	10	70
Copper	0.0029	<0.00085	0.00579	<0.0085	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0156	0.00713	0.0312	0.0827	0.5	10	30
Nickel	0.00643	0.000631	0.0128	0.0141	0.4	10	40
Lead	0.00106	0.000125	0.00212	0.00251	0.5	10	50
Antimony	0.00159	0.00136	0.00318	0.0139	0.06	0.7	5
Selenium	0.11	0.0193	0.22	0.315	0.1	0.5	7
Zinc	0.0131	0.000814	0.0262	0.0246	4	50	200
Chloride	2280	175	4560	4580	800	15000	25000
Fluoride	0.563	<0.5	1.12	<5	10	150	500
Sulphate (soluble)	458	43.6	915	992	1000	20000	50000
Total Dissolved Solids	5620	502	11200	11900	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.48	<3	6.95	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	7.903	8.134
Conductivity (µS/cm)	6.33	650.00
Temperature (°C)	23.00	21.90
Volume Leachant (Litres)	0.308	1.400
Volume of Eluate VE1 (Litres)	0.235	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.218	**Moisture Content Ratio (%)**	24.6
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	80.3
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912618
Sampled Date	08-Aug-2013
Customer Sample Ref.	40
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.351	3	5	6
Loss on Ignition (%)	1.85	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	27.4	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.71	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.469	-	-	-
ANC to pH 4 (mol/kg)	2.21	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00437	0.000995	0.00874	0.014	0.5	2	25
Barium	0.0625	0.00435	0.125	0.113	20	100	300
Cadmium	0.00207	<0.0001	0.00415	0.00248	0.04	1	5
Chromium	0.00375	0.00226	0.0075	0.0244	0.5	10	70
Copper	0.00233	<0.00085	0.00466	<0.0085	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0635	0.02	0.127	0.252	0.5	10	30
Nickel	0.00093	0.000408	0.00186	0.00471	0.4	10	40
Lead	0.00101	0.000164	0.00202	0.00266	0.5	10	50
Antimony	0.000733	0.000535	0.00147	0.00559	0.06	0.7	5
Selenium	0.0236	0.00932	0.0471	0.11	0.1	0.5	7
Zinc	0.00511	0.000816	0.0102	0.0133	4	50	200
Chloride	2300	187	4600	4400	800	15000	25000
Fluoride	1.36	0.513	2.71	6.15	10	150	500
Sulphate (soluble)	214	20.8	427	439	1000	20000	50000
Total Dissolved Solids	5430	532	10900	11200	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.78	<3	7.56	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.105	8.890
Conductivity (µS/cm)	6.19	640.00
Temperature (°C)	23.00	22.60
Volume Leachant (Litres)	0.307	1.400
Volume of Eluate VE1 (Litres)	0.210	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.283	**Moisture Content Ratio (%)**	61.5
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	61.9
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912619
Sampled Date	08-Aug-2013
Customer Sample Ref.	32
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.676	3	5	6
Loss on Ignition (%)	3.69	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	119	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.15	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.6	-	-	-
ANC to pH 4 (mol/kg)	2.49	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0111	0.00496	0.0222	0.0554	0.5	2	25
Barium	0.0477	0.0186	0.0954	0.213	20	100	300
Cadmium	0.00714	0.000151	0.0143	0.0081	0.04	1	5
Chromium	0.0121	0.00491	0.0242	0.0559	0.5	10	70
Copper	0.006	0.00217	0.012	0.0253	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.472	0.0667	0.944	1.05	0.5	10	30
Nickel	0.00579	0.00369	0.0116	0.0389	0.4	10	40
Lead	0.00348	0.000364	0.00696	0.00658	0.5	10	50
Antimony	0.0177	0.0134	0.0353	0.138	0.06	0.7	5
Selenium	0.0356	0.00606	0.071	0.0885	0.1	0.5	7
Zinc	0.0162	0.00271	0.0323	0.0398	4	50	200
Chloride	4890	504	9770	9170	800	15000	25000
Fluoride	1.78	1.1	3.56	11.6	10	150	500
Sulphate (soluble)	310	58.5	619	822	1000	20000	50000
Total Dissolved Solids	11800	1310	23500	23000	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	25.6	10.2	51.1	117	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.175	8.692
Conductivity (µS/cm)	12.63	537.00
Temperature (°C)	23.10	21.90
Volume Leachant (Litres)	0.242	1.400
Volume of Eluate VE1 (Litres)	0.165	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.217	**Moisture Content Ratio (%)**	23.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	80.8
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912621
Sampled Date	08-Aug-2013
Customer Sample Ref.	20
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.617	3	5	6
Loss on Ignition (%)	2	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	38.2	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.27	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.525	-	-	-
ANC to pH 4 (mol/kg)	2.13	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00655	0.00186	0.0131	0.0233	0.5	2	25
Barium	0.0458	0.0302	0.0918	0.318	20	100	300
Cadmium	0.00255	<0.0001	0.0051	0.00255	0.04	1	5
Chromium	0.004	0.00261	0.00801	0.0275	0.5	10	70
Copper	0.00225	0.00324	0.0045	0.0314	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0164	0.00827	0.0328	0.0909	0.5	10	30
Nickel	0.00359	0.00125	0.00718	0.0148	0.4	10	40
Lead	0.00117	0.000254	0.00235	0.00346	0.5	10	50
Antimony	0.00972	0.00443	0.0195	0.0496	0.06	0.7	5
Selenium	0.0632	0.0386	0.127	0.41	0.1	0.5	7
Zinc	0.00653	0.00294	0.0131	0.033	4	50	200
Chloride	2170	229	4340	4230	800	15000	25000
Fluoride	0.638	<0.5	1.28	<5	10	150	500
Sulphate (soluble)	266	41.7	532	641	1000	20000	50000
Total Dissolved Solids	5170	663	10300	11100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.47	<3	6.95	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.068	8.127
Conductivity (µS/cm)	6.24	832.00
Temperature (°C)	22.80	20.50
Volume Leachant (Litres)	0.309	1.400
Volume of Eluate VE1 (Litres)	0.175	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.205	**Moisture Content Ratio (%)**	17.2
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	85.3
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912622
Sampled Date	08-Aug-2013
Customer Sample Ref.	36
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.532	3	5	6
Loss on Ignition (%)	2.3	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	124	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.77	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.431	-	-	-
ANC to pH 4 (mol/kg)	3.01	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00811	0.00199	0.0162	0.0269	0.5	2	25
Barium	0.102	0.0138	0.204	0.239	20	100	300
Cadmium	0.00255	<0.0001	0.00511	0.00291	0.04	1	5
Chromium	0.00737	0.00306	0.0147	0.0355	0.5	10	70
Copper	0.00277	0.00198	0.00555	0.0207	2	50	100
Mercury Dissolved (CVAF)	0.0000103	<0.00001	0.0000206	<0.0001	0.01	0.2	2
Molybdenum	0.0316	0.00599	0.0631	0.0892	0.5	10	30
Nickel	0.00183	0.000761	0.00365	0.00883	0.4	10	40
Lead	0.00119	0.000157	0.00239	0.00275	0.5	10	50
Antimony	0.014	0.00403	0.0281	0.0517	0.06	0.7	5
Selenium	0.0803	0.0264	0.161	0.325	0.1	0.5	7
Zinc	0.00252	0.00119	0.00505	0.0134	4	50	200
Chloride	1700	140	3400	3180	800	15000	25000
Fluoride	1.21	<0.5	2.41	<5	10	150	500
Sulphate (soluble)	122	14.2	243	265	1000	20000	50000
Total Dissolved Solids	4220	418	8440	8530	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	5.26	<3	10.5	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.131	8.707
Conductivity (µS/cm)	5.21	483.00
Temperature (°C)	22.70	21.40
Volume Leachant (Litres)	0.320	1.400
Volume of Eluate VE1 (Litres)	0.200	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.190	**Moisture Content Ratio (%)**	8.75
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	92
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912623
Sampled Date	08-Aug-2013
Customer Sample Ref.	51
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.237	3	5	6
Loss on Ignition (%)	0.971	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	73.5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	9.16	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.625	-	-	-
ANC to pH 4 (mol/kg)	3.01	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00352	0.002	0.00704	0.0221	0.5	2	25
Barium	0.0214	0.00248	0.0427	0.0508	20	100	300
Cadmium	0.000486	<0.0001	0.000973	<0.001	0.04	1	5
Chromium	0.00218	0.00174	0.00437	0.018	0.5	10	70
Copper	0.00215	<0.00085	0.00431	<0.0085	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.00382	0.00149	0.00764	0.0181	0.5	10	30
Nickel	0.000682	0.000435	0.00137	0.00469	0.4	10	40
Lead	0.000343	0.000072	0.000687	0.00109	0.5	10	50
Antimony	0.00315	0.00106	0.00631	0.0134	0.06	0.7	5
Selenium	0.0124	0.00278	0.0249	0.041	0.1	0.5	7
Zinc	0.00175	0.000639	0.00349	0.00791	4	50	200
Chloride	811	63.6	1620	1660	800	15000	25000
Fluoride	<0.5	<0.5	<1	<5	10	150	500
Sulphate (soluble)	127	10.6	253	265	1000	20000	50000
Total Dissolved Solids	2210	209	4410	4830	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<6.01	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.476	9.429
Conductivity (µS/cm)	2.49	265.00
Temperature (°C)	22.90	22.00
Volume Leachant (Litres)	0.335	1.400
Volume of Eluate VE1 (Litres)	0.240	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.211	**Moisture Content Ratio (%)**	20.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	82.9
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912625
Sampled Date	08-Aug-2013
Customer Sample Ref.	52
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.444	3	5	6
Loss on Ignition (%)	1.53	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	35.7	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.64	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.457	-	-	-
ANC to pH 4 (mol/kg)	2.28	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0189	0.00543	0.0377	0.0731	0.5	2	25
Barium	0.0644	0.00255	0.129	0.112	20	100	300
Cadmium	0.0036	<0.0001	0.0072	0.00504	0.04	1	5
Chromium	0.00352	0.00193	0.00705	0.0215	0.5	10	70
Copper	0.00611	0.00227	0.0122	0.0281	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0156	0.0033	0.0312	0.0503	0.5	10	30
Nickel	0.00524	0.0013	0.0105	0.0185	0.4	10	40
Lead	0.0012	0.000334	0.0024	0.00455	0.5	10	50
Antimony	0.0184	0.00584	0.0368	0.076	0.06	0.7	5
Selenium	0.412	0.089	0.825	1.34	0.1	0.5	7
Zinc	0.00678	0.00102	0.0136	0.0183	4	50	200
Chloride	2140	147	4290	4260	800	15000	25000
Fluoride	0.673	<0.5	1.35	<5	10	150	500
Sulphate (soluble)	330	25.8	660	684	1000	20000	50000
Total Dissolved Solids	5090	413	10200	10700	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	4.62	<3	9.24	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	7.977	8.692
Conductivity (µS/cm)	6.27	537.00
Temperature (°C)	22.90	21.90
Volume Leachant (Litres)	0.314	1.400
Volume of Eluate VE1 (Litres)	0.245	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.307	**Moisture Content Ratio (%)**	75.9
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	56.9
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912627
Sampled Date	08-Aug-2013
Customer Sample Ref.	35
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	1.89	3	5	6
Loss on Ignition (%)	8.12	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	0.0461	1	-	-
Mineral Oil (mg/kg)	538	500	-	-
PAH Sum of 17 (mg/kg)	19.8	100	-	-
pH (pH Units)	8.86	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.438	-	-	-
ANC to pH 4 (mol/kg)	2.23	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0161	0.00467	0.0321	0.0551	0.5	2	25
Barium	0.14	0.0325	0.28	0.405	20	100	300
Cadmium	0.00743	0.000338	0.0149	0.00865	0.04	1	5
Chromium	0.0155	0.00795	0.031	0.0851	0.5	10	70
Copper	0.00374	0.0029	0.00748	0.0297	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.453	0.121	0.905	1.46	0.5	10	30
Nickel	0.00525	0.00409	0.0105	0.0417	0.4	10	40
Lead	0.00434	0.000622	0.00867	0.00898	0.5	10	50
Antimony	0.00491	0.00488	0.00981	0.0488	0.06	0.7	5
Selenium	0.0465	0.00807	0.093	0.109	0.1	0.5	7
Zinc	0.0164	0.00344	0.0328	0.044	4	50	200
Chloride	6970	867	13900	13200	800	15000	25000
Fluoride	7.43	4.88	14.9	50.7	10	150	500
Sulphate (soluble)	893	298	1780	3420	1000	20000	50000
Total Dissolved Solids	16700	2560	33400	36100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	46.1	22.7	92.2	244	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.047	7.899
Conductivity (µS/cm)	18.54	3,050.00
Temperature (°C)	22.70	21.90
Volume Leachant (Litres)	0.217	1.400
Volume of Eluate VE1 (Litres)	0.130	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.252	**Moisture Content Ratio (%)**	44.2
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	69.4
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912630
Sampled Date	08-Aug-2013
Customer Sample Ref.	43
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	1.18	3	5	6
Loss on Ignition (%)	4.88	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	203	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.53	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.547	-	-	-
ANC to pH 4 (mol/kg)	2.24	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00964	0.00439	0.0193	0.0502	0.5	2	25
Barium	0.122	0.0114	0.244	0.246	20	100	300
Cadmium	0.00444	0.000132	0.00888	0.00649	0.04	1	5
Chromium	0.0084	0.00383	0.0168	0.0438	0.5	10	70
Copper	0.00313	0.00466	0.00626	0.0448	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.246	0.0403	0.492	0.65	0.5	10	30
Nickel	0.00421	0.00266	0.00842	0.0284	0.4	10	40
Lead	0.00218	0.000613	0.00437	0.00801	0.5	10	50
Antimony	0.0157	0.00843	0.0314	0.093	0.06	0.7	5
Selenium	0.0308	0.00437	0.0616	0.0754	0.1	0.5	7
Zinc	0.00855	0.00242	0.0171	0.0316	4	50	200
Chloride	4140	358	8280	8120	800	15000	25000
Fluoride	2.07	1.48	4.14	15.5	10	150	500
Sulphate (soluble)	482	71.3	964	1210	1000	20000	50000
Total Dissolved Solids	10100	961	20100	20600	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	31.8	14	63.7	161	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.122	8.299
Conductivity (µS/cm)	10.85	1,172.00
Temperature (°C)	23.30	22.00
Volume Leachant (Litres)	0.273	1.400
Volume of Eluate VE1 (Litres)	0.210	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.218	**Moisture Content Ratio (%)**	24.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	80.2
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912632
Sampled Date	08-Aug-2013
Customer Sample Ref.	24
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.81	3	5	6
Loss on Ignition (%)	2.32	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	48.5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.4	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.515	-	-	-
ANC to pH 4 (mol/kg)	3.33	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00765	0.00191	0.0153	0.0253	0.5	2	25
Barium	0.0387	0.0137	0.0775	0.164	20	100	300
Cadmium	0.00244	<0.0001	0.00489	0.00265	0.04	1	5
Chromium	0.00607	0.0028	0.0121	0.0316	0.5	10	70
Copper	0.00367	0.00301	0.00735	0.0309	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0221	0.00863	0.0442	0.101	0.5	10	30
Nickel	0.00344	0.00117	0.00688	0.0142	0.4	10	40
Lead	0.00114	0.000174	0.00227	0.00279	0.5	10	50
Antimony	0.0188	0.00664	0.0377	0.0796	0.06	0.7	5
Selenium	0.0538	0.0298	0.108	0.324	0.1	0.5	7
Zinc	0.00369	0.00149	0.00739	0.0173	4	50	200
Chloride	2370	208	4750	4430	800	15000	25000
Fluoride	1.11	<0.5	2.22	<5	10	150	500
Sulphate (soluble)	261	35.3	522	598	1000	20000	50000
Total Dissolved Solids	5770	636	11500	11900	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	6.62	<3	13.2	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.090	8.353
Conductivity (µS/cm)	6.88	796.00
Temperature (°C)	22.60	20.20
Volume Leachant (Litres)	0.307	1.400
Volume of Eluate VE1 (Litres)	0.190	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.355	**Moisture Content Ratio (%)**	102
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	49.4
Particle Size <4mm	>95%		

Case	
SDG	130810-55
Lab Sample Number(s)	7912634
Sampled Date	08-Aug-2013
Customer Sample Ref.	23
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	2.42	3	5	6
Loss on Ignition (%)	12.5	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	0.0326	1	-	-
Mineral Oil (mg/kg)	811	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.47	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.342	-	-	-
ANC to pH 4 (mol/kg)	1.91	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0279	0.00816	0.0559	0.0957	0.5	2	25
Barium	0.0588	0.0192	0.118	0.22	20	100	300
Cadmium	0.0116	0.000795	0.0232	0.0157	0.04	1	5
Chromium	0.0666	0.011	0.133	0.15	0.5	10	70
Copper	0.00874	0.0015	0.0175	0.0201	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.531	0.146	1.06	1.74	0.5	10	30
Nickel	0.00717	0.0049	0.0144	0.0507	0.4	10	40
Lead	0.00954	0.000773	0.0191	0.014	0.5	10	50
Antimony	0.031	0.0196	0.0621	0.204	0.06	0.7	5
Selenium	0.0575	0.0113	0.115	0.146	0.1	0.5	7
Zinc	0.0365	0.0024	0.0731	0.0484	4	50	200
Chloride	10800	1380	21600	20500	800	15000	25000
Fluoride	2.37	1.67	4.74	17.2	10	150	500
Sulphate (soluble)	124	97.7	248	996	1000	20000	50000
Total Dissolved Solids	24800	3140	49800	46800	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	135	34.2	270	414	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.071	8.299
Conductivity (µS/cm)	27.00	1,172.00
Temperature (°C)	22.90	22.00
Volume Leachant (Litres)	0.172	1.400
Volume of Eluate VE1 (Litres)	0.125	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 13:38:01

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM114		Leaching Procedure for CEN Two Stage BatchTest 2:1/8:1 Cumulative		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
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)		
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		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
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		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM182	CEN/TC 292 - WI 292046-chacterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils		
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		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	7912617	7912621	7912634	7912632	7912616	7912615	7912619	7912627	7912622	7912618
Customer Sample Ref.	19	20	23	24	27	28	32	35	36	40
AGS Ref.										
Depth	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00	1.50 - 2.00
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
ANC at pH4 and ANC at pH 6	20-Aug-2013	20-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	19-Aug-2013	20-Aug-2013	20-Aug-2013	19-Aug-2013
Anions by Kone (w)	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
CEN 2:1 Leachate (2 Stage)	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013
CEN 2:1 Readings	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
CEN 8:1 Leachate (2 Stage)	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
CEN 8:1 Readings	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
Dissolved Metals by ICP-MS	23-Aug-2013	23-Aug-2013	22-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013
Dissolved Organic/Inorganic Carbon	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Fluoride	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
GRO by GC-FID (S)	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Loss on Ignition in soils	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	23-Aug-2013	21-Aug-2013	20-Aug-2013	21-Aug-2013	21-Aug-2013	20-Aug-2013
Mercury Dissolved	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Mineral Oil	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	23-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
PAH Value of soil	20-Aug-2013	16-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	19-Aug-2013	16-Aug-2013	16-Aug-2013	19-Aug-2013
PCBs by GCMS	21-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	18-Aug-2013	21-Aug-2013	21-Aug-2013	18-Aug-2013
pH	15-Aug-2013	15-Aug-2013	14-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	14-Aug-2013	15-Aug-2013	14-Aug-2013
Phenols by HPLC (W)	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Sample description	12-Aug-2013	12-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013	13-Aug-2013	12-Aug-2013	12-Aug-2013	13-Aug-2013
Total Dissolved Solids	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Total Organic Carbon	22-Aug-2013	20-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013

Lab Sample No(s)	7912630	7912614	7912623	7912625
Customer Sample Ref.	43	47	51	52
AGS Ref.				
Depth	0.50 - 1.00	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00
Type	SOLID	SOLID	SOLID	SOLID
ANC at pH4 and ANC at pH 6	21-Aug-2013	21-Aug-2013	20-Aug-2013	19-Aug-2013
Anions by Kone (w)	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
CEN 2:1 Leachate (2 Stage)	19-Aug-2013	19-Aug-2013	19-Aug-2013	19-Aug-2013
CEN 2:1 Readings	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
CEN 8:1 Leachate (2 Stage)	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
CEN 8:1 Readings	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
Dissolved Metals by ICP-MS	22-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013
Dissolved Organic/Inorganic Carbon	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Fluoride	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
GRO by GC-FID (S)	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013
Loss on Ignition in soils	21-Aug-2013	21-Aug-2013	21-Aug-2013	20-Aug-2013
Mercury Dissolved	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Mineral Oil	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
PAH Value of soil	15-Aug-2013	15-Aug-2013	16-Aug-2013	19-Aug-2013
PCBs by GCMS	22-Aug-2013	22-Aug-2013	21-Aug-2013	18-Aug-2013
pH	14-Aug-2013	14-Aug-2013	14-Aug-2013	15-Aug-2013
Phenols by HPLC (W)	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Sample description	13-Aug-2013	13-Aug-2013	12-Aug-2013	13-Aug-2013
Total Dissolved Solids	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Total Organic Carbon	22-Aug-2013	22-Aug-2013	20-Aug-2013	20-Aug-2013

CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

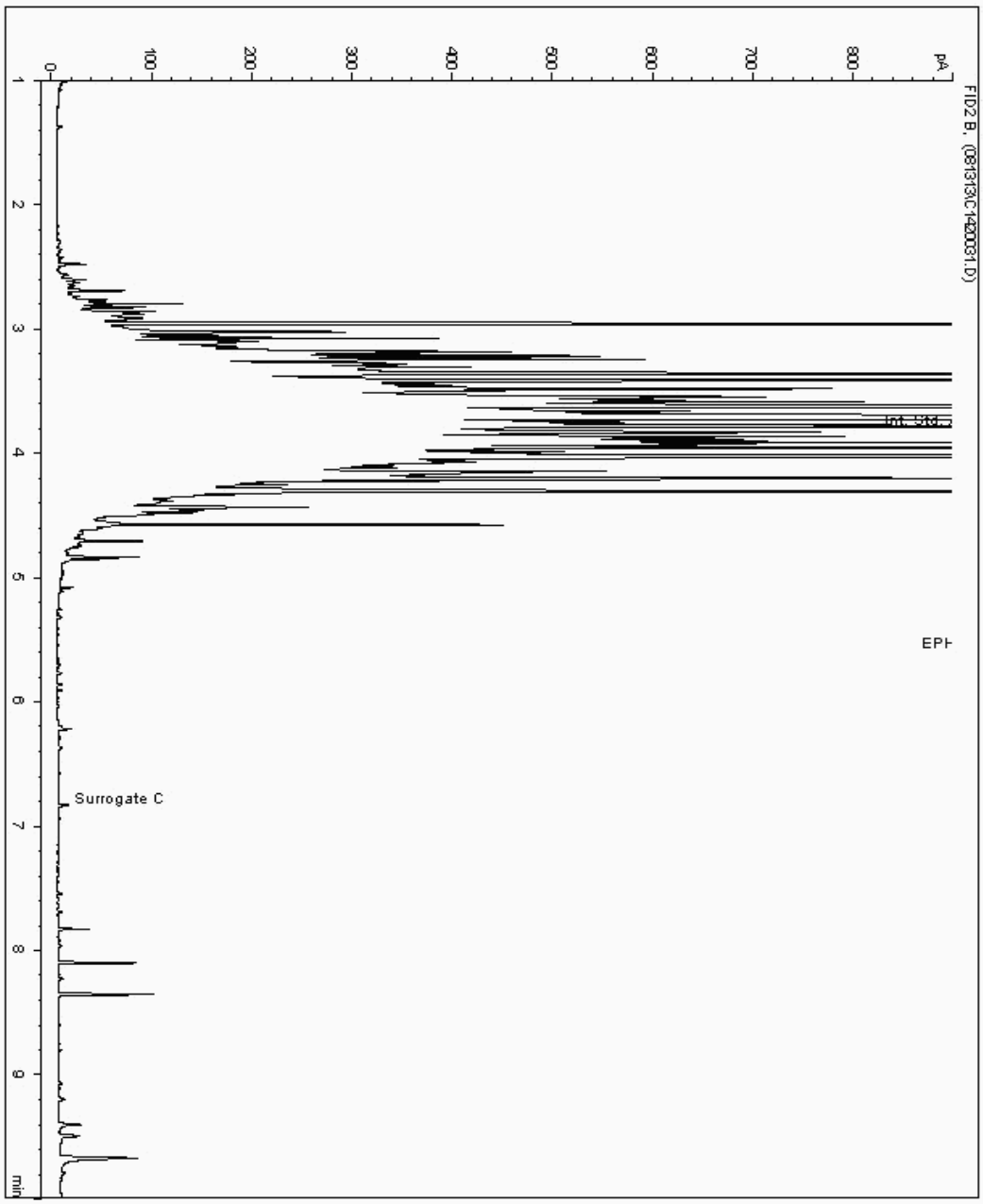
Analysis: Mineral Oil

Sample No : 7947398
Sample ID : 32

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7508474-7920211
Date Acquired : 14/08/13 00:32:54 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

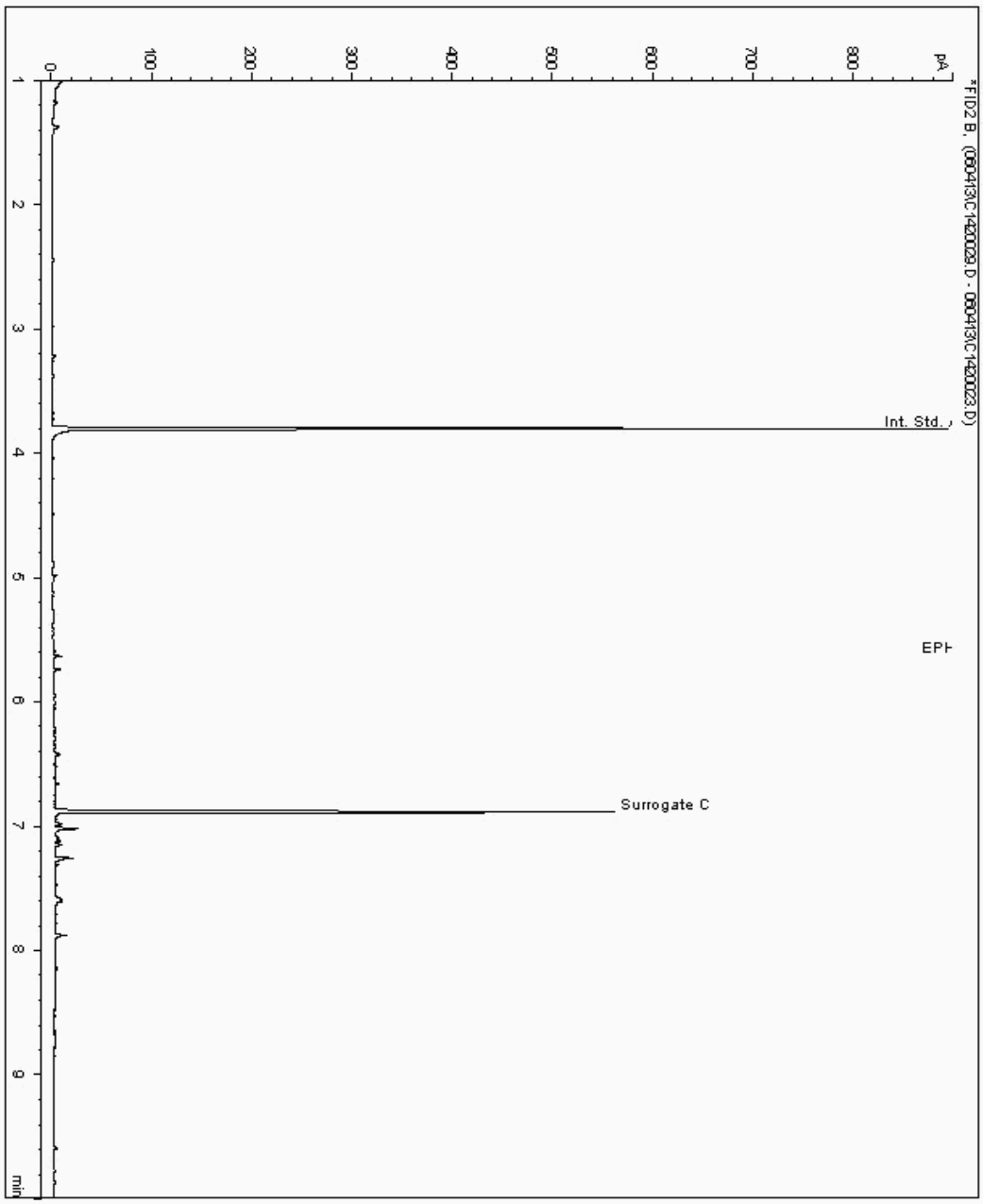
Analysis: Mineral Oil

Sample No : 7947504
Sample ID : 52

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7180751-7520255
Date Acquired : 04/06/13 19:54:24 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

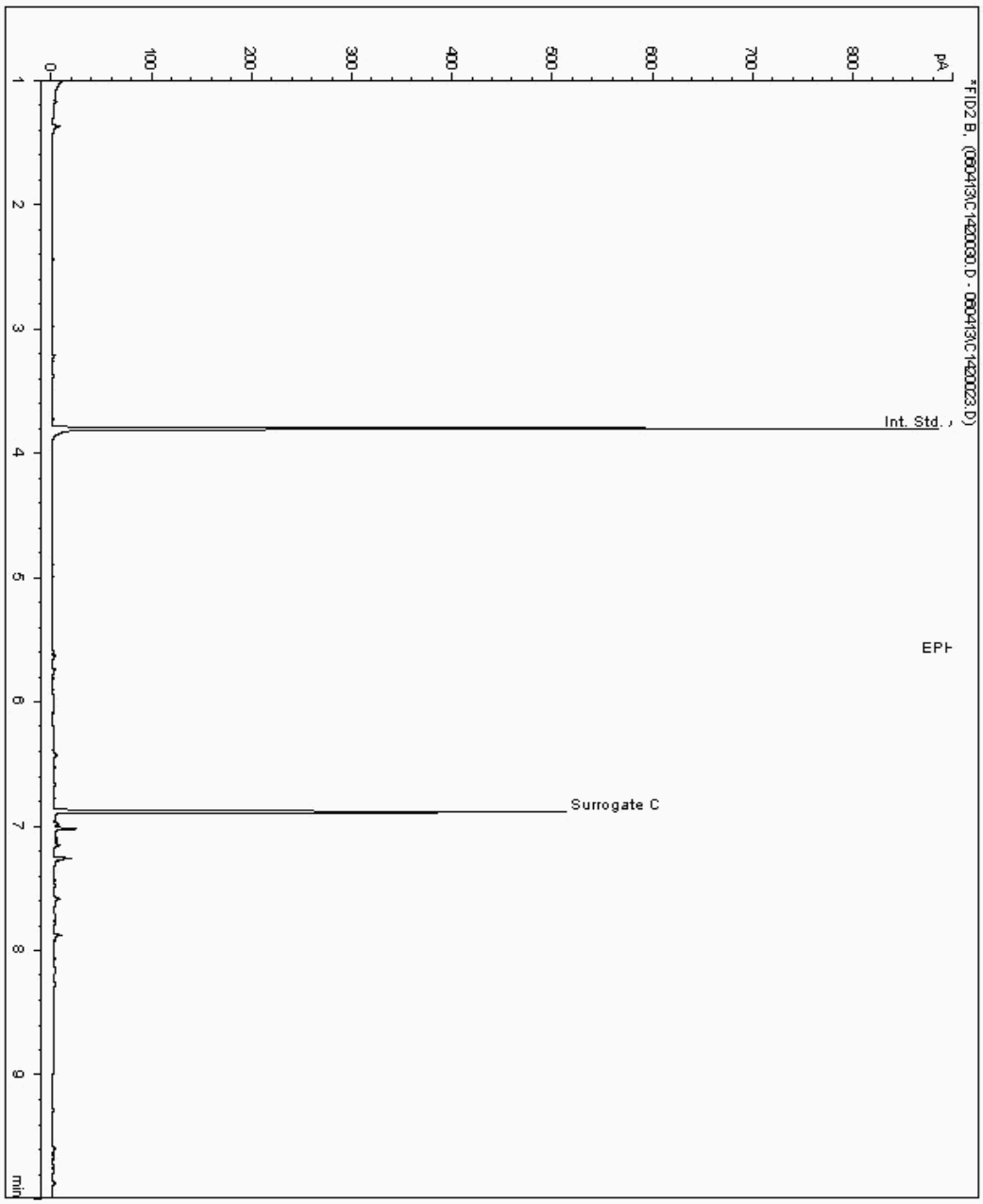
Analysis: Mineral Oil

Sample No : 7947621
Sample ID : 40

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7180760-7520260
Date Acquired : 04/06/13 20:19:07 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

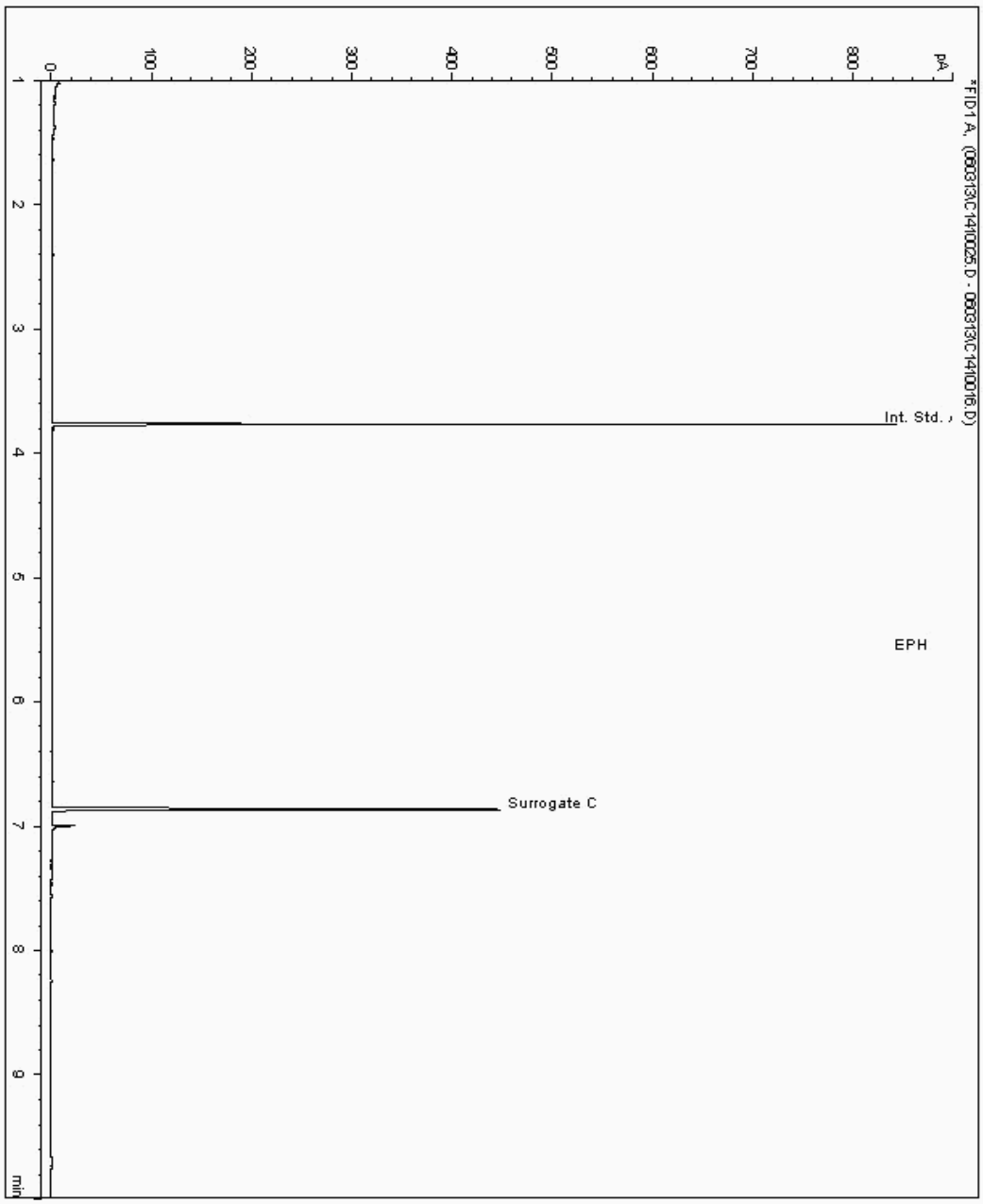
Analysis: Mineral Oil

Sample No : 7961255
Sample ID : 35

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7211147-7515386
Date Acquired : 03/06/13 17:38:37 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

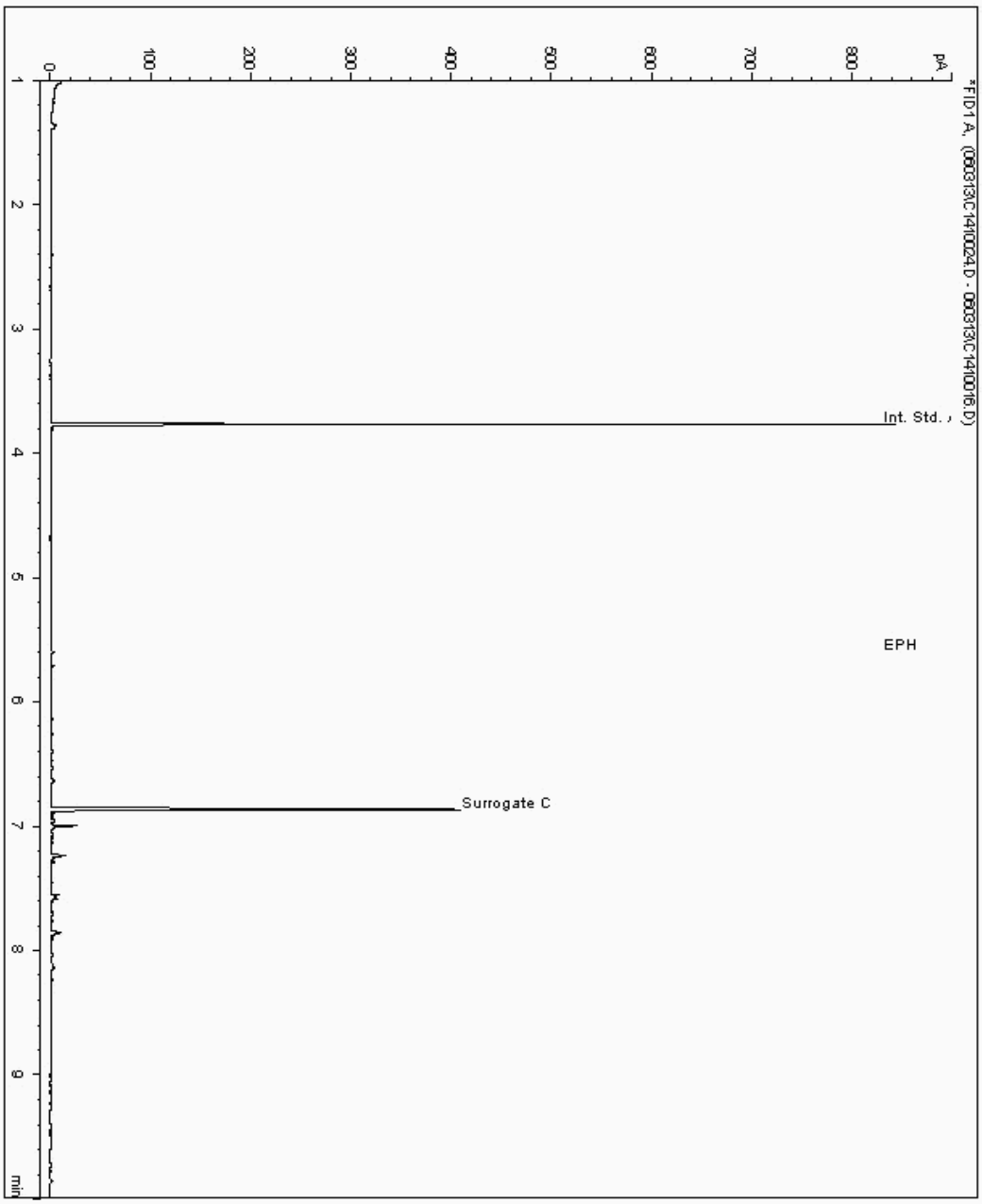
Analysis: Mineral Oil

Sample No : 7961358
Sample ID : 51

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7211146-7515385
Date Acquired : 03/06/13 17:15:20 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

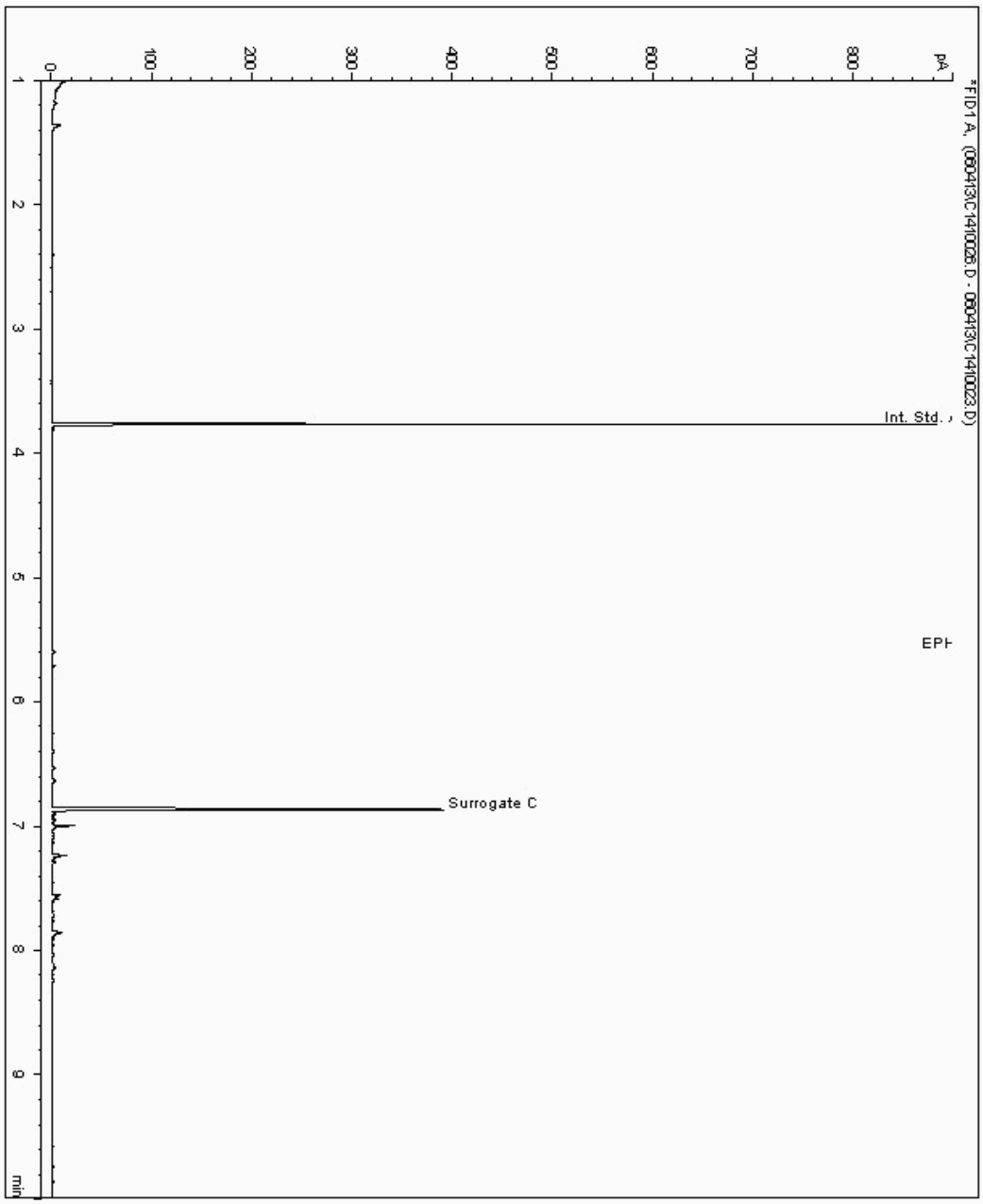
Analysis: Mineral Oil

Sample No : 7961401
Sample ID : 20

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7218989-7520357
Date Acquired : 04/06/13 18:40:58 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

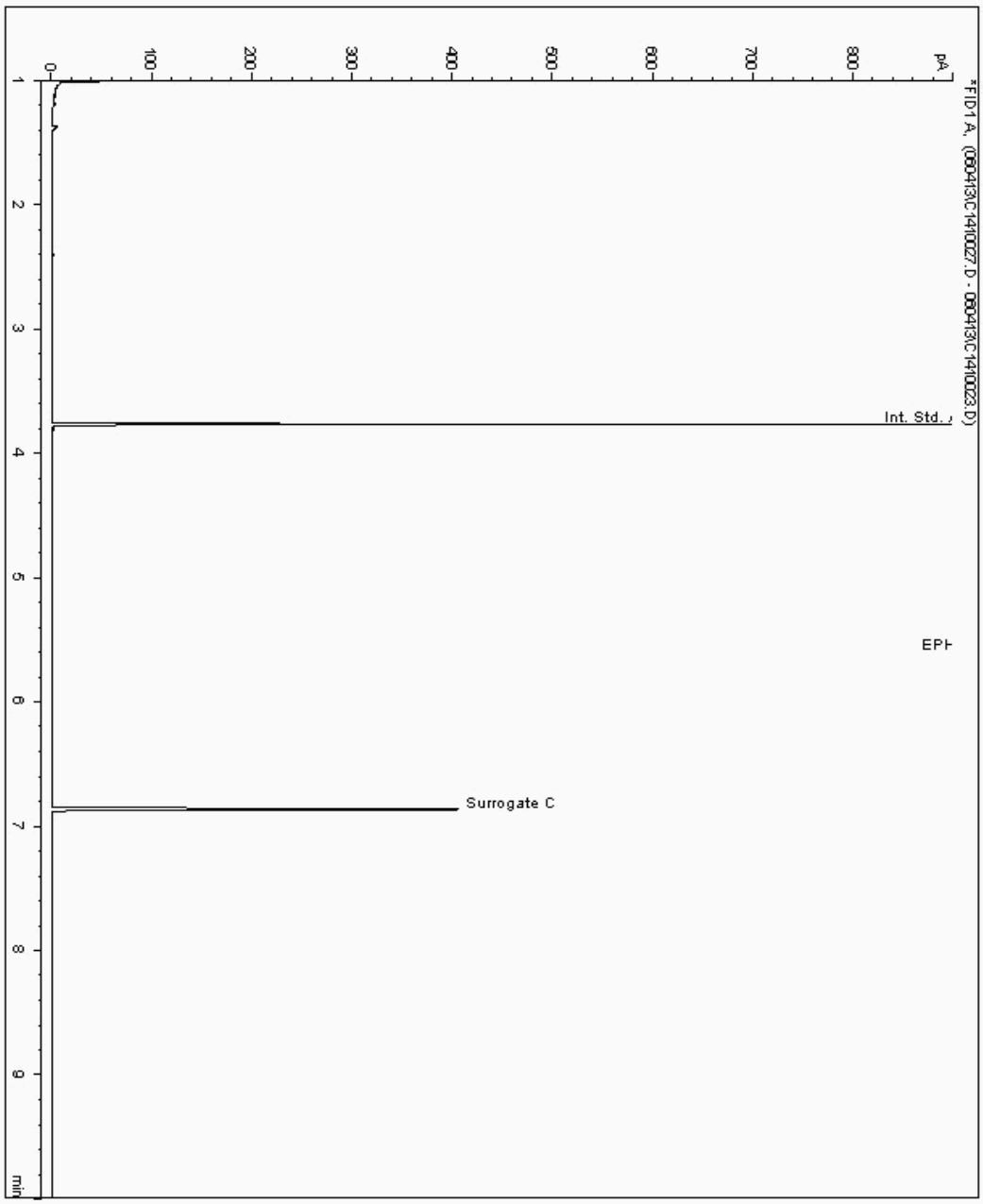
Analysis: Mineral Oil

Sample No : 7961435
Sample ID : 36

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7218990-7520358
Date Acquired : 04/06/13 19:05:06 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

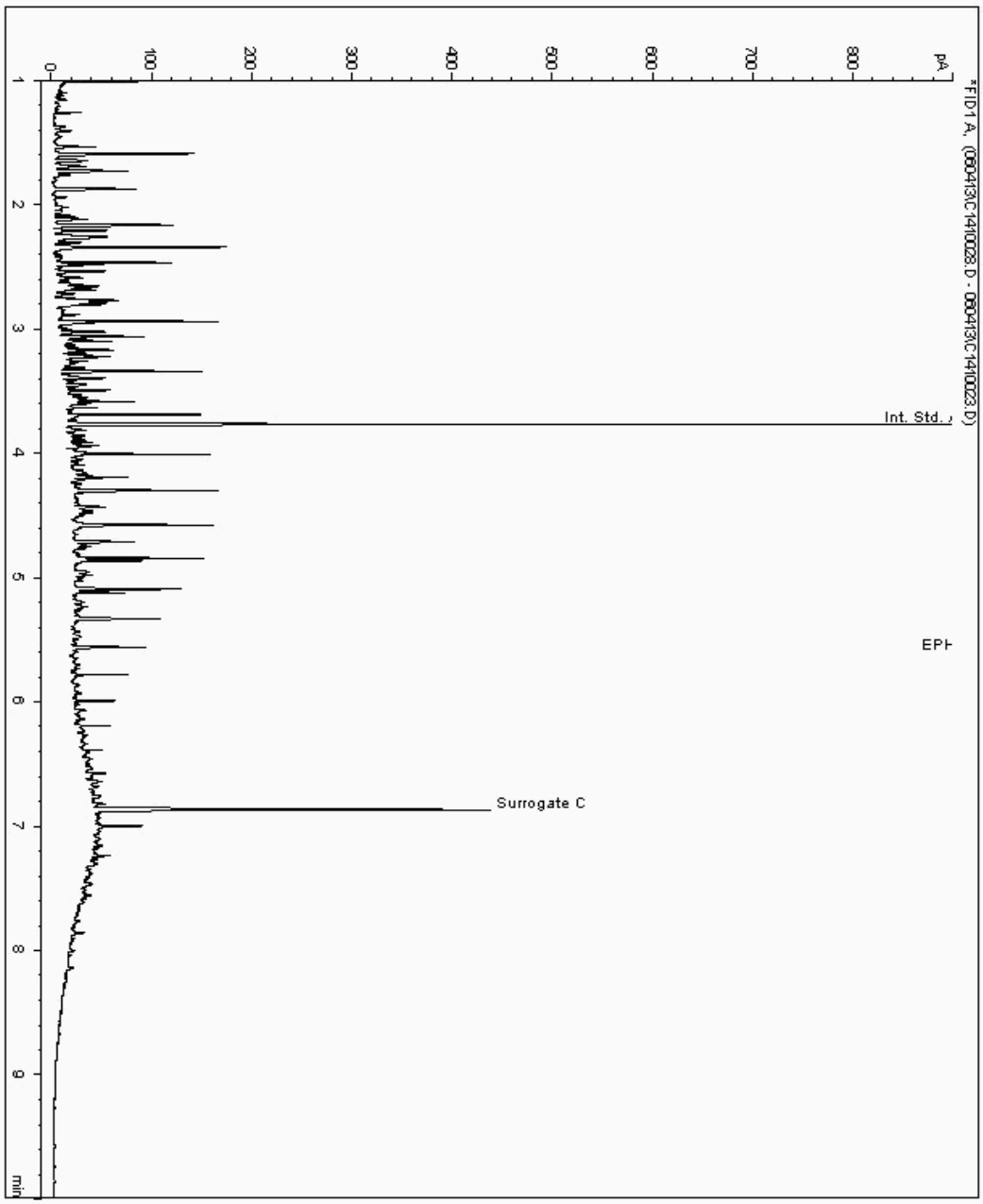
Analysis: Mineral Oil

Sample No : 7961997
Sample ID : 19

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7218991-7520359
Date Acquired : 04/06/13 19:29:46 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

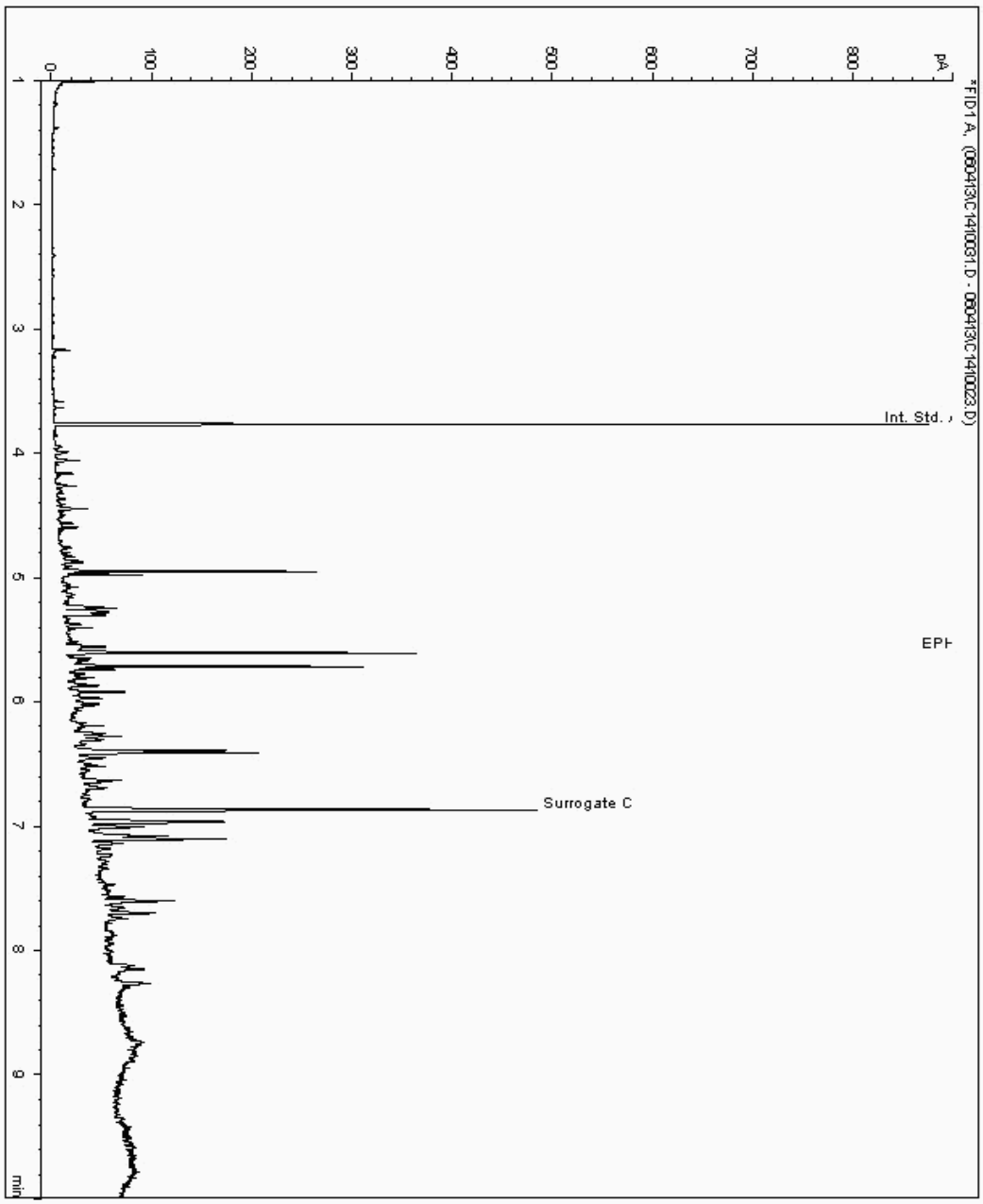
Analysis: Mineral Oil

Sample No : 7964791
Sample ID : 24

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7184110-7517644
Date Acquired : 04/06/13 20:44:24 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

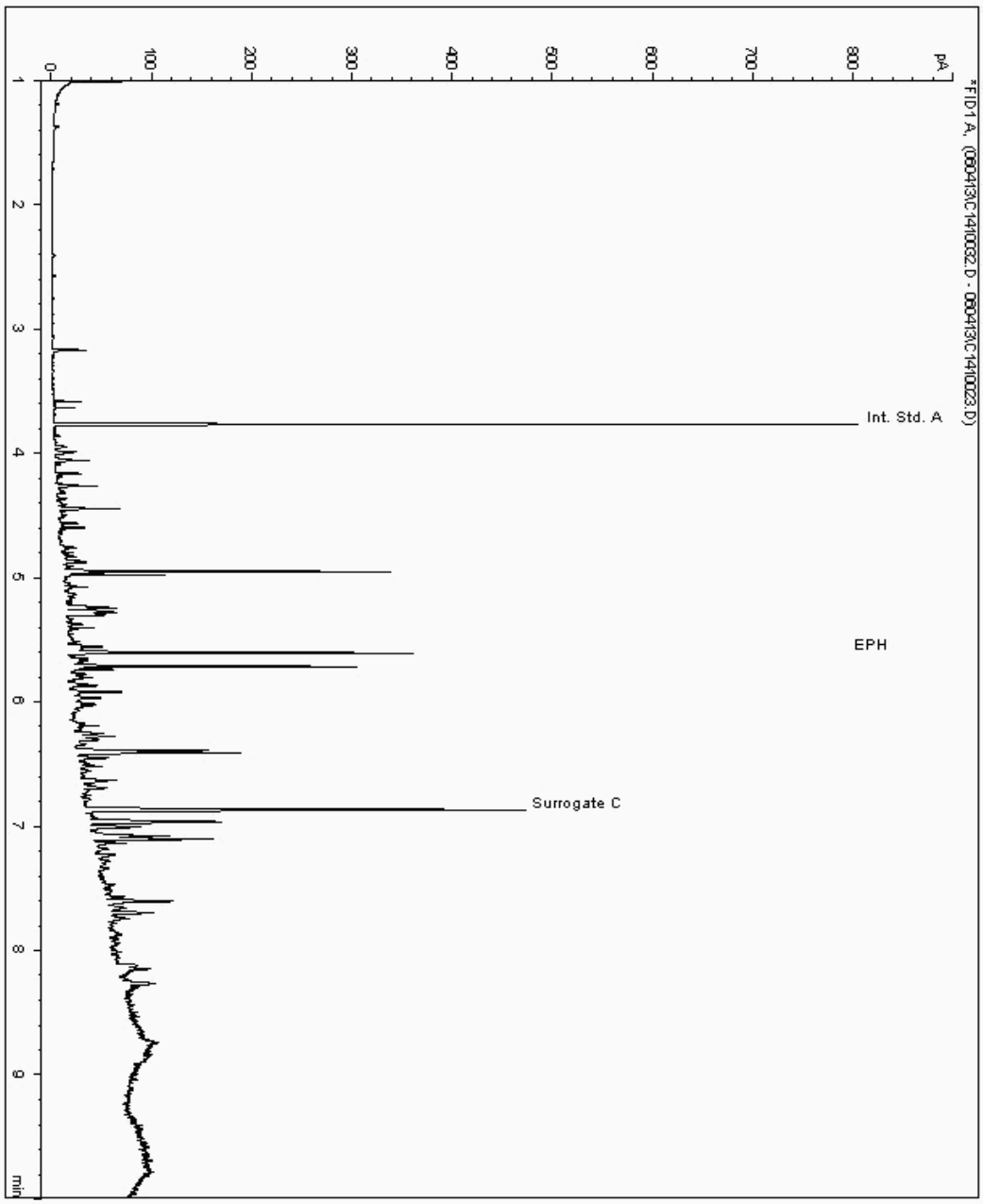
Analysis: Mineral Oil

Sample No : 7964905
Sample ID : 23

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7184084-7517650
Date Acquired : 04/06/13 21:09:34 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

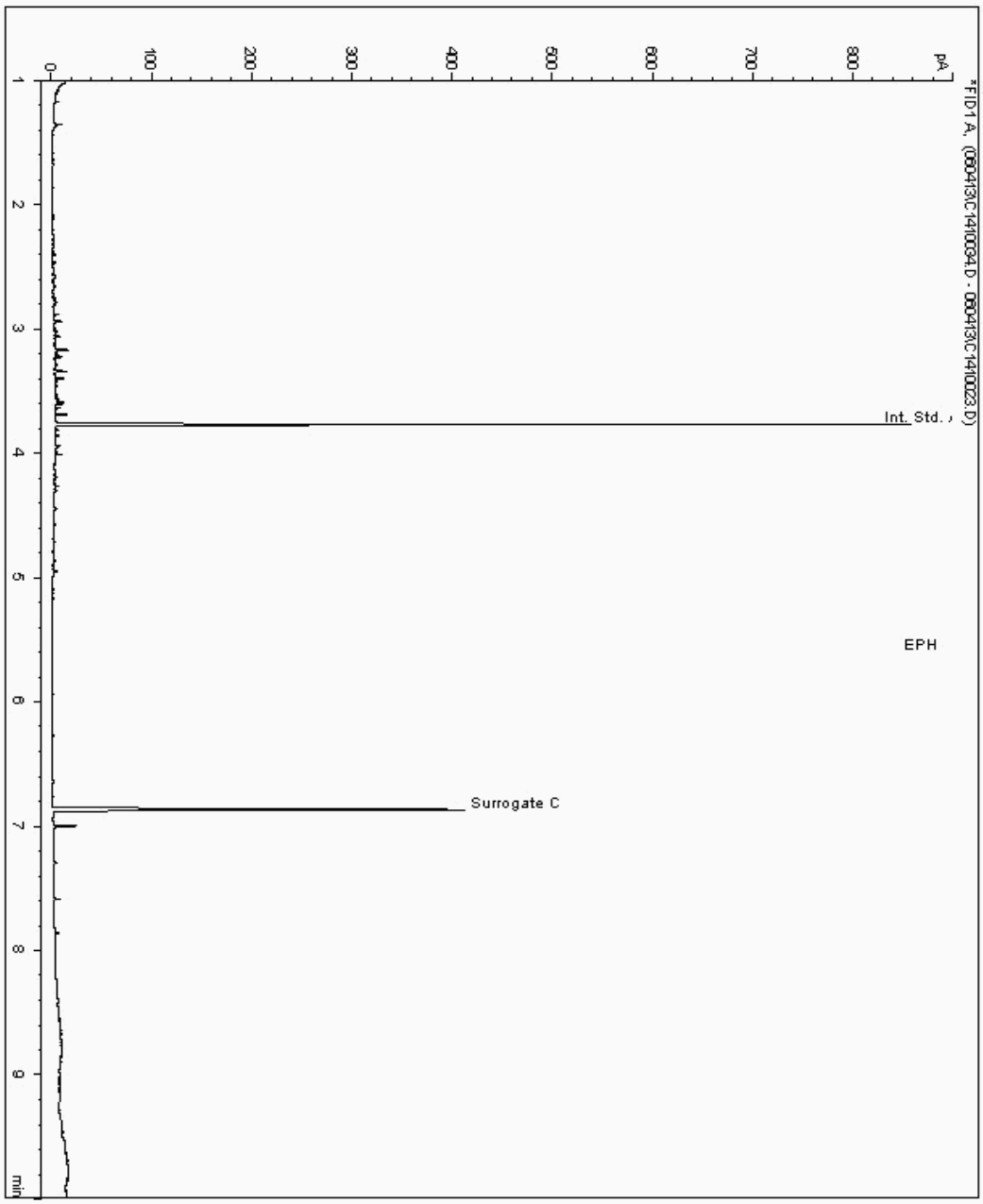
Analysis: Mineral Oil

Sample No : 7965605
Sample ID : 47

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7184049-7517673
Date Acquired : 04/06/13 22:00:20 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

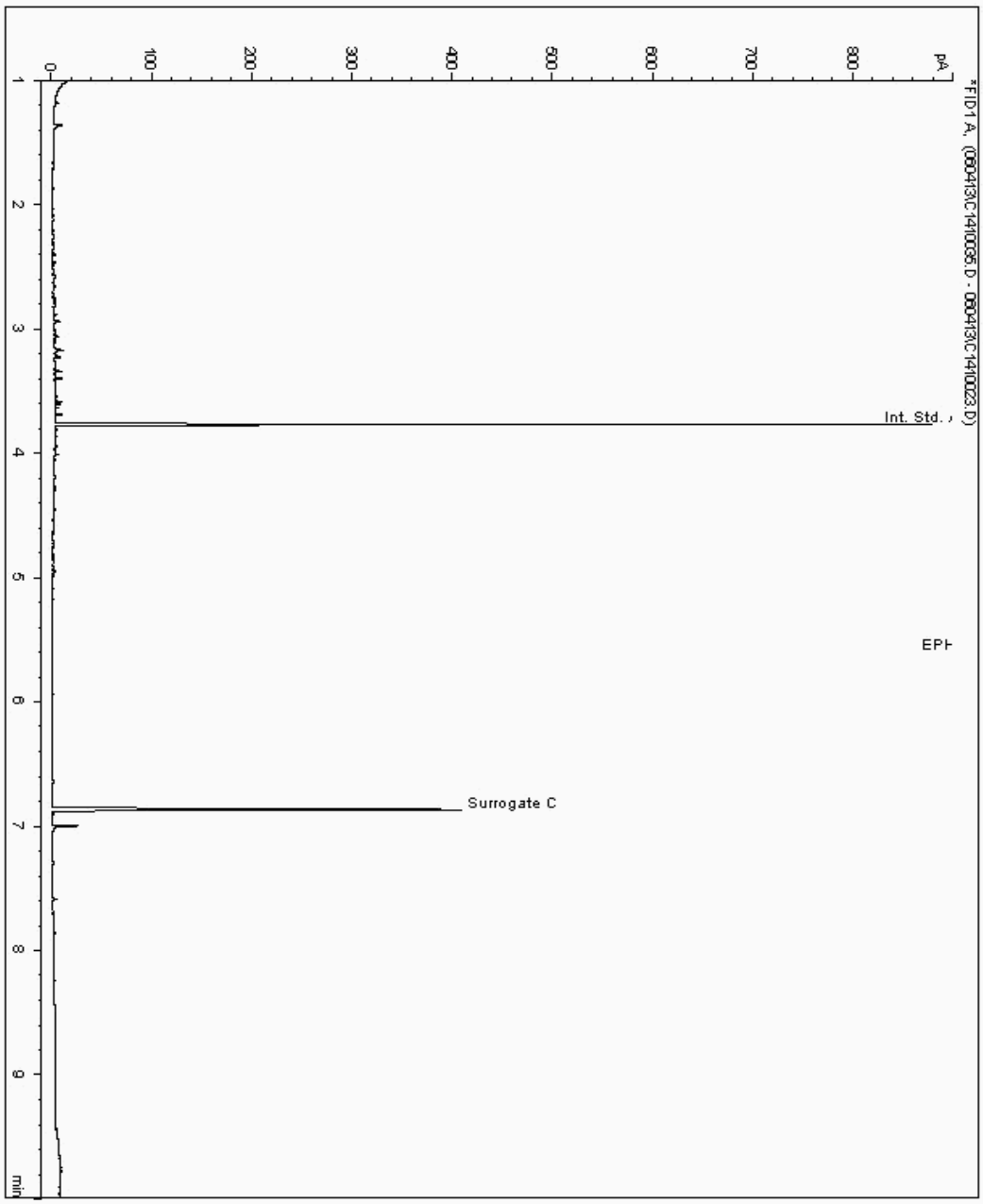
Analysis: Mineral Oil

Sample No : 7965658
Sample ID : 28

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7184079-7517685
Date Acquired : 04/06/13 22:25:46 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

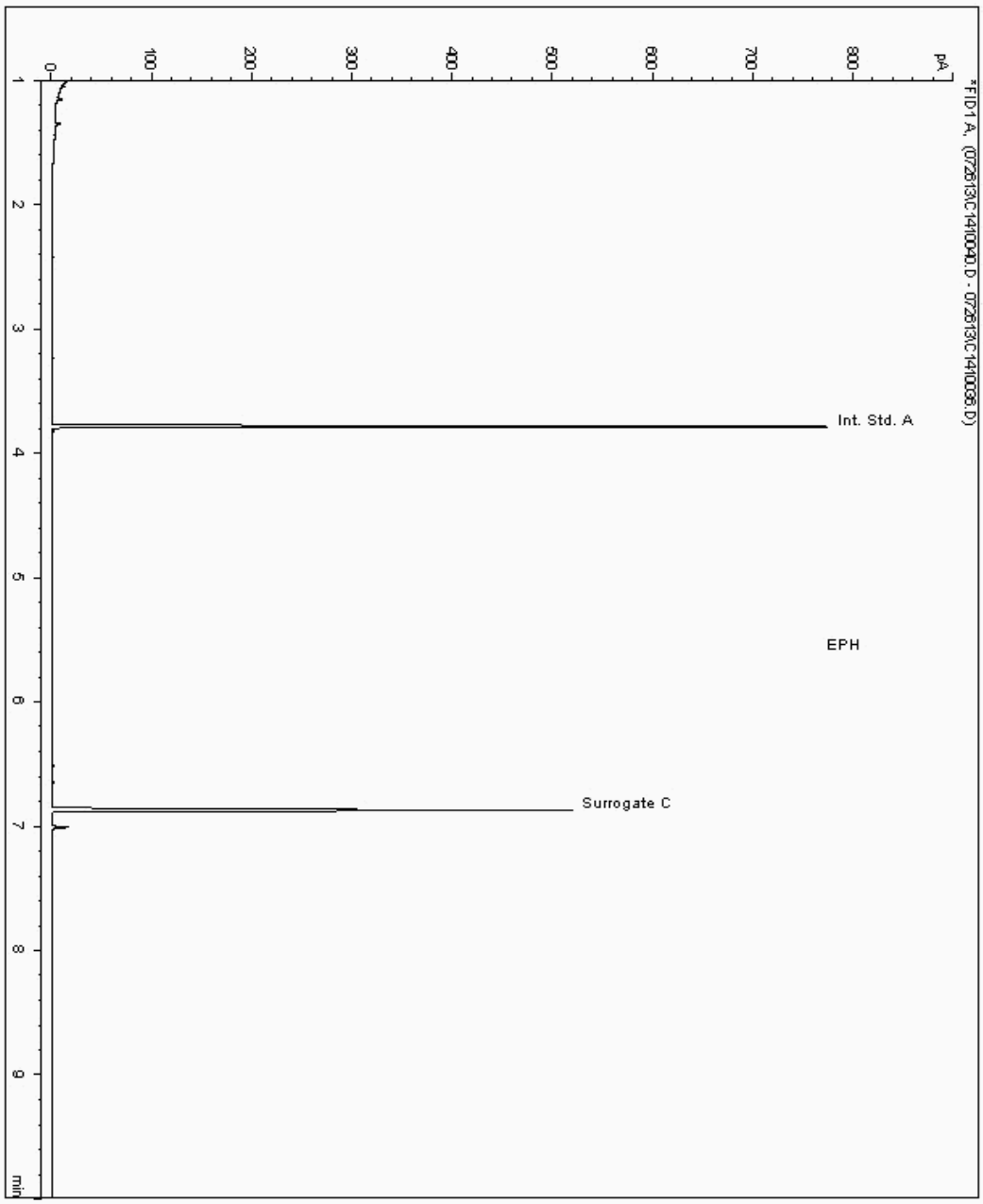
Analysis: Mineral Oil

Sample No : 7966254
Sample ID : 43

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7496659-7819362
Date Acquired : 27/07/13 01:25:54 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

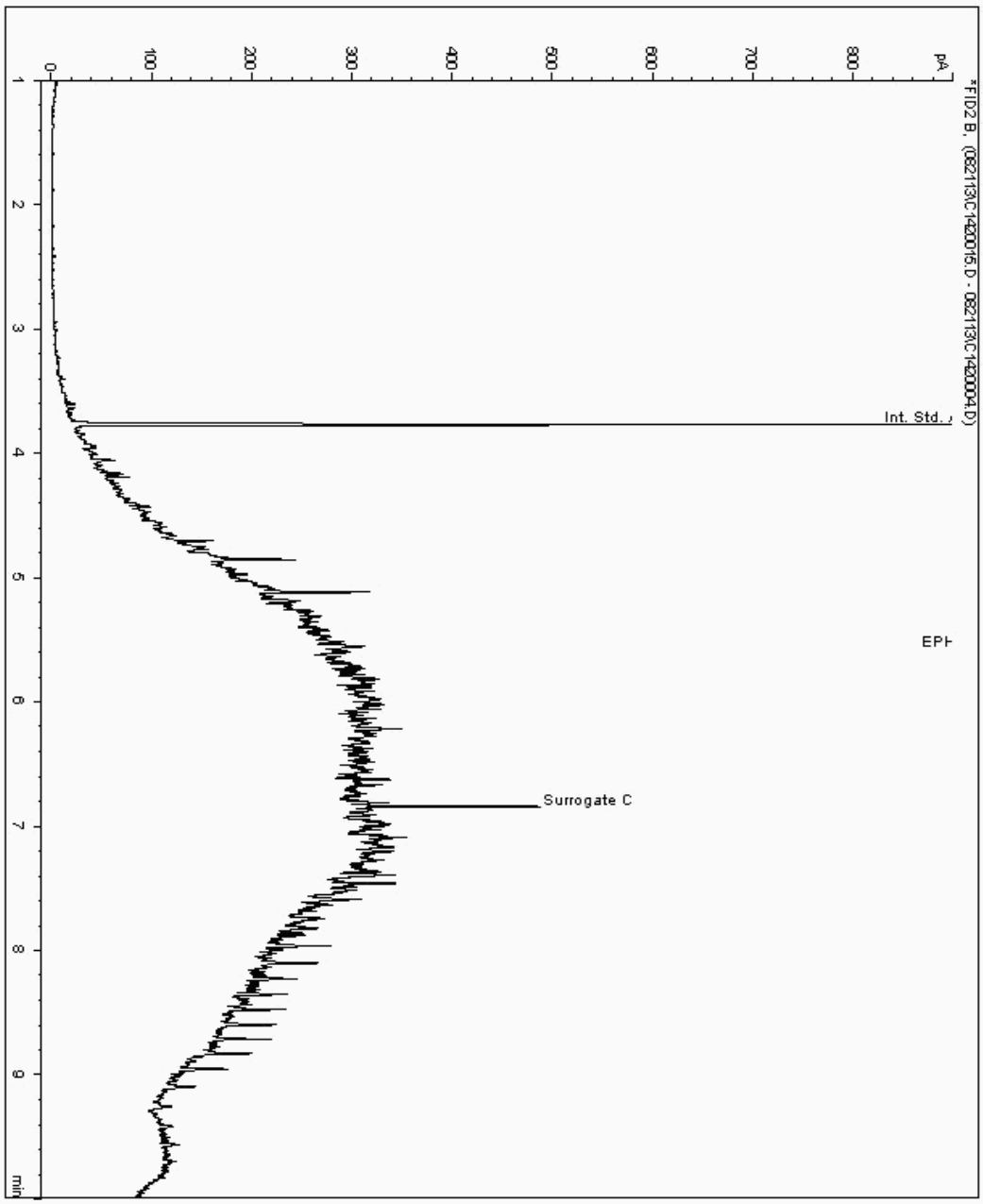
Analysis: Mineral Oil

Sample No : 7967297
Sample ID : 27

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7565644-7958101
Date Acquired : 21/08/13 12:48:46 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

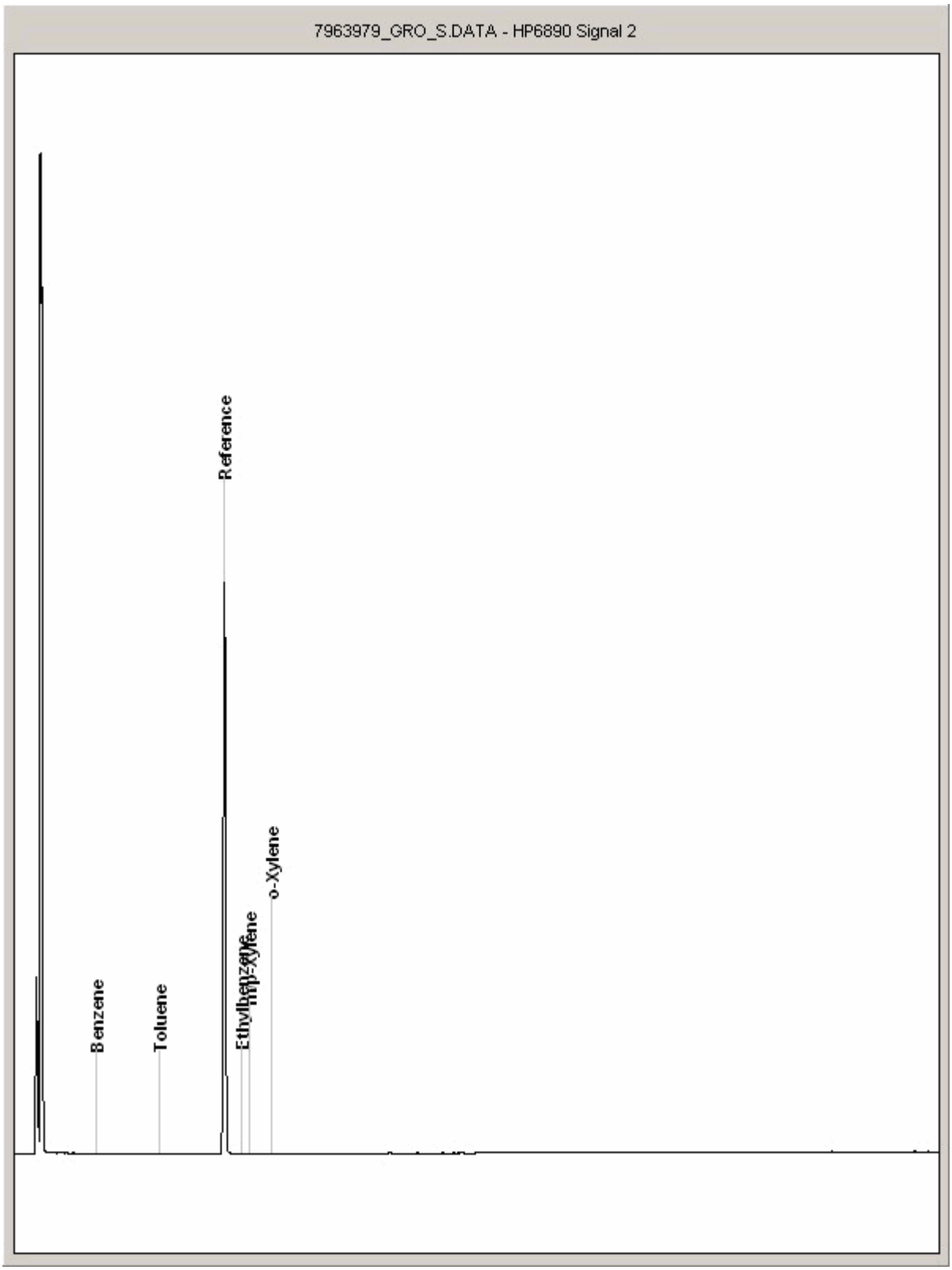
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7963979
Sample ID : 32

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

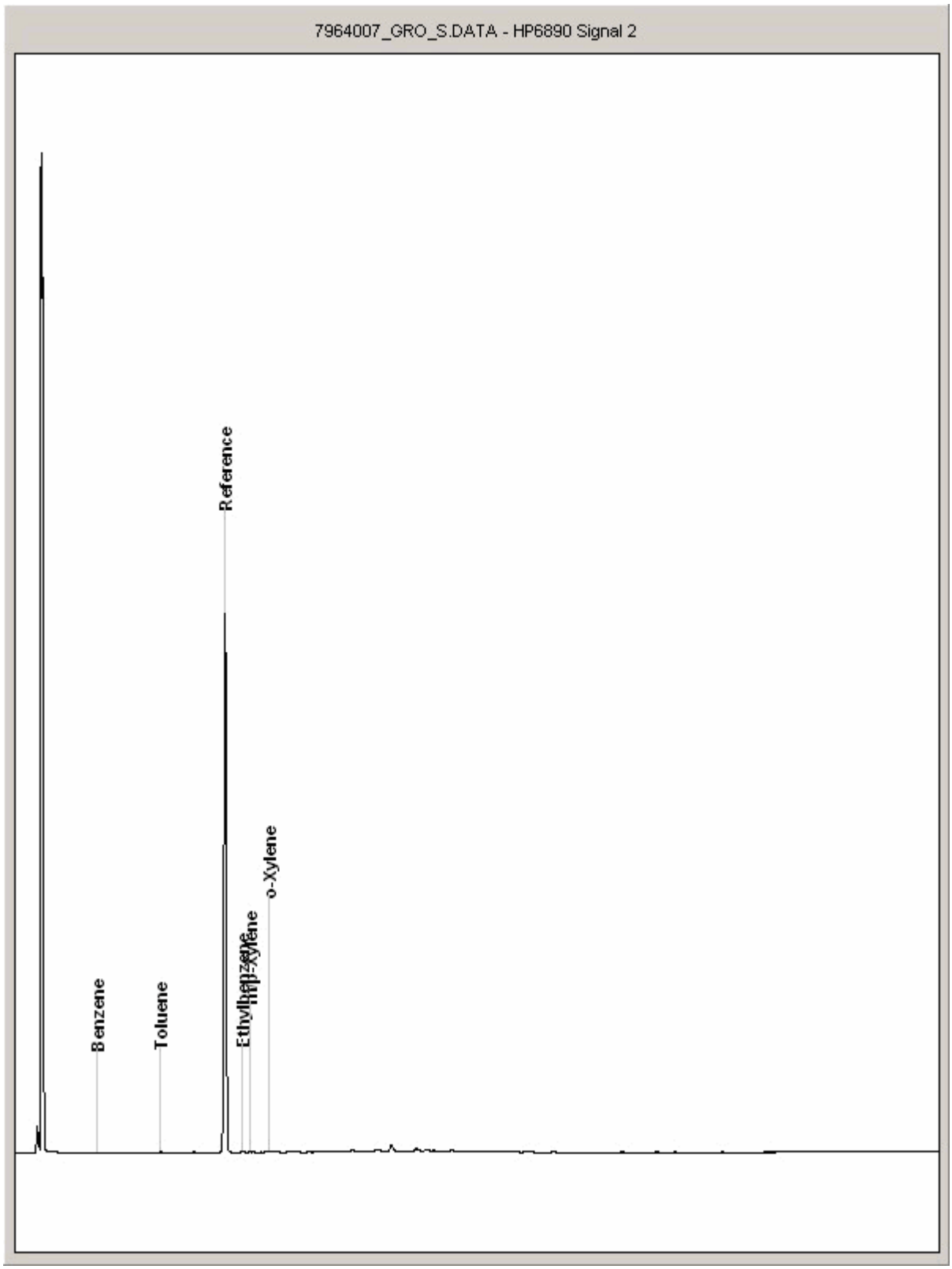
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7964007
Sample ID : 51

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

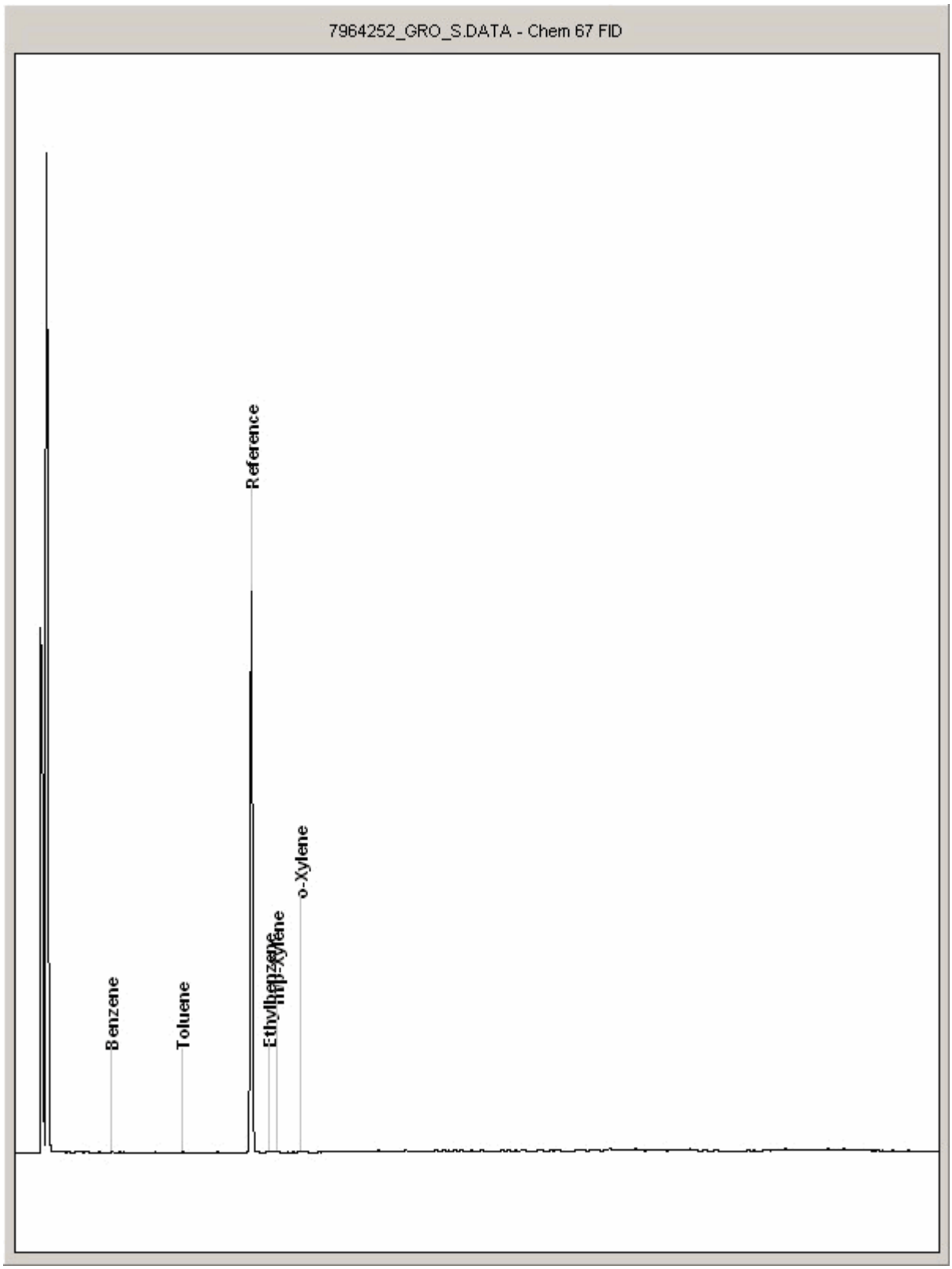
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7964252
Sample ID : 23

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

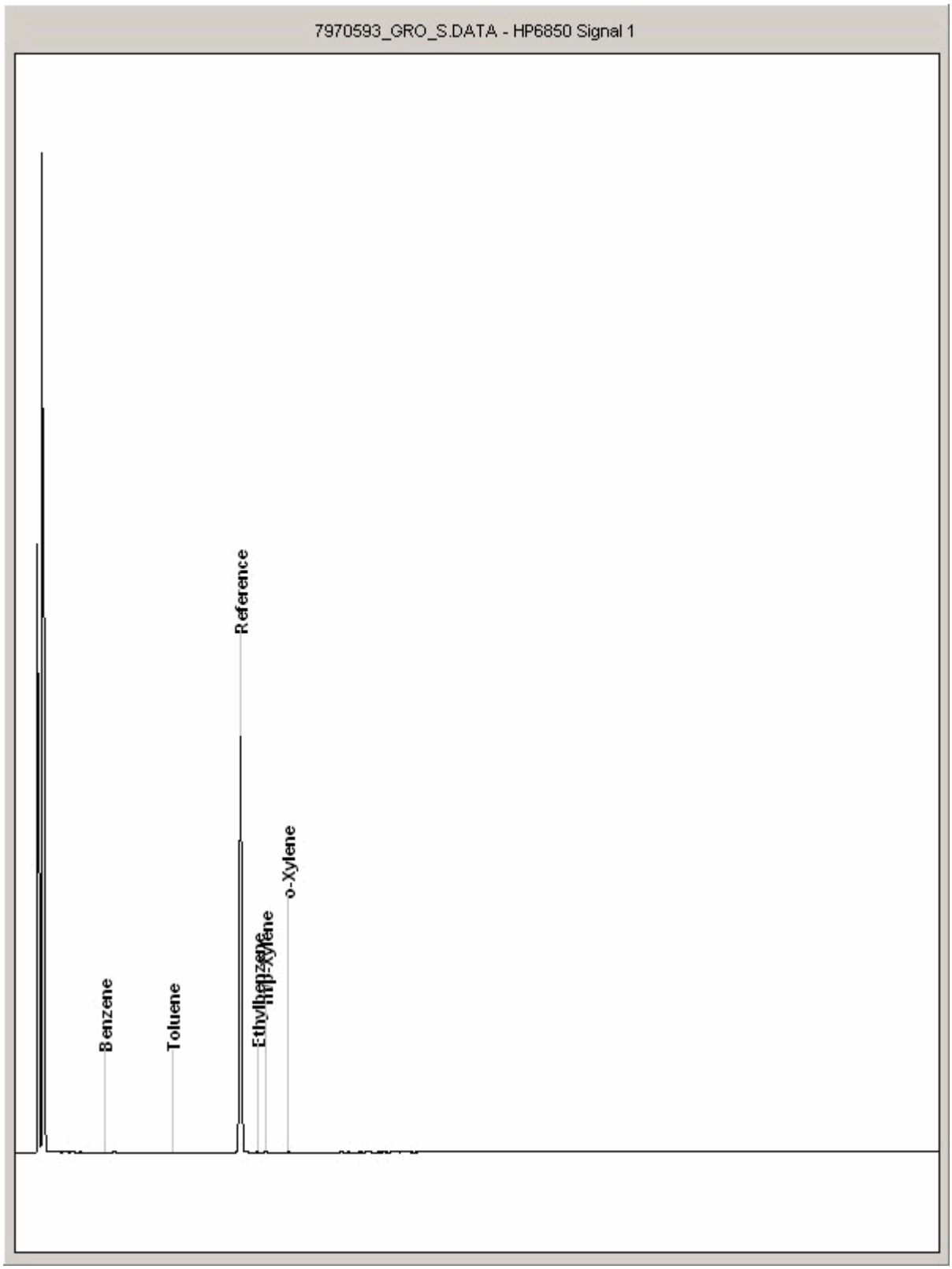
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970593
Sample ID : 27

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

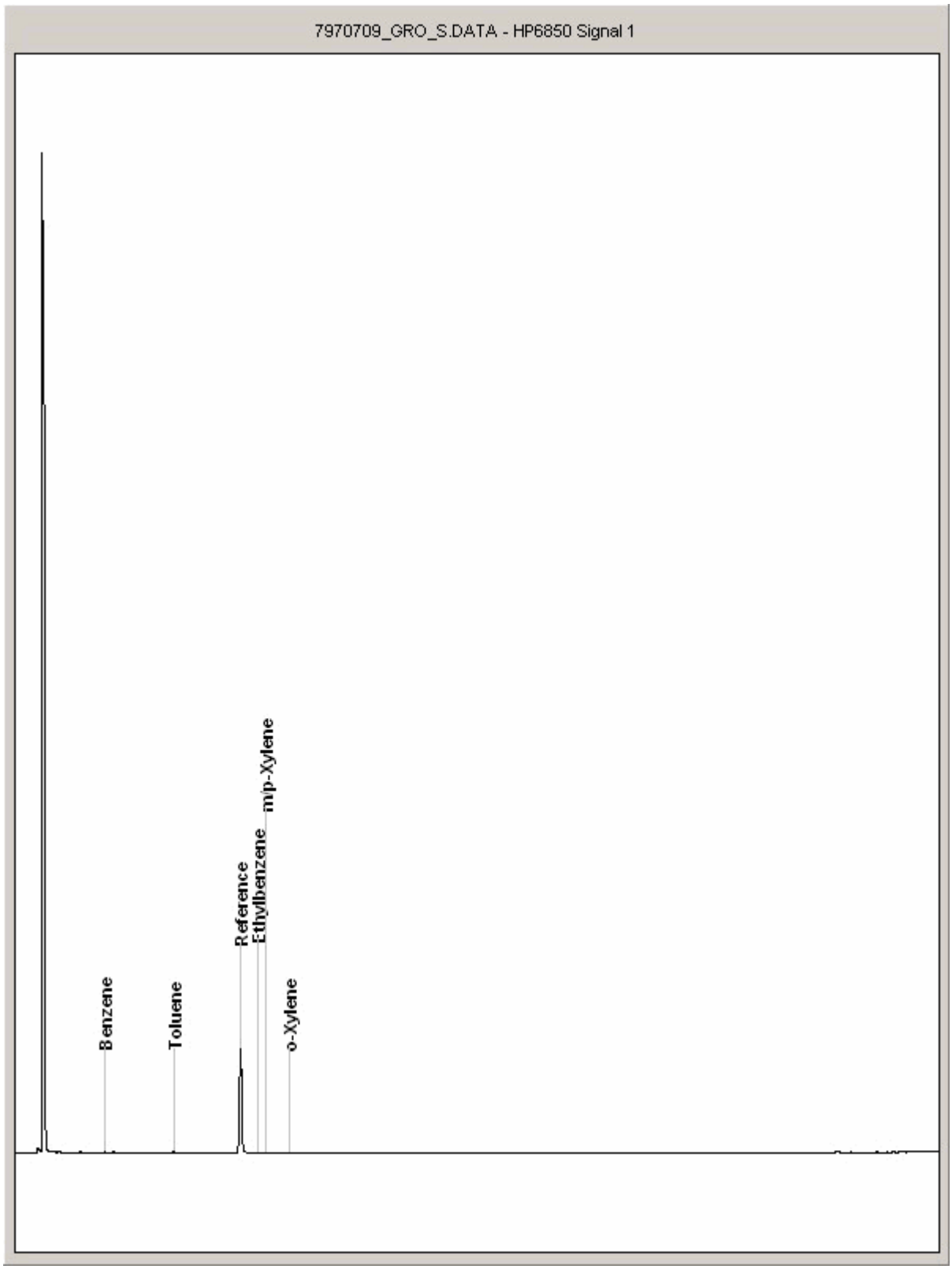
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970709
Sample ID : 52

Depth : 1.50 - 2.00



CERTIFICATE OF ANALYSIS

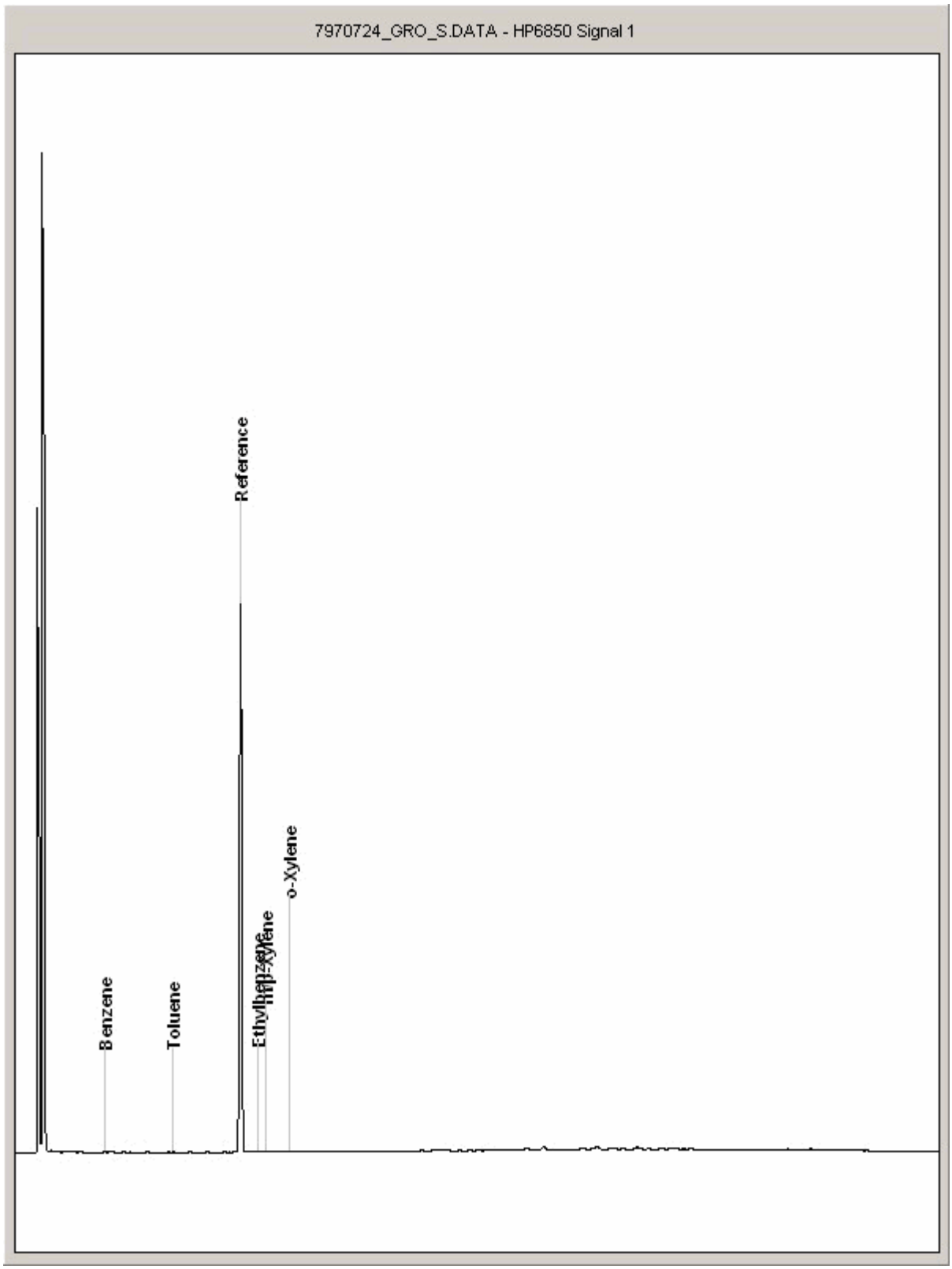
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970724
Sample ID : 35

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

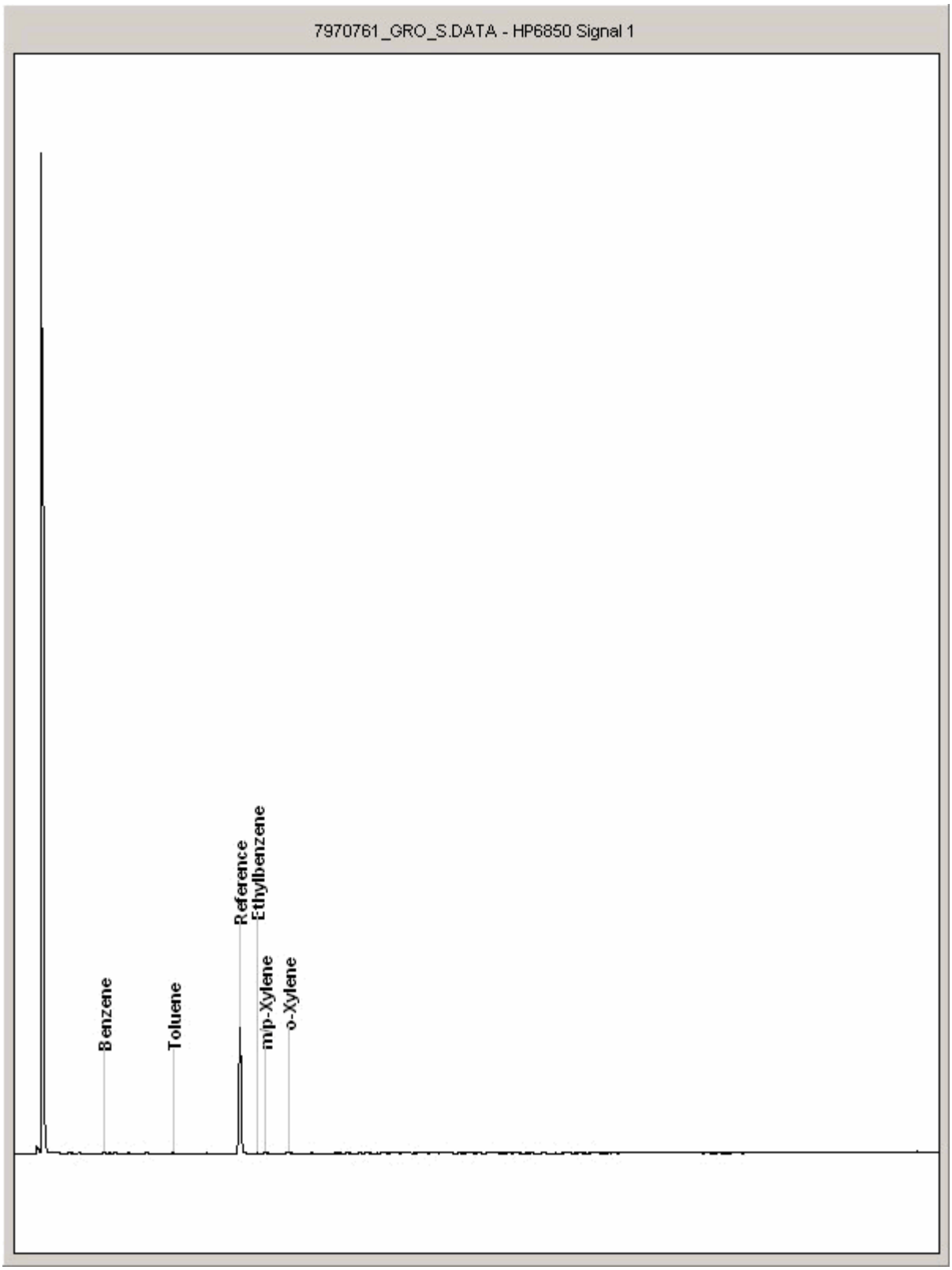
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970761
Sample ID : 43

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

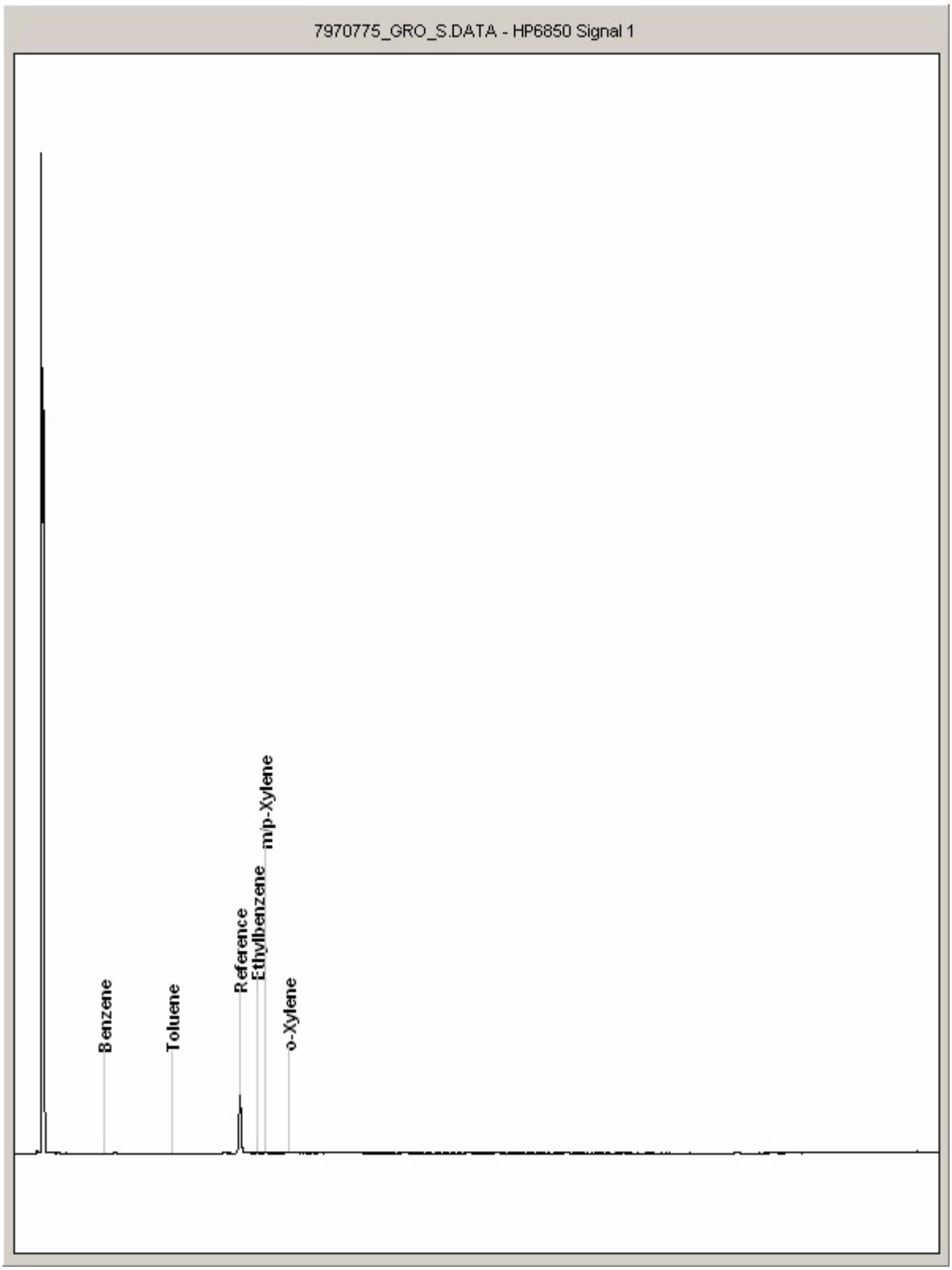
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970775
Sample ID : 36

Depth : 1.50 - 2.00



CERTIFICATE OF ANALYSIS

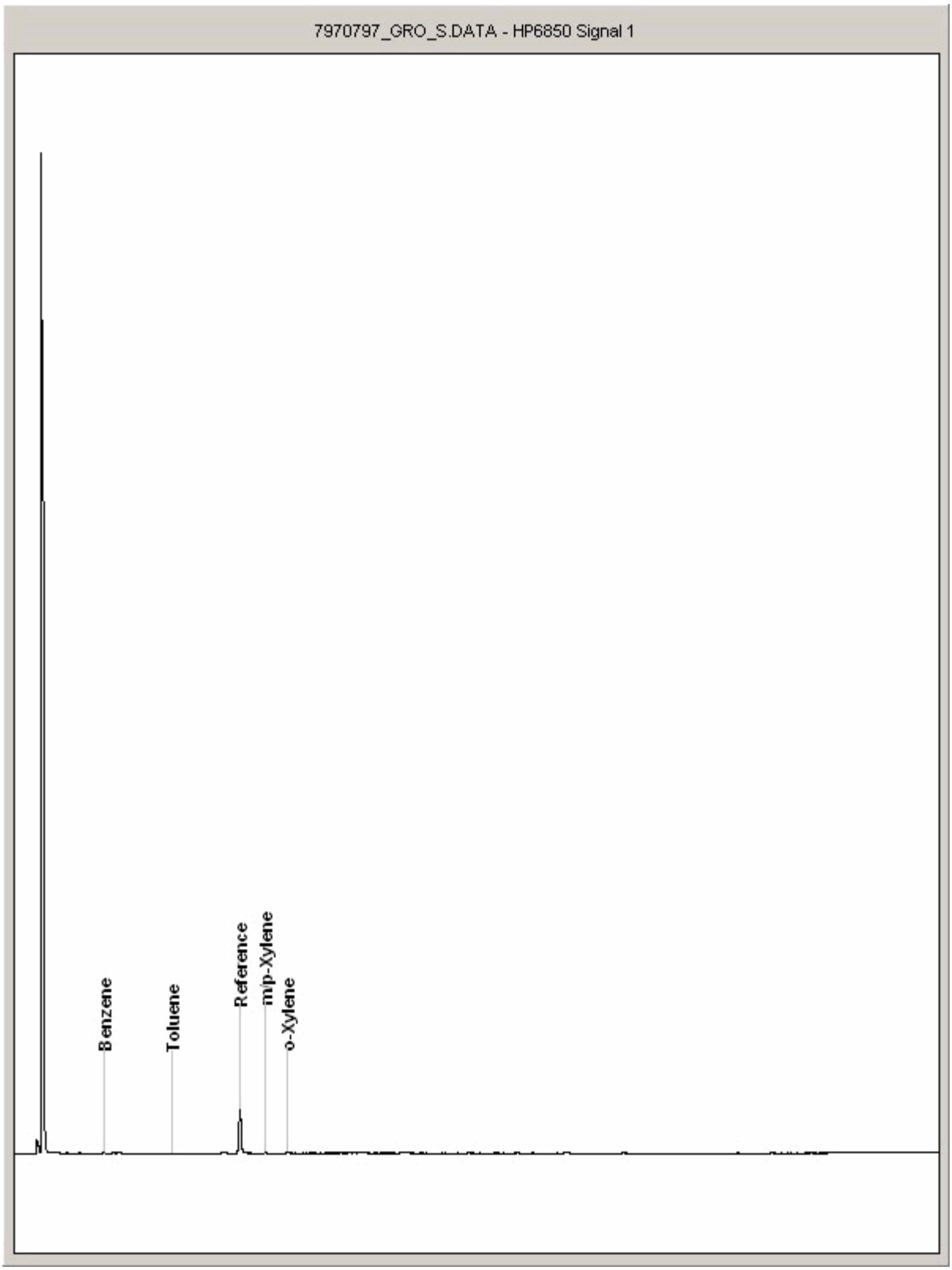
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7970797
Sample ID : 24

Depth : 1.50 - 2.00



CERTIFICATE OF ANALYSIS

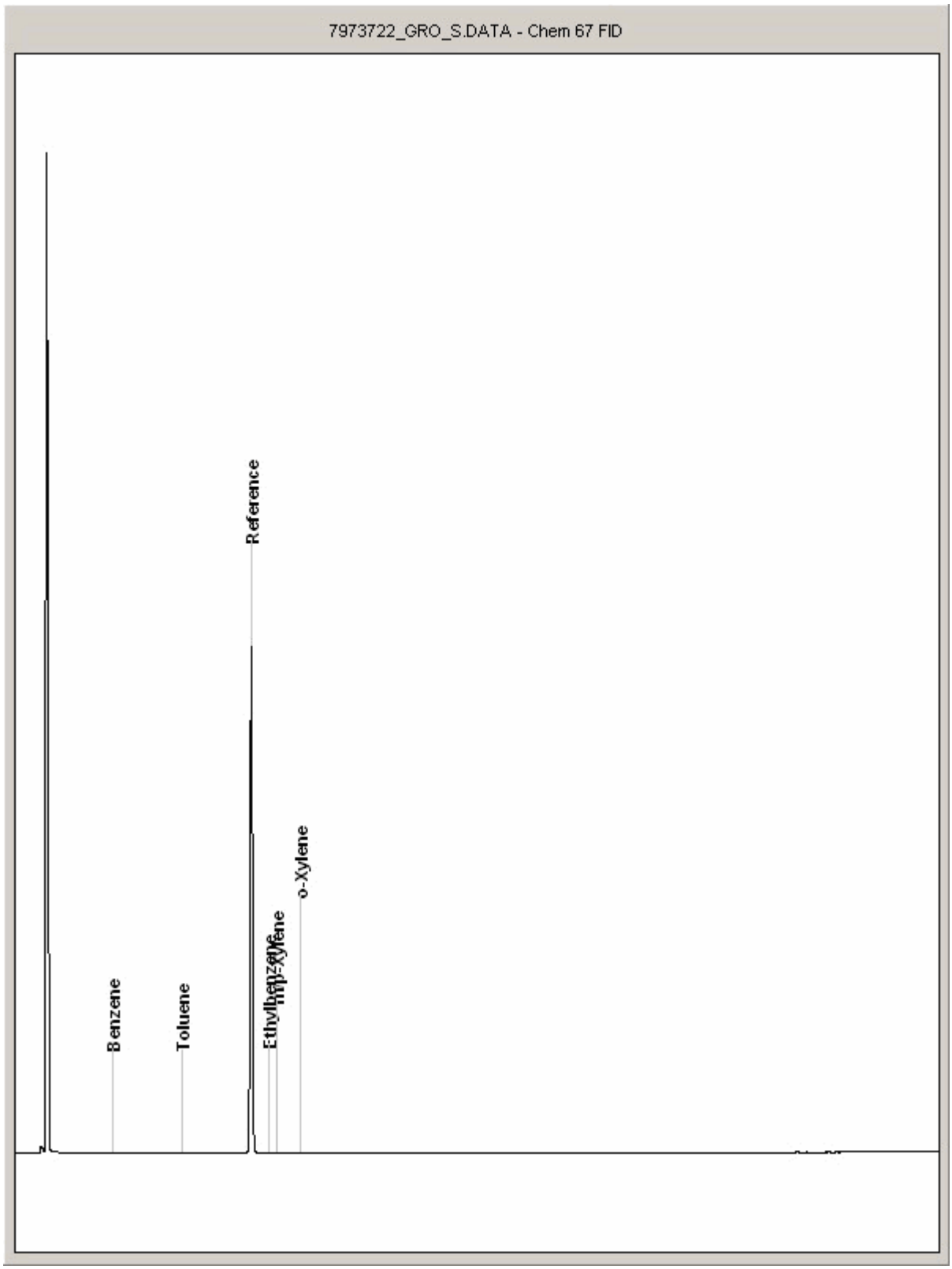
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973722
Sample ID : 40

Depth : 1.50 - 2.00



CERTIFICATE OF ANALYSIS

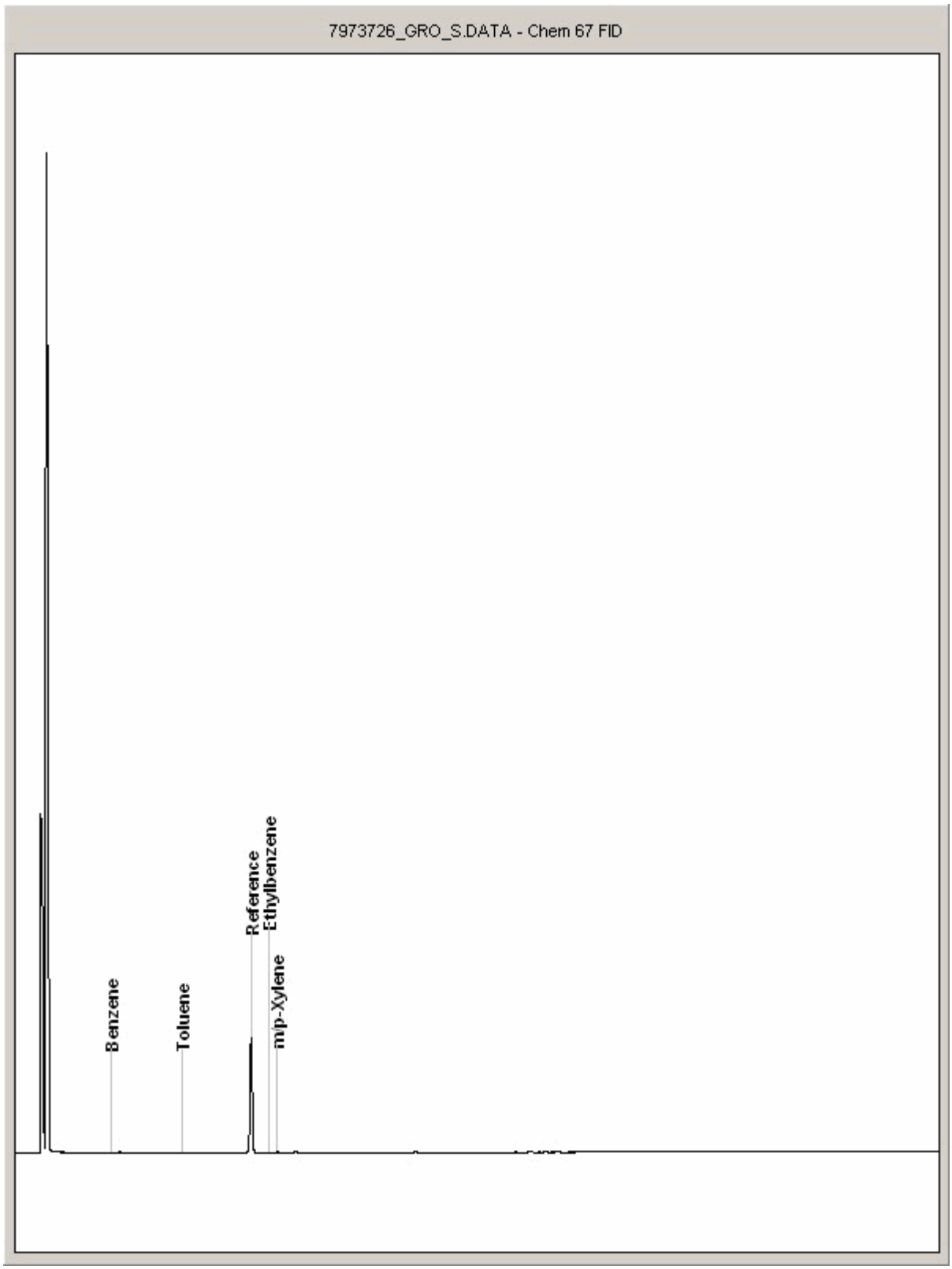
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973726
Sample ID : 28

Depth : 1.50 - 2.00



CERTIFICATE OF ANALYSIS

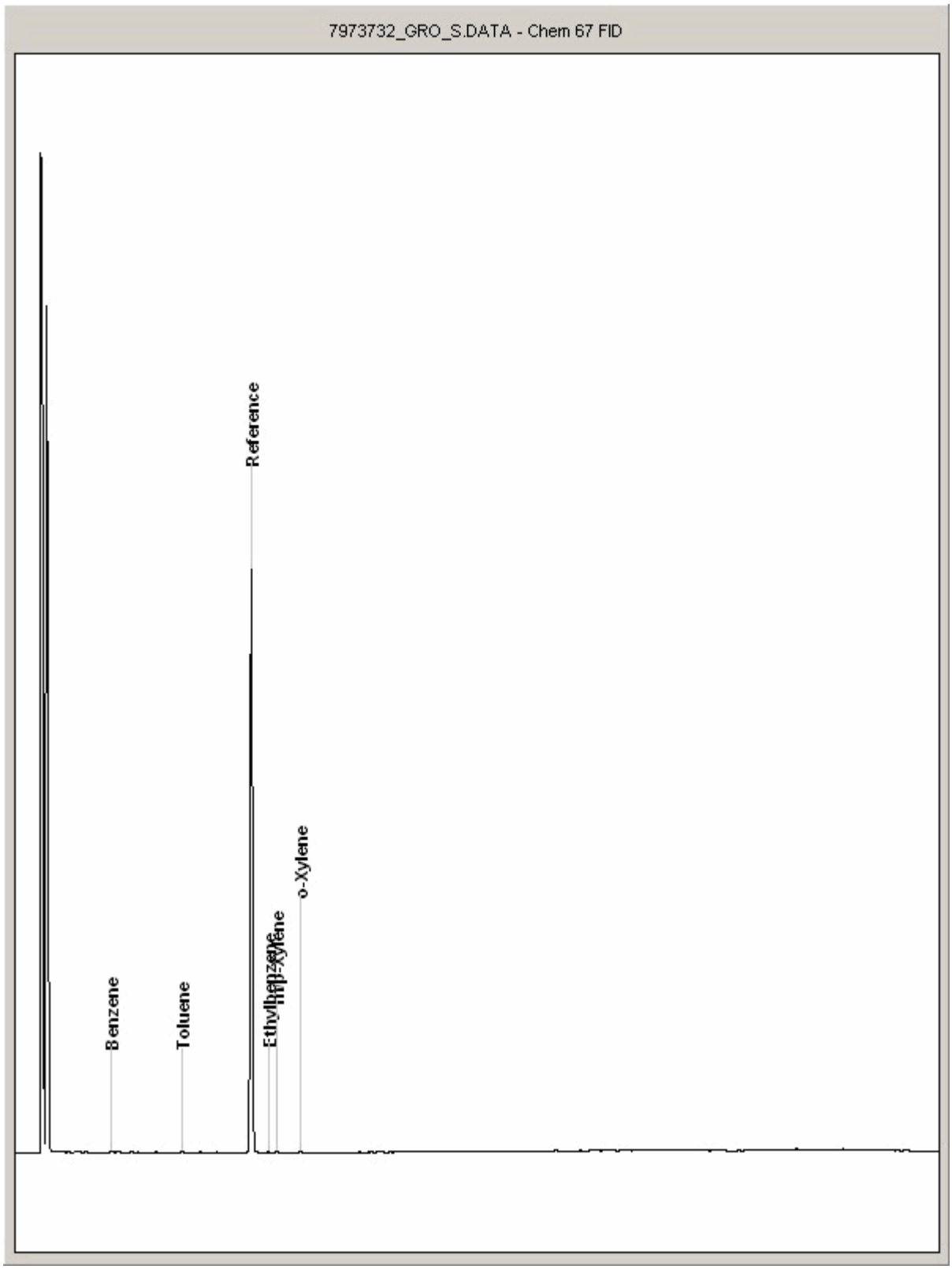
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973732
Sample ID : 47

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

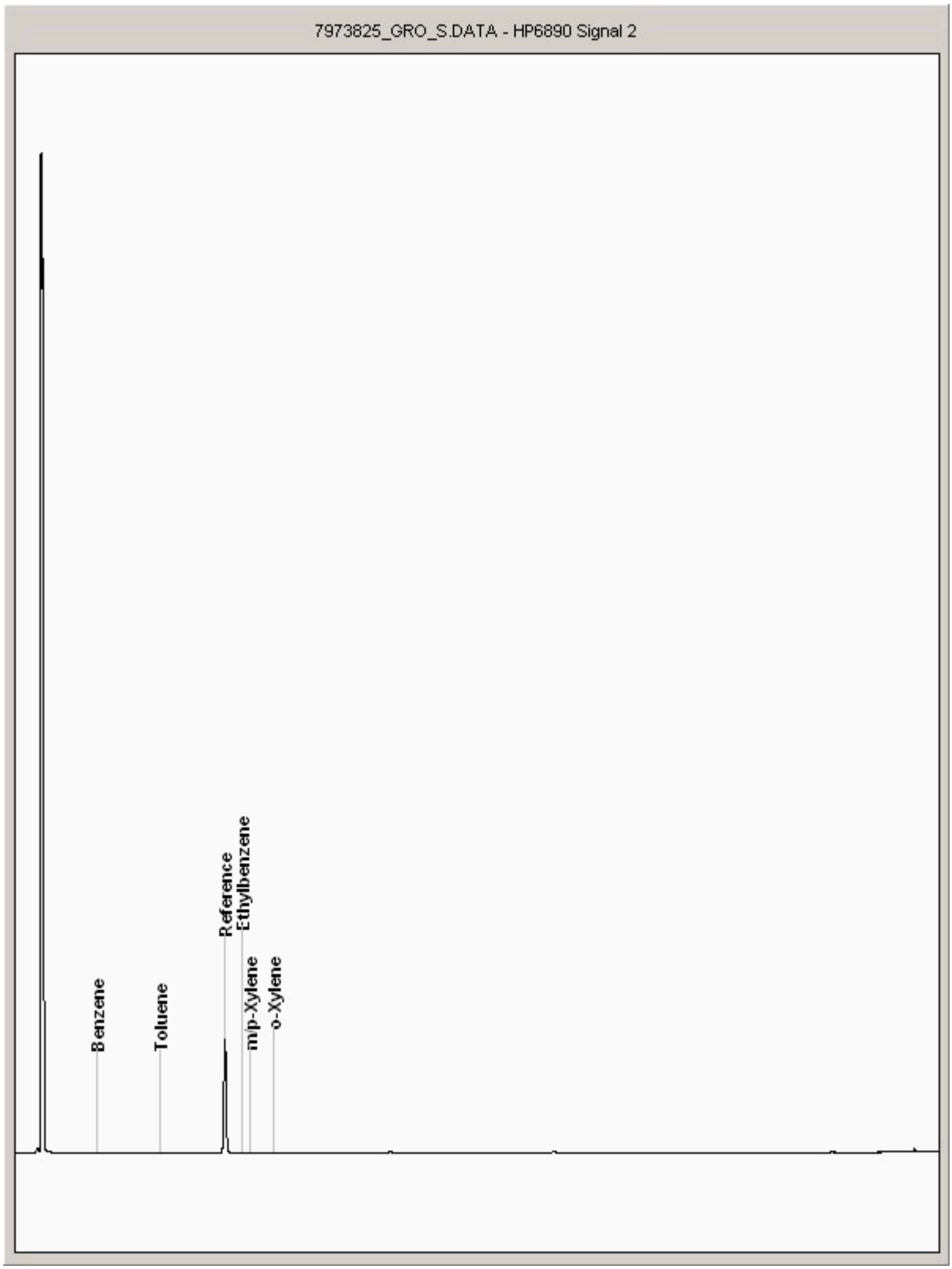
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973825
Sample ID : 19

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

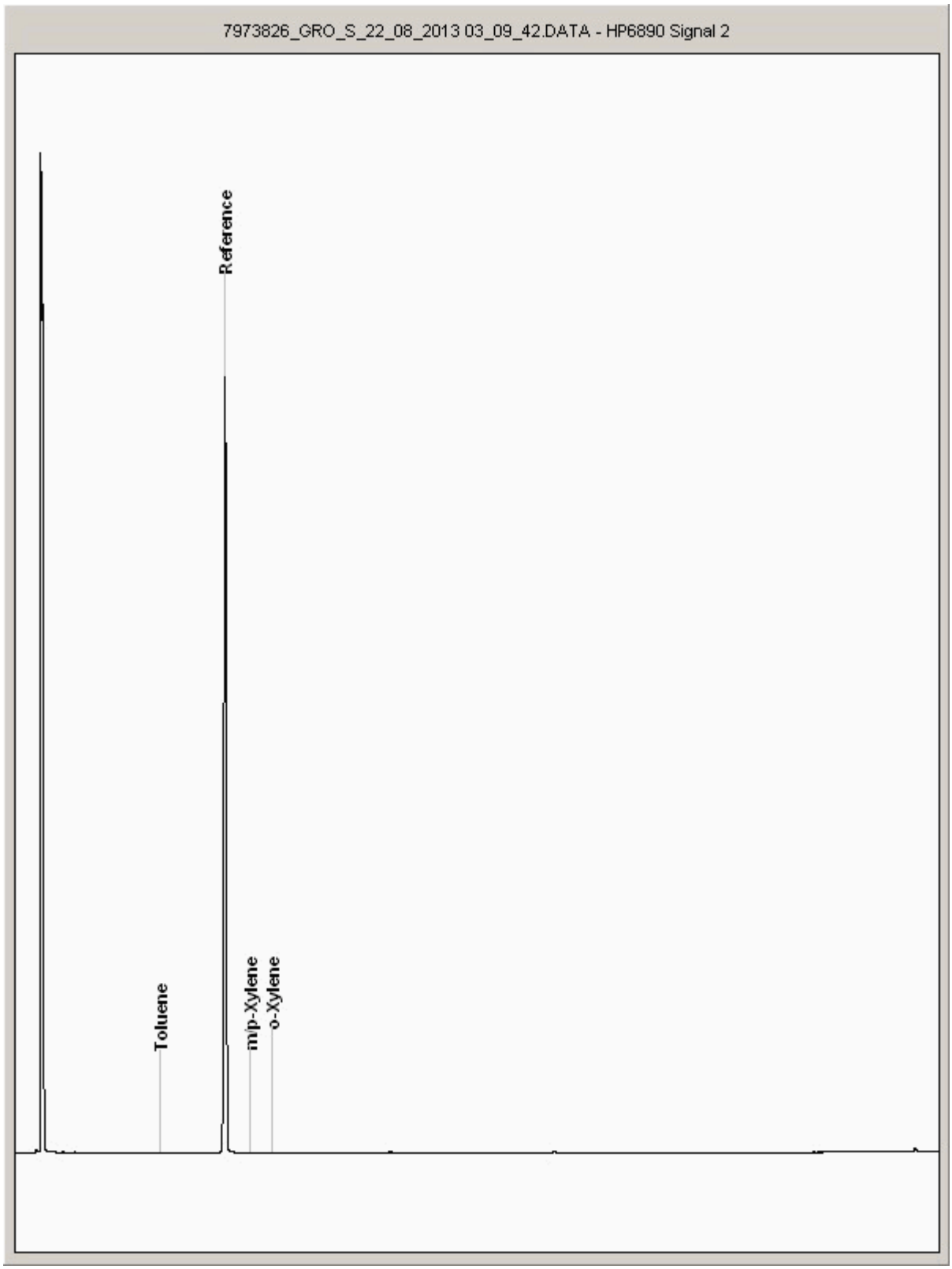
SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973826
Sample ID : 20

Depth : 1.50 - 2.00



SDG:	130810-55	**Location:**	Dublin Port	**Order Number:**	
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239267
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

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 2 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. ALcontrol Laboratories 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 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.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
§	**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 Alcontrol Laboratories (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 Alcontrol Laboratories (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.

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

Priority Geotechnical Ltd
Unit 12
Owenacurra Business Park
Midleton
Co Cork
Co Cork

Attention: Colette Kelly

CERTIFICATE OF ANALYSIS

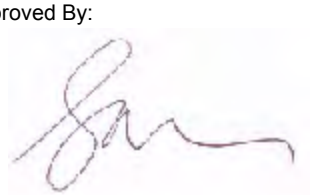
Date:	23 August 2013
Customer:	D_PRIORGEOT_CRK
Sample Delivery Group (SDG):	130810-49
Your Reference:	PH13003B
Location:	Dublin Port
Report No:	239241

We received 2 samples on Friday August 09, 2013 and 2 of these samples were scheduled for analysis which was completed on Friday August 23, 2013. 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.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

ALcontrol Laboratories is a trading division of ALcontrol UK Limited
Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No.

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7912462	31		0.50 - 1.00	09/08/2013
7912464	32		1.50 - 2.00	09/08/2013

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

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)						Customer Sample Reference						AGS Reference						Depth (m)						Container					
			7912462					7912464	31					32							0.50 - 1.00					1.50 - 2.00	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 2	X			X																										
Anions by Kone (w)	All	NDPs: 0 Tests: 2		X			X																									
CEN 2:1 Readings	All	NDPs: 0 Tests: 2		X			X																									
CEN 8:1 Readings	All	NDPs: 0 Tests: 2		X			X																									
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2		X			X																									
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2		X			X																									
Fluoride	All	NDPs: 0 Tests: 2		X			X																									
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2			X			X																								
Loss on Ignition in soils	All	NDPs: 0 Tests: 2	X			X																										
Mercury Dissolved	All	NDPs: 0 Tests: 2		X			X																									
Mineral Oil	All	NDPs: 0 Tests: 2	X			X																										
PAH Value of soil	All	NDPs: 0 Tests: 2	X			X																										
PCBs by GCMS	All	NDPs: 0 Tests: 2	X			X																										
pH	All	NDPs: 0 Tests: 2		X			X																									
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2		X			X																									

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container					
			7912462	7912464	31	32			0.50 - 1.00	1.50 - 2.00	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)
Sample description	All	NDPs: 0 Tests: 2	X			X										
Total Dissolved Solids	All	NDPs: 0 Tests: 2		X											X	
Total Organic Carbon	All	NDPs: 0 Tests: 2	X			X										

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
7912462	31	0.50 - 1.00	Grey	Silt Loam	0.063 - 0.1 mm	None	None
7912464	32	1.50 - 2.00	Grey	Loamy Sand	0.1 - 2 mm	None	None

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	31	32				
			Depth (m)	0.50 - 1.00	1.50 - 2.00				
			Sample Type	Soil/Solid	Soil/Solid				
			Date Sampled	09/08/2013	09/08/2013				
			Sampled Time	.	.				
			Date Received	09/08/2013	09/08/2013				
			SDG Ref	130810-49	130810-49				
			Lab Sample No.(s)	7912462	7912464				
			AGS Reference						
Loss on ignition	<0.7 %	TM018		12 M	1.96 M				
Mineral oil >C10-C40	<1 mg/kg	TM061		948 #	46.2 #				
Organic Carbon, Total	<0.2 %	TM132		2.23 #	0.494 #				
pH	1 pH Units	TM133		8.51 M	8.4 M				
PCB congener 28	<3 µg/kg	TM168		42.1 M	<3 M				
PCB congener 52	<3 µg/kg	TM168		17.6 M	<3 M				
PCB congener 101	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 118	<3 µg/kg	TM168		8.73 M	<3 M				
PCB congener 138	<3 µg/kg	TM168		9.77 M	<3 M				
PCB congener 153	<3 µg/kg	TM168		8.24 M	<3 M				
PCB congener 180	<3 µg/kg	TM168		5.58 M	<3 M				
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		92.1	<21				
ANC @ pH 4	<0.03 mol/kg	TM182		1.7	1.99				
ANC @ pH 6	<0.03 mol/kg	TM182		0.335	0.439				
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	<10				

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	31	32
			Depth (m)	0.50 - 1.00	1.50 - 2.00
			Sample Type	Soil/Solid	Soil/Solid
			Date Sampled	09/08/2013	09/08/2013
			Sampled Time	.	.
			Date Received	09/08/2013	09/08/2013
			SDG Ref	130810-49	130810-49
			Lab Sample No.(s)	7912462	7912464
			AGS Reference		
GRO Surrogate % recovery**	%	TM089		61	13
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 M	<5 M
Benzene	<10 µg/kg	TM089		<10 M	<10 M
Toluene	<2 µg/kg	TM089		<2 M	3.63 M
Ethylbenzene	<3 µg/kg	TM089		<3 M	<3 M
m,p-Xylene	<6 µg/kg	TM089		<6 M	<6 M
o-Xylene	<3 µg/kg	TM089		<3 M	<3 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.324	**Moisture Content Ratio (%)**	84.8
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	54.1
Particle Size <4mm	>95%		

Case	
SDG	130810-49
Lab Sample Number(s)	7912462
Sampled Date	09-Aug-2013
Customer Sample Ref.	31
Depth (m)	0.50 - 1.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	2.23	3	5	6
Loss on Ignition (%)	12	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	0.0921	1	-	-
Mineral Oil (mg/kg)	948	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.51	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.335	-	-	-
ANC to pH 4 (mol/kg)	1.7	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0199	0.0055	0.0399	0.0657	0.5	2	25
Barium	0.0893	0.0361	0.179	0.4	20	100	300
Cadmium	0.00902	0.000558	0.0181	0.0119	0.04	1	5
Chromium	0.0441	0.00872	0.0883	0.113	0.5	10	70
Copper	0.00575	0.00361	0.0115	0.0377	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.77	0.204	1.54	2.46	0.5	10	30
Nickel	0.00631	0.00387	0.0126	0.0406	0.4	10	40
Lead	0.00695	0.000863	0.0139	0.0132	0.5	10	50
Antimony	0.0403	0.0213	0.0807	0.227	0.06	0.7	5
Selenium	0.0557	0.00964	0.111	0.131	0.1	0.5	7
Zinc	0.0257	0.0036	0.0514	0.0524	4	50	200
Chloride	8170	1100	16400	16300	800	15000	25000
Fluoride	2.84	3.7	5.68	36.4	10	150	500
Sulphate (soluble)	125	68.7	250	729	1000	20000	50000
Total Dissolved Solids	19600	3080	39300	43100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	91.9	24.5	184	295	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.106	7.963
Conductivity (µS/cm)	20.20	3,410.00
Temperature (°C)	23.00	22.70
Volume Leachant (Litres)	0.202	1.400
Volume of Eluate VE1 (Litres)	0.130	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 12:09:08

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.232	**Moisture Content Ratio (%)**	32.6
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	75.4
Particle Size <4mm	>95%		

Case	
SDG	130810-49
Lab Sample Number(s)	7912464
Sampled Date	09-Aug-2013
Customer Sample Ref.	32
Depth (m)	1.50 - 2.00

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.494	3	5	6
Loss on Ignition (%)	1.96	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	46.2	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.4	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.439	-	-	-
ANC to pH 4 (mol/kg)	1.99	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00697	0.00181	0.014	0.024	0.5	2	25
Barium	0.0474	0.0123	0.0948	0.163	20	100	300
Cadmium	0.00268	<0.0001	0.00535	0.00306	0.04	1	5
Chromium	0.00633	0.00197	0.0127	0.0247	0.5	10	70
Copper	0.00266	0.00878	0.00532	0.0808	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.0351	0.0117	0.0702	0.143	0.5	10	30
Nickel	0.00227	0.000931	0.00454	0.0108	0.4	10	40
Lead	0.0014	0.000502	0.0028	0.00605	0.5	10	50
Antimony	0.00863	0.00396	0.0173	0.0449	0.06	0.7	5
Selenium	0.0547	0.0299	0.109	0.327	0.1	0.5	7
Zinc	0.00514	0.0103	0.0103	0.0974	4	50	200
Chloride	2720	188	5430	4770	800	15000	25000
Fluoride	0.948	<0.5	1.9	<5	10	150	500
Sulphate (soluble)	186	22	371	407	1000	20000	50000
Total Dissolved Solids	6290	586	12600	12400	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.6	<3	7.2	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	19-Aug-2013	20-Aug-2013
pH (pH Units)	8.129	6.861
Conductivity (µS/cm)	7.63	0.99
Temperature (°C)	22.70	22.20
Volume Leachant (Litres)	0.293	1.400
Volume of Eluate VE1 (Litres)	0.200	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 12:09:08

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM114		Leaching Procedure for CEN Two Stage BatchTest 2:1/8:1 Cumulative		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
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)		
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		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
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		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM182	CEN/TC 292 - WI 292046-chacterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils		
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		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	7912462	7912464
Customer Sample Ref.	31	32
AGS Ref.		
Depth	0.50 - 1.00	1.50 - 2.00
Type	SOLID	SOLID
ANC at pH4 and ANC at pH 6	21-Aug-2013	21-Aug-2013
Anions by Kone (w)	22-Aug-2013	22-Aug-2013
CEN 2:1 Leachate (2 Stage)	19-Aug-2013	19-Aug-2013
CEN 2:1 Readings	21-Aug-2013	21-Aug-2013
CEN 8:1 Leachate (2 Stage)	21-Aug-2013	21-Aug-2013
CEN 8:1 Readings	21-Aug-2013	21-Aug-2013
Dissolved Metals by ICP-MS	23-Aug-2013	23-Aug-2013
Dissolved Organic/Inorganic Carbon	22-Aug-2013	22-Aug-2013
Fluoride	22-Aug-2013	22-Aug-2013
GRO by GC-FID (S)	22-Aug-2013	22-Aug-2013
Loss on Ignition in soils	21-Aug-2013	21-Aug-2013
Mercury Dissolved	22-Aug-2013	22-Aug-2013
Mineral Oil	23-Aug-2013	23-Aug-2013
PAH Value of soil	15-Aug-2013	15-Aug-2013
PCBs by GCMS	22-Aug-2013	22-Aug-2013
pH	14-Aug-2013	14-Aug-2013
Phenols by HPLC (W)	22-Aug-2013	22-Aug-2013
Sample description	13-Aug-2013	13-Aug-2013
Total Dissolved Solids	22-Aug-2013	22-Aug-2013
Total Organic Carbon	22-Aug-2013	22-Aug-2013

CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

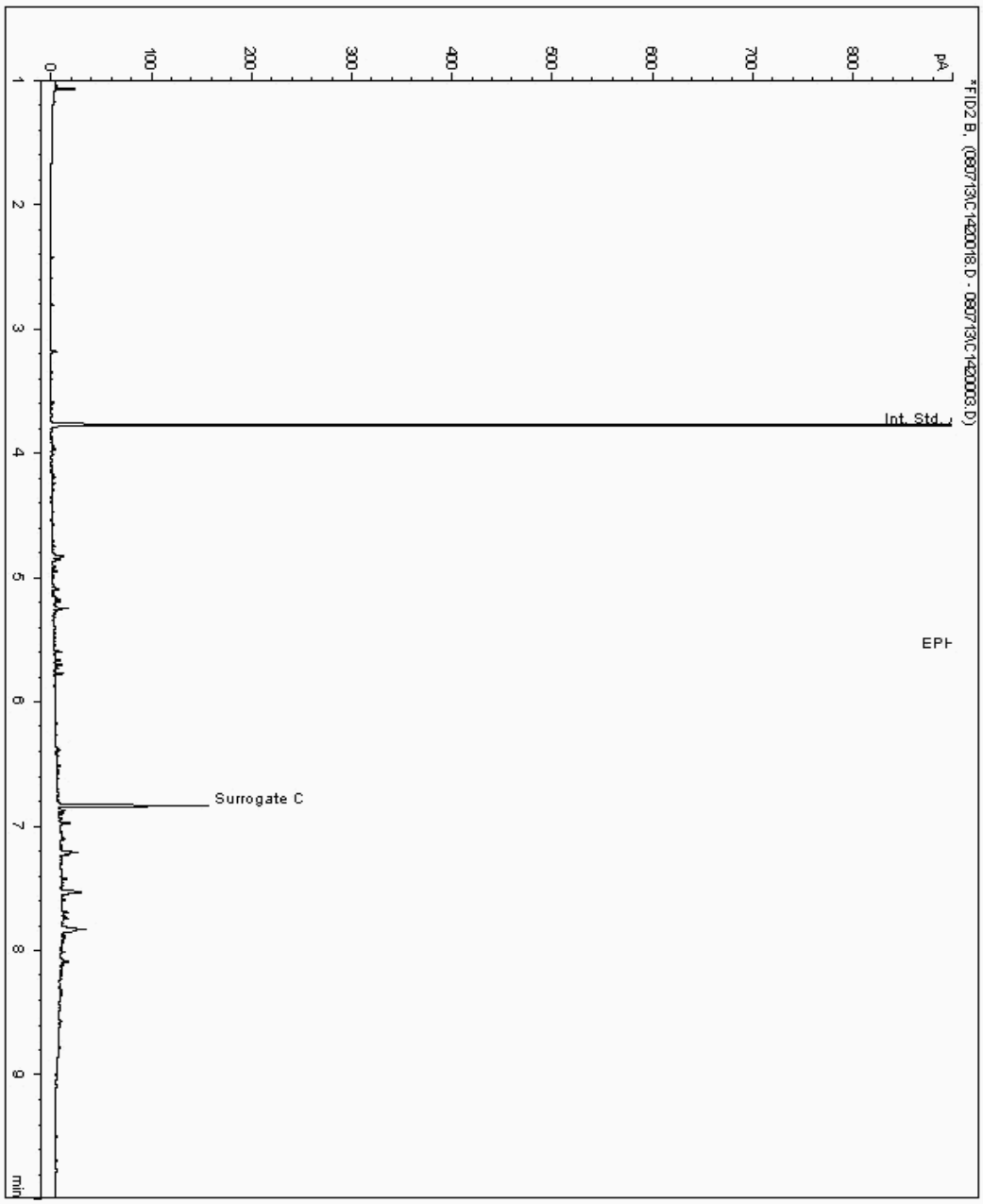
Analysis: Mineral Oil

Sample No : 7966199
Sample ID : 31

Depth : 0.50 - 1.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7505424-7881898
Date Acquired : 07/08/13 12:48:13 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

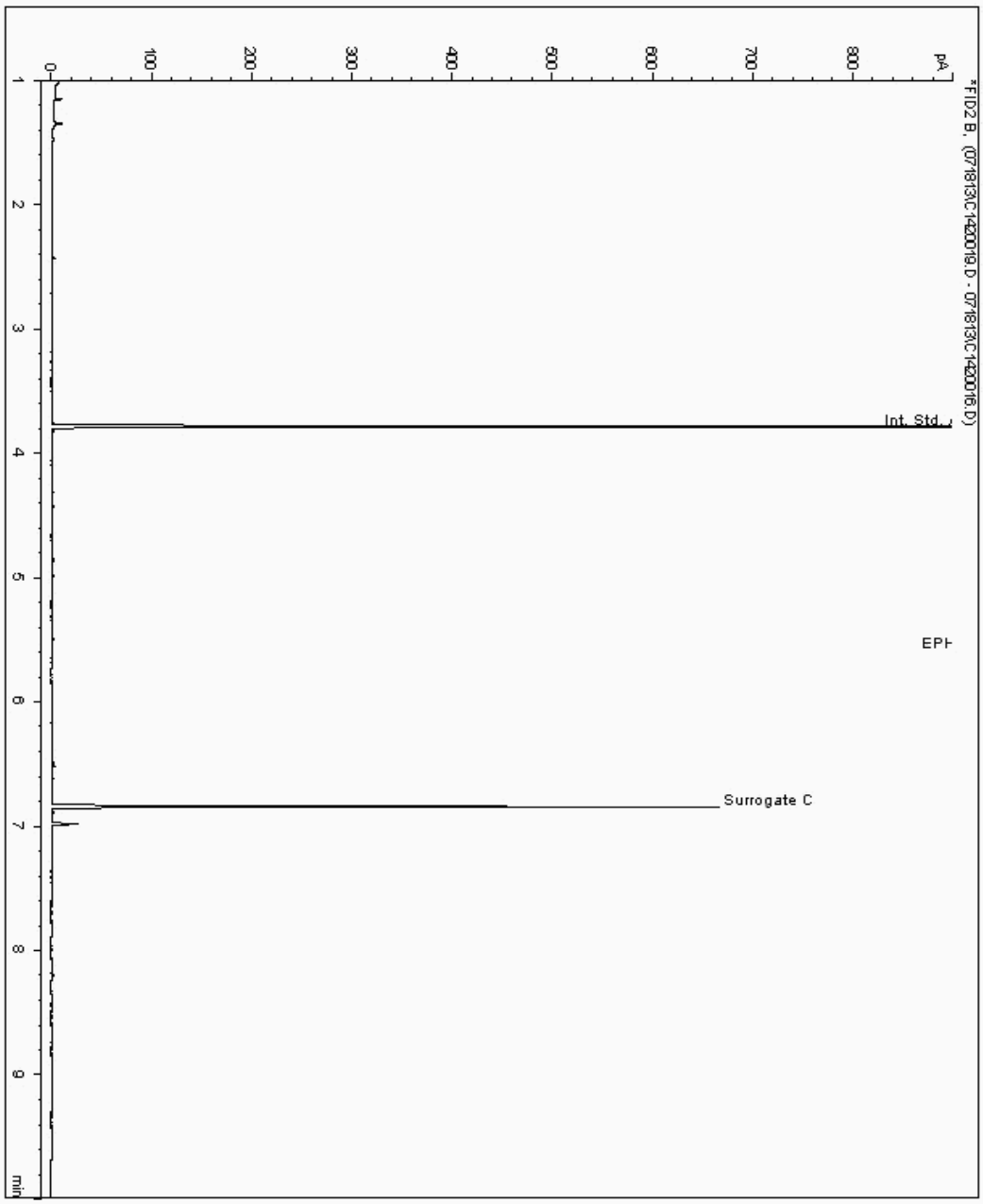
Analysis: Mineral Oil

Sample No : 7966212
Sample ID : 32

Depth : 1.50 - 2.00

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7455132-7773407
Date Acquired : 19/07/13 00:01:22 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

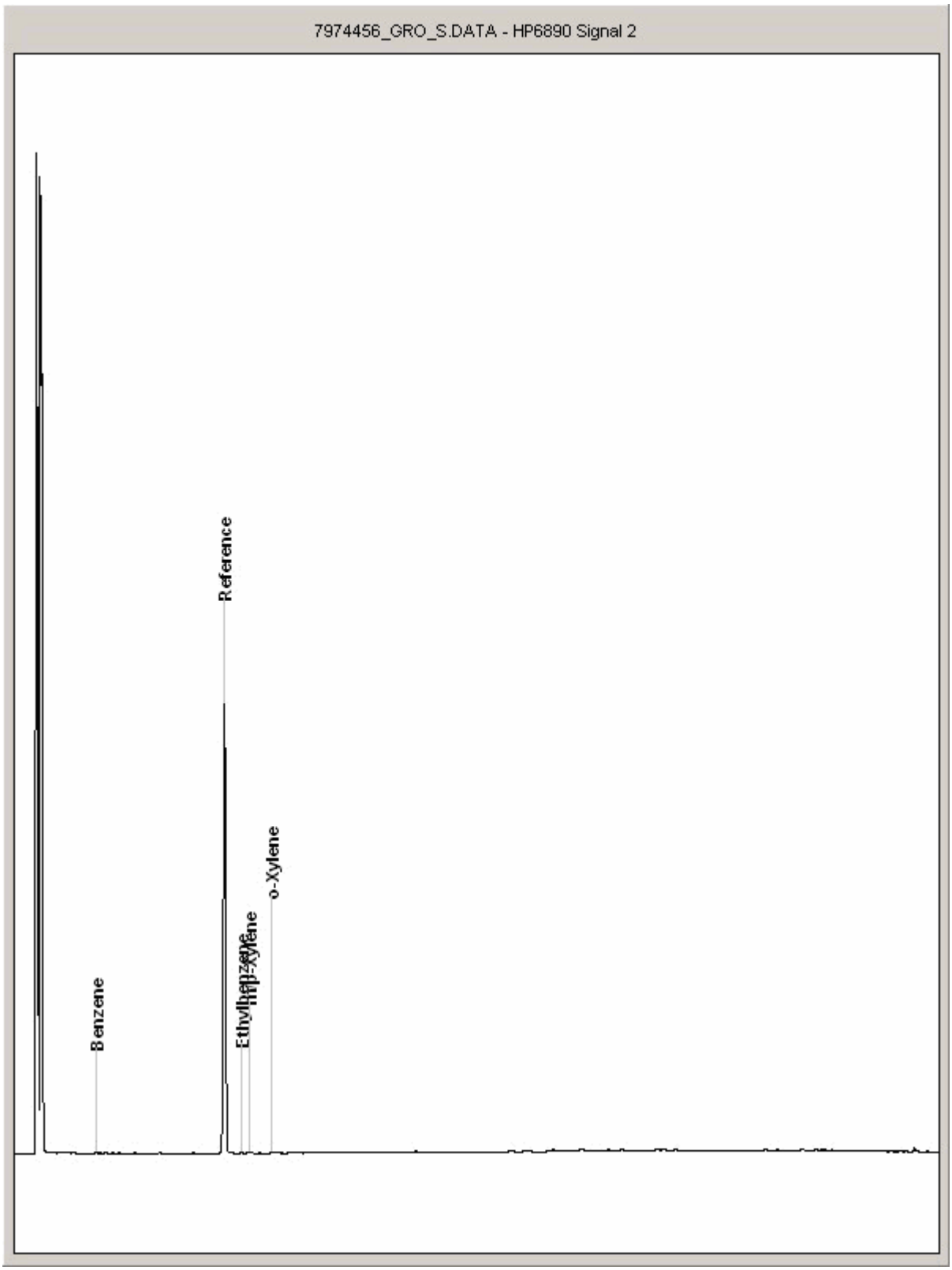
SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7974456
Sample ID : 31

Depth : 0.50 - 1.00



CERTIFICATE OF ANALYSIS

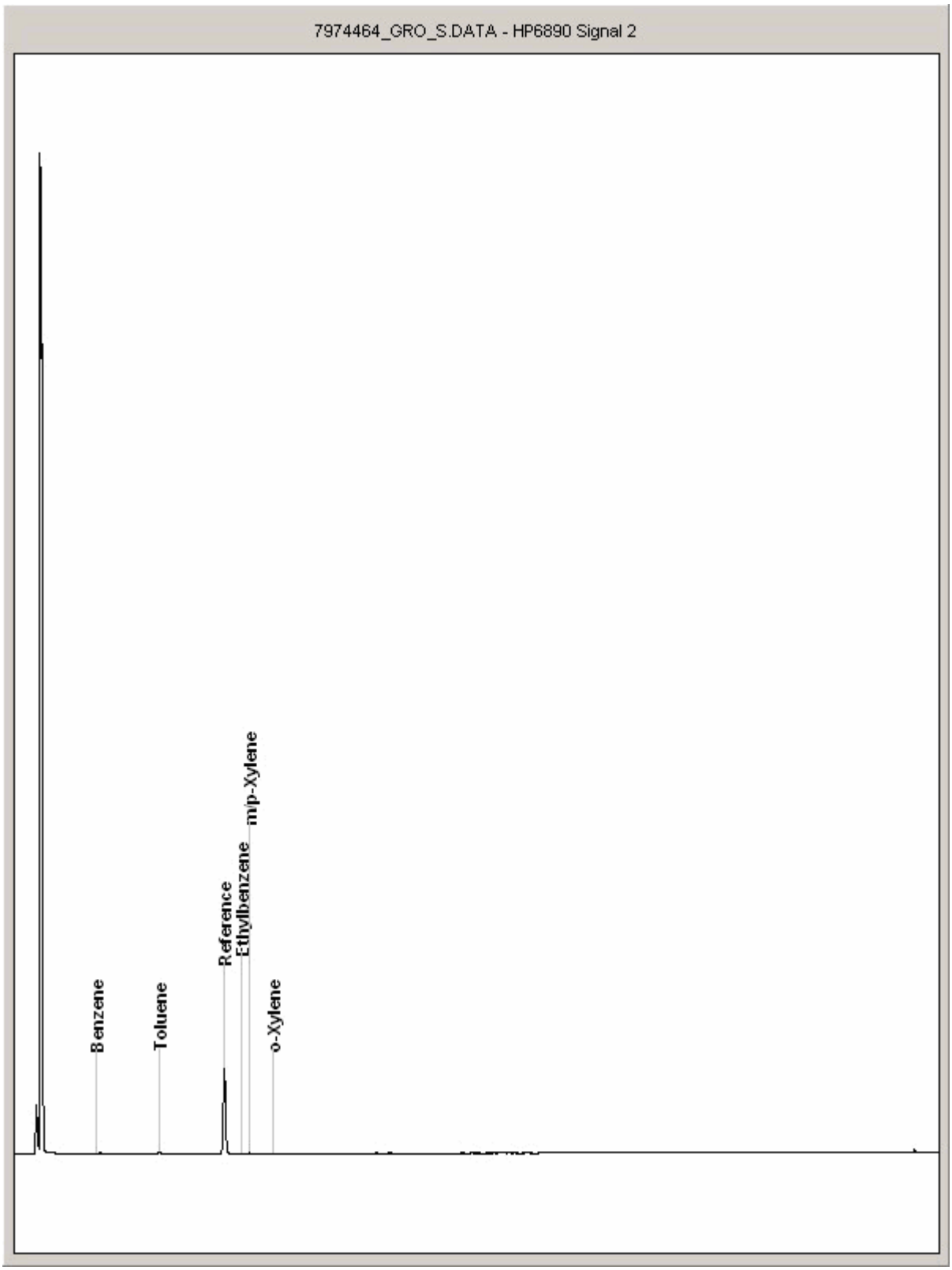
SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7974464
Sample ID : 32

Depth : 1.50 - 2.00



SDG:	130810-49	**Location:**	Dublin Port	**Order Number:**	6130
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239241
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

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 2 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. ALcontrol Laboratories 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 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.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
§	**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 Alcontrol Laboratories (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 Alcontrol Laboratories (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.

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

Priority Geotechnical Ltd
Unit 12
Owenacurra Business Park
Midleton
Co Cork
Co Cork

Attention: Colette Kelly

CERTIFICATE OF ANALYSIS

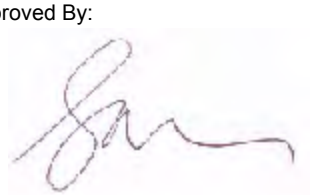
Date:	23 August 2013
Customer:	D_PRIORGEOT_CRK
Sample Delivery Group (SDG):	130809-67
Your Reference:	PH13003B
Location:	Dublin Port
Report No:	239189

We received 10 samples on Thursday August 08, 2013 and 10 of these samples were scheduled for analysis which was completed on Friday August 23, 2013. 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.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

ALcontrol Laboratories is a trading division of ALcontrol UK Limited
Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No.

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
7904997	15		0.50	07/08/2013
7904995	16		1.50	07/08/2013
7904992	55		0.50	07/08/2013
7904988	56		1.50	07/08/2013
7904993	59		0.50	07/08/2013
7904991	60		1.50	07/08/2013
7905005	63		0.50	07/08/2013
7905009	64		1.50	07/08/2013
7905007	67		0.50	07/08/2013
7905003	68		1.50	07/08/2013

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

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X Test

N No Determination Possible

Lab Sample No(s)	7904997	7904995	7904992	7904988	7904993	7904991	7905005	7905009	7905007	7905003
Customer Sample Reference	15	16	55	56	59	60	63	64	67	68
AGS Reference										
Depth (m)	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50
Container	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)

ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 10	X			X			X			X			X			X			X			X			X			X			X			X		
Anions by Kone (w)	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	
CEN 2:1 Readings	All	NDPs: 0 Tests: 7		X			X			X			X			X			X												X						X	
CEN 8:1 Readings	All	NDPs: 0 Tests: 7		X			X			X			X			X			X												X						X	
CEN Readings	All	NDPs: 0 Tests: 3																		X			X			X												
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	
Fluoride	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 10			X			X			X			X			X			X			X			X			X			X			X			X
Loss on Ignition in soils	All	NDPs: 0 Tests: 10	X			X			X			X			X			X			X			X			X			X			X					
Mercury Dissolved	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	
Mineral Oil	All	NDPs: 0 Tests: 10	X			X			X			X			X			X			X			X			X			X			X					
PAH Value of soil	All	NDPs: 0 Tests: 10	X			X			X			X			X			X			X			X			X			X			X					
PCBs by GCMS	All	NDPs: 0 Tests: 10	X			X			X			X			X			X			X			X			X			X			X					
pH	All	NDPs: 0 Tests: 10		X			X			X			X			X			X			X			X			X			X			X			X	

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

SOLID

Results Legend

X Test

N No Determination Possible

Lab Sample No(s)	7904997	7904995	7904992	7904988	7904993	7904991	7905005	7905009	7905007	7905003	
Customer Sample Reference	15	16	55	56	59	60	63	64	67	68	
AGS Reference											
Depth (m)	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	
Container	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)	250g Amber Jar (AL	400g Tub (ALE214)	60g VOC (ALE215)
Phenols by HPLC (W)	All	NDPs: 0 Tests: 10		X		X		X		X		X		X		X		X		X		X		X	
Sample description	All	NDPs: 0 Tests: 10	X		X		X		X		X		X		X		X		X		X		X		
Total Dissolved Solids	All	NDPs: 0 Tests: 10		X		X		X		X		X		X		X		X		X		X		X	
Total Organic Carbon	All	NDPs: 0 Tests: 10	X		X		X		X		X		X		X		X		X		X		X		

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
7904997	15	0.50	Dark Brown	Silty Clay Loam	0.063 - 0.1 mm	None	None
7904995	16	1.50	Dark Brown	Clay	0.063 - 0.1 mm	None	None
7904992	55	0.50	Dark Brown	Clay	<0.063 mm	None	None
7904988	56	1.50	Black	Silty Clay Loam	0.063 - 0.1 mm	None	None
7904993	59	0.50	Dark Brown	Silty Clay Loam	0.063 - 0.1 mm	None	None
7904991	60	1.50	Black	Silty Clay Loam	0.063 - 0.1 mm	None	None
7905005	63	0.50	Black	Silt Loam	0.063 - 0.1 mm	None	None
7905009	64	1.50	Dark Brown	Silt Loam	0.063 - 0.1 mm	None	None
7905007	67	0.50	Dark Brown	Silt Loam	0.063 - 0.1 mm	None	None
7905003	68	1.50	Dark Brown	Sandy Loam	0.1 - 2 mm	None	None

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	15	16	55	56	59	60
			Depth (m)	0.50	1.50	0.50	1.50	0.50	1.50
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			SDG Ref	130809-67	130809-67	130809-67	130809-67	130809-67	130809-67
			Lab Sample No.(s)	7904997	7904995	7904992	7904988	7904993	7904991
			AGS Reference						
Loss on ignition	<0.7 %	TM018		2.34 M	3.97 M	3.68 M	1.91 M	4.98 M	2.56 M
Mineral oil >C10-C40	<1 mg/kg	TM061		29.5 ♦ #	37.5 ♦ #	34.6 ♦ #	72.6 ♦ #	102 ♦ #	44.5 ♦ #
Organic Carbon, Total	<0.2 %	TM132		0.734 #	0.919 #	0.824 #	0.727 #	1.2 #	0.831 #
pH	1 pH Units	TM133		8.01 M	7.9 M	8.03 M	8.2 M	8.31 M	7.94 M
PCB congener 28	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	8.6 M	<3 M
PCB congener 52	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
PCB congener 101	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
PCB congener 118	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
PCB congener 138	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
PCB congener 153	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
PCB congener 180	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21	<21	<21	<21	<21	<21
ANC @ pH 4	<0.03 mol/kg	TM182		3.33	3.98	3.98	3.25	4.1	3.31
ANC @ pH 6	<0.03 mol/kg	TM182		0.548	0.782	0.847	0.632	0.858	0.624
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	<10	<10	<10	<10	<10

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	63	64	67	68		
			Depth (m)	0.50	1.50	0.50	1.50		
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
			Date Sampled	07/08/2013	07/08/2013	07/08/2013	07/08/2013		
			Sampled Time	.	.	.	.		
			Date Received	08/08/2013	08/08/2013	08/08/2013	08/08/2013		
			SDG Ref	130809-67	130809-67	130809-67	130809-67		
			Lab Sample No.(s)	7905005	7905009	7905007	7905003		
			AGS Reference						
Loss on ignition	<0.7 %	TM018		9.01 M	11.2 M	9.81 M	3.3 M		
Mineral oil >C10-C40	<1 mg/kg	TM061		504 ♦ #	1230 ♦ #	1030 ♦ #	67.7 ♦ #		
Organic Carbon, Total	<0.2 %	TM132		2.08 #	2.63 #	2.61 #	0.693 #		
pH	1 pH Units	TM133		7.83 M	7.91 M	8.33 M	8.48 M		
PCB congener 28	<3 µg/kg	TM168		8.99 M	21.5 M	15 M	<3 M		
PCB congener 52	<3 µg/kg	TM168		3.38 M	12.4 M	6.21 M	<3 M		
PCB congener 101	<3 µg/kg	TM168		<3 M	<3 M	<3 M	<3 M		
PCB congener 118	<3 µg/kg	TM168		<3 M	7.48 M	4.08 M	<3 M		
PCB congener 138	<3 µg/kg	TM168		<3 M	9.23 M	5.18 M	<3 M		
PCB congener 153	<3 µg/kg	TM168		<3 M	9.17 M	4.43 M	<3 M		
PCB congener 180	<3 µg/kg	TM168		<3 M	5.7 M	3.46 M	<3 M		
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21	65.4	38.3	<21		
ANC @ pH 4	<0.03 mol/kg	TM182		1.21	1.6	1.88	2.45		
ANC @ pH 6	<0.03 mol/kg	TM182		0.202	0.301	0.343	0.482		
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	<10	<10	<10		

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	15	16	55	56	59	60
			Depth (m)	0.50	1.50	0.50	1.50	0.50	1.50
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013	07/08/2013
			Sampled Time	.	.	.	.	.	.
			Date Received	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013	08/08/2013
			SDG Ref	130809-67	130809-67	130809-67	130809-67	130809-67	130809-67
			Lab Sample No.(s)	7904997	7904995	7904992	7904988	7904993	7904991
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		72	62	67	69	65	57
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<100 M	<100 M	<100 M	<100 M	<100 M	<100 M
Benzene	<10 µg/kg	TM089		<200 M	<200 M	<200 M	<200 M	<200 M	<200 M
Toluene	<2 µg/kg	TM089		<40 M	<40 M	<40 M	<40 M	<40 M	<40 M
Ethylbenzene	<3 µg/kg	TM089		<60 M	<60 M	<60 M	<60 M	<60 M	<60 M
m,p-Xylene	<6 µg/kg	TM089		<120 M	<120 M	<120 M	<120 M	<120 M	<120 M
o-Xylene	<3 µg/kg	TM089		<60 M	<60 M	<60 M	<60 M	<60 M	<60 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9	<9	<9	<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24	<24	<24	<24	<24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

GRO by GC-FID (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
1-4&♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	63	64	67	68		
			Depth (m)	0.50	1.50	0.50	1.50		
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
			Date Sampled	07/08/2013	07/08/2013	07/08/2013	07/08/2013		
			Sampled Time	.	.	.	.		
			Date Received	08/08/2013	08/08/2013	08/08/2013	08/08/2013		
			SDG Ref	130809-67	130809-67	130809-67	130809-67		
			Lab Sample No.(s)	7905005	7905009	7905007	7905003		
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		62	39	53	5		
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 M	<5 M	<5 M	<5 M		
Benzene	<10 µg/kg	TM089		<10 M	<10 M	<10 M	<10 M		
Toluene	<2 µg/kg	TM089		<2 M	<2 M	<2 M	<2 M		
Ethylbenzene	<3 µg/kg	TM089		<3 M	<3 M	<3 M	<3 M		
m,p-Xylene	<6 µg/kg	TM089		<6 M	<6 M	<6 M	<6 M		
o-Xylene	<3 µg/kg	TM089		<3 M	6.88 M	5.67 M	<3 M		
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9	<9	<9		
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24	<24	<24		

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.222	**Moisture Content Ratio (%)**	148
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	40.4
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7905005
Sampled Date	07-Aug-2013
Customer Sample Ref.	63
Depth (m)	0.50

Solid Waste Analysis	**Result**			
Total Organic Carbon (%)	2.08	-	-	-
Loss on Ignition (%)	9.01	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	-	-	-
Mineral Oil (mg/kg)	504	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	7.83	-	-	-
ANC to pH 6 (mol/kg)	0.202	-	-	-
ANC to pH 4 (mol/kg)	1.21	-	-	-

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.163	<0.00012	1.63	<0.0012	-	-	-
Barium	0.0131	<0.00003	0.131	<0.0003	-	-	-
Cadmium	0.00771	<0.0001	0.0771	<0.001	-	-	-
Chromium	0.0167	<0.00022	0.167	<0.0022	-	-	-
Copper	<0.00085	<0.00085	<0.0085	<0.0085	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Molybdenum	0.135	<0.00024	1.35	<0.0024	-	-	-
Nickel	0.00386	<0.00015	0.0386	<0.0015	-	-	-
Lead	0.00288	<0.00002	0.0288	<0.0002	-	-	-
Antimony	0.0136	<0.00016	0.136	<0.0016	-	-	-
Selenium	0.021	<0.00039	0.21	<0.0039	-	-	-
Zinc	0.00627	<0.00041	0.0627	<0.0041	-	-	-
Chloride	2860	<40	28600	<400	-	-	-
Fluoride	0.935	<0.5	9.35	<5	-	-	-
Sulphate (soluble)	41.1	<2	411	<20	-	-	-
Total Dissolved Solids	6800	<25	68000	<250	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Dissolved Organic Carbon	22	<3	220	<30	-	-	-

Leach Test Information

Date Prepared	19-Aug-2013
pH (pH Units)	8.08
Conductivity (µS/cm)	8.03
Temperature (°C)	21.30
Volume Leachant (Litres)	0.767
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

23/08/2013 08:44:23

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.204	**Moisture Content Ratio (%)**	127
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	44
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7905007
Sampled Date	07-Aug-2013
Customer Sample Ref.	67
Depth (m)	0.50

Solid Waste Analysis	**Result**			
Total Organic Carbon (%)	2.61	-	-	-
Loss on Ignition (%)	9.81	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	0.0383	-	-	-
Mineral Oil (mg/kg)	1030	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	8.33	-	-	-
ANC to pH 6 (mol/kg)	0.343	-	-	-
ANC to pH 4 (mol/kg)	1.88	-	-	-

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.031	<0.00012	0.31	<0.0012	-	-	-
Barium	0.0206	<0.00003	0.206	<0.0003	-	-	-
Cadmium	0.0045	<0.0001	0.045	<0.001	-	-	-
Chromium	0.012	<0.00022	0.12	<0.0022	-	-	-
Copper	0.00768	<0.00085	0.0768	<0.0085	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Molybdenum	0.0936	<0.00024	0.936	<0.0024	-	-	-
Nickel	0.00308	<0.00015	0.0308	<0.0015	-	-	-
Lead	0.0113	<0.00002	0.113	<0.0002	-	-	-
Antimony	0.00659	<0.00016	0.0659	<0.0016	-	-	-
Selenium	0.0182	<0.00039	0.182	<0.0039	-	-	-
Zinc	0.0109	<0.00041	0.109	<0.0041	-	-	-
Chloride	2480	<40	24800	<400	-	-	-
Fluoride	1.25	<0.5	12.5	<5	-	-	-
Sulphate (soluble)	59.6	<2	596	<20	-	-	-
Total Dissolved Solids	6020	<25	60200	<250	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Dissolved Organic Carbon	29	<3	290	<30	-	-	-

Leach Test Information

Date Prepared	19-Aug-2013
pH (pH Units)	8.16
Conductivity (µS/cm)	7.26
Temperature (°C)	22.80
Volume Leachant (Litres)	0.786
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

23/08/2013 08:44:23

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.190	**Moisture Content Ratio (%)**	111
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	47.4
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7905009
Sampled Date	07-Aug-2013
Customer Sample Ref.	64
Depth (m)	1.50

Solid Waste Analysis	**Result**			
Total Organic Carbon (%)	2.63	-	-	-
Loss on Ignition (%)	11.2	-	-	-
Sum of BTEX (mg/kg)	<0.024	-	-	-
Sum of 7 PCBs (mg/kg)	0.0654	-	-	-
Mineral Oil (mg/kg)	1230	-	-	-
PAH Sum of 17 (mg/kg)	<10	-	-	-
pH (pH Units)	7.91	-	-	-
ANC to pH 6 (mol/kg)	0.301	-	-	-
ANC to pH 4 (mol/kg)	1.6	-	-	-

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.0368	<0.00012	0.368	<0.0012	-	-	-
Barium	0.0244	<0.00003	0.244	<0.0003	-	-	-
Cadmium	0.00389	<0.0001	0.0389	<0.001	-	-	-
Chromium	0.00965	<0.00022	0.0965	<0.0022	-	-	-
Copper	0.00104	<0.00085	0.0104	<0.0085	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Molybdenum	0.119	<0.00024	1.19	<0.0024	-	-	-
Nickel	0.00247	<0.00015	0.0247	<0.0015	-	-	-
Lead	0.00202	<0.00002	0.0202	<0.0002	-	-	-
Antimony	0.0201	<0.00016	0.201	<0.0016	-	-	-
Selenium	0.0178	<0.00039	0.178	<0.0039	-	-	-
Zinc	0.00391	<0.00041	0.0391	<0.0041	-	-	-
Chloride	2100	<40	21000	<400	-	-	-
Fluoride	1.39	<0.5	13.9	<5	-	-	-
Sulphate (soluble)	93.7	<2	937	<20	-	-	-
Total Dissolved Solids	5220	<25	52200	<250	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Dissolved Organic Carbon	24.6	<3	246	<30	-	-	-

Leach Test Information

Date Prepared	19-Aug-2013
pH (pH Units)	8.32
Conductivity (µS/cm)	6.24
Temperature (°C)	22.80
Volume Leachant (Litres)	0.800
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

23/08/2013 08:44:23

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.208	**Moisture Content Ratio (%)**	19.2
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	83.9
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904988
Sampled Date	07-Aug-2013
Customer Sample Ref.	56
Depth (m)	1.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.727	3	5	6
Loss on Ignition (%)	1.91	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	72.6	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.2	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.632	-	-	-
ANC to pH 4 (mol/kg)	3.25	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00747	0.00198	0.0149	0.0269	0.5	2	25
Barium	0.0748	0.0187	0.149	0.259	20	100	300
Cadmium	0.00244	<0.0001	0.00488	0.00314	0.04	1	5
Chromium	0.00332	0.00212	0.00664	0.0227	0.5	10	70
Copper	0.00215	<0.00085	0.0043	<0.0085	2	50	100
Mercury Dissolved (CVAF)	0.0000106	0.0000278	0.0000212	0.000256	0.01	0.2	2
Molybdenum	0.0226	0.0138	0.0452	0.149	0.5	10	30
Nickel	0.00342	0.000655	0.00682	0.0101	0.4	10	40
Lead	0.000999	<0.00002	0.002	0.00128	0.5	10	50
Antimony	0.00665	0.00452	0.0133	0.0479	0.06	0.7	5
Selenium	0.116	0.0333	0.232	0.44	0.1	0.5	7
Zinc	0.0024	0.000504	0.00479	0.00748	4	50	200
Chloride	1440	108	2880	2790	800	15000	25000
Fluoride	0.622	<0.5	1.24	<5	10	150	500
Sulphate (soluble)	199	28.8	397	507	1000	20000	50000
Total Dissolved Solids	3820	343	7630	7900	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.56	<3	7.1	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.004	8.211
Conductivity (µS/cm)	4.46	447.00
Temperature (°C)	22.40	25.70
Volume Leachant (Litres)	0.316	1.400
Volume of Eluate VE1 (Litres)	0.225	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.214	**Moisture Content Ratio (%)**	22.3
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	81.8
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904991
Sampled Date	07-Aug-2013
Customer Sample Ref.	60
Depth (m)	1.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.831	3	5	6
Loss on Ignition (%)	2.56	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	44.5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.94	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.624	-	-	-
ANC to pH 4 (mol/kg)	3.31	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00813	0.00233	0.0163	0.0298	0.5	2	25
Barium	0.125	0.00604	0.25	0.193	20	100	300
Cadmium	0.00438	<0.0001	0.00875	0.00488	0.04	1	5
Chromium	0.00402	0.00243	0.00804	0.026	0.5	10	70
Copper	0.0027	<0.00085	0.00539	<0.0085	2	50	100
Mercury Dissolved (CVAF)	0.000236	0.0000191	0.000471	0.000433	0.01	0.2	2
Molybdenum	0.0176	0.0158	0.0351	0.16	0.5	10	30
Nickel	0.00637	0.000795	0.0127	0.0142	0.4	10	40
Lead	0.00175	0.000031	0.0035	0.00223	0.5	10	50
Antimony	0.00744	0.00483	0.0149	0.0512	0.06	0.7	5
Selenium	0.101	0.0381	0.202	0.451	0.1	0.5	7
Zinc	0.00754	<0.00041	0.0151	0.0084	4	50	200
Chloride	2130	195	4250	4110	800	15000	25000
Fluoride	0.598	<0.5	1.2	<5	10	150	500
Sulphate (soluble)	198	39.6	396	573	1000	20000	50000
Total Dissolved Solids	5260	590	10500	11100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	4.25	<3	8.49	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.057	7.868
Conductivity (µS/cm)	6.24	759.00
Temperature (°C)	22.50	21.40
Volume Leachant (Litres)	0.311	1.400
Volume of Eluate VE1 (Litres)	0.195	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.239	**Moisture Content Ratio (%)**	36.8
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	73.1
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904992
Sampled Date	07-Aug-2013
Customer Sample Ref.	55
Depth (m)	0.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.824	3	5	6
Loss on Ignition (%)	3.68	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	34.6	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.03	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.847	-	-	-
ANC to pH 4 (mol/kg)	3.98	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00919	0.00231	0.0184	0.0298	0.5	2	25
Barium	0.118	0.0207	0.236	0.302	20	100	300
Cadmium	0.00486	0.0001	0.00974	0.00563	0.04	1	5
Chromium	0.00356	0.00242	0.00713	0.0253	0.5	10	70
Copper	0.00309	0.00176	0.00618	0.0189	2	50	100
Mercury Dissolved (CVAF)	0.0000125	0.0000343	0.000025	0.000322	0.01	0.2	2
Molybdenum	0.0253	0.0174	0.0507	0.182	0.5	10	30
Nickel	0.00478	0.000933	0.00957	0.0131	0.4	10	40
Lead	0.00174	0.000202	0.00348	0.00351	0.5	10	50
Antimony	0.00467	0.0036	0.00934	0.037	0.06	0.7	5
Selenium	0.152	0.0429	0.304	0.535	0.1	0.5	7
Zinc	0.00465	0.00109	0.0093	0.0144	4	50	200
Chloride	2220	204	4440	4000	800	15000	25000
Fluoride	0.61	<0.5	1.22	<5	10	150	500
Sulphate (soluble)	353	50.3	707	797	1000	20000	50000
Total Dissolved Solids	5470	630	11000	11000	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.63	<3	7.26	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.012	8.175
Conductivity (µS/cm)	6.64	818.00
Temperature (°C)	22.50	22.70
Volume Leachant (Litres)	0.286	1.400
Volume of Eluate VE1 (Litres)	0.170	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.324	**Moisture Content Ratio (%)**	84.8
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	54.1
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904993
Sampled Date	07-Aug-2013
Customer Sample Ref.	59
Depth (m)	0.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	1.2	3	5	6
Loss on Ignition (%)	4.98	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	102	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.31	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.858	-	-	-
ANC to pH 4 (mol/kg)	4.1	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.0141	0.0035	0.0281	0.0411	0.5	2	25
Barium	0.428	0.113	0.856	1.31	20	100	300
Cadmium	0.0172	0.000748	0.0344	0.0169	0.04	1	5
Chromium	0.0107	0.00813	0.0214	0.0828	0.5	10	70
Copper	0.00564	0.00238	0.0113	0.0257	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.0001	0.01	0.2	2
Molybdenum	0.162	0.0573	0.324	0.633	0.5	10	30
Nickel	0.00803	0.00483	0.0161	0.0501	0.4	10	40
Lead	0.00757	0.000388	0.0152	0.00798	0.5	10	50
Antimony	0.00835	0.00929	0.0167	0.0924	0.06	0.7	5
Selenium	0.0809	0.0174	0.162	0.21	0.1	0.5	7
Zinc	0.0266	0.00205	0.0532	0.0345	4	50	200
Chloride	6520	778	13100	11100	800	15000	25000
Fluoride	1.37	1.07	2.75	10.9	10	150	500
Sulphate (soluble)	1310	398	2620	4500	1000	20000	50000
Total Dissolved Solids	17000	2690	34000	35100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	15.1	8.46	30.1	88.4	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.128	8.056
Conductivity (µS/cm)	18.36	3,160.00
Temperature (°C)	22.40	22.70
Volume Leachant (Litres)	0.202	1.400
Volume of Eluate VE1 (Litres)	0.100	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.216	**Moisture Content Ratio (%)**	23.2
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	81.2
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904995
Sampled Date	07-Aug-2013
Customer Sample Ref.	16
Depth (m)	1.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.919	3	5	6
Loss on Ignition (%)	3.97	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	37.5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.9	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.782	-	-	-
ANC to pH 4 (mol/kg)	3.98	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00748	0.00234	0.0149	0.029	0.5	2	25
Barium	0.0417	0.036	0.0833	0.366	20	100	300
Cadmium	0.00379	0.000141	0.00757	0.00537	0.04	1	5
Chromium	0.00336	0.00248	0.00671	0.0258	0.5	10	70
Copper	0.00415	0.00159	0.00828	0.0187	2	50	100
Mercury Dissolved (CVAF)	<0.00001	0.0000428	<0.00002	0.000382	0.01	0.2	2
Molybdenum	0.0151	0.0185	0.0302	0.181	0.5	10	30
Nickel	0.00711	0.00153	0.0142	0.0214	0.4	10	40
Lead	0.00163	0.00015	0.00326	0.00311	0.5	10	50
Antimony	0.00549	0.00466	0.011	0.0475	0.06	0.7	5
Selenium	0.103	0.0434	0.207	0.499	0.1	0.5	7
Zinc	0.0171	0.00138	0.0341	0.0308	4	50	200
Chloride	1800	187	3600	3620	800	15000	25000
Fluoride	0.643	0.503	1.28	5.18	10	150	500
Sulphate (soluble)	310	55.2	620	829	1000	20000	50000
Total Dissolved Solids	4810	571	9600	10300	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.7	<3	7.39	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.002	8.038
Conductivity (µS/cm)	5.54	740.00
Temperature (°C)	22.50	22.90
Volume Leachant (Litres)	0.309	1.400
Volume of Eluate VE1 (Litres)	0.190	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.214	**Moisture Content Ratio (%)**	22.2
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	81.8
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7904997
Sampled Date	07-Aug-2013
Customer Sample Ref.	15
Depth (m)	0.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.734	3	5	6
Loss on Ignition (%)	2.34	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	29.5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.01	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.548	-	-	-
ANC to pH 4 (mol/kg)	3.33	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00833	0.00213	0.0166	0.0285	0.5	2	25
Barium	0.0514	0.042	0.103	0.431	20	100	300
Cadmium	0.00369	<0.0001	0.00737	0.00432	0.04	1	5
Chromium	0.00401	0.0024	0.00802	0.0259	0.5	10	70
Copper	0.00285	0.00105	0.0057	0.0126	2	50	100
Mercury Dissolved (CVAF)	<0.00001	0.0000168	<0.00002	0.000148	0.01	0.2	2
Molybdenum	0.0233	0.0142	0.0466	0.152	0.5	10	30
Nickel	0.00456	0.000734	0.00911	0.0118	0.4	10	40
Lead	0.0014	0.000032	0.0028	0.00192	0.5	10	50
Antimony	0.00894	0.00513	0.0179	0.0558	0.06	0.7	5
Selenium	0.105	0.0355	0.211	0.436	0.1	0.5	7
Zinc	0.00331	<0.00041	0.00661	<0.0041	4	50	200
Chloride	1890	165	3770	3670	800	15000	25000
Fluoride	0.677	<0.5	1.35	<5	10	150	500
Sulphate (soluble)	378	46.8	756	856	1000	20000	50000
Total Dissolved Solids	5080	503	10100	10400	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	3.45	<3	6.89	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.101	8.108
Conductivity (µS/cm)	6.05	650.00
Temperature (°C)	22.60	22.70
Volume Leachant (Litres)	0.311	1.400
Volume of Eluate VE1 (Litres)	0.205	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/3

Client Reference		**Site Location**	Dublin Port
Mass Sample taken (kg)	0.208	**Moisture Content Ratio (%)**	19.1
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	83.9
Particle Size <4mm	>95%		

Case	
SDG	130809-67
Lab Sample Number(s)	7905003
Sampled Date	07-Aug-2013
Customer Sample Ref.	68
Depth (m)	1.50

Solid Waste Analysis

		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.693	3	5	6
Loss on Ignition (%)	3.3	-	-	10
Sum of BTEX (mg/kg)	<0.024	6	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	67.7	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.48	-	<6 or >9	-
ANC to pH 6 (mol/kg)	0.482	-	-	-
ANC to pH 4 (mol/kg)	2.45	-	-	-

Eluate Analysis

	C_2 Concⁿ in 2:1 eluate	C_8 Concⁿ in 8:1 eluate	A_2 2:1 concⁿ leached	$A_{2\text{-}10}$ Cumulative concⁿ leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l		mg/kg				
Arsenic	0.00754	0.00167	0.0151	0.0251	0.5	2	25
Barium	0.132	0.0825	0.264	0.896	20	100	300
Cadmium	0.0039	<0.0001	0.00781	0.00557	0.04	1	5
Chromium	0.00896	0.00469	0.0179	0.053	0.5	10	70
Copper	0.00141	<0.00085	0.00282	<0.0085	2	50	100
Mercury Dissolved (CVAF)	0.0000526	<0.00001	0.000105	<0.0001	0.01	0.2	2
Molybdenum	0.0209	0.00757	0.0419	0.0948	0.5	10	30
Nickel	0.0158	0.00388	0.0316	0.0558	0.4	10	40
Lead	0.00245	0.000201	0.0049	0.00522	0.5	10	50
Antimony	0.00382	0.00295	0.00766	0.0308	0.06	0.7	5
Selenium	0.0715	0.0163	0.143	0.242	0.1	0.5	7
Zinc	0.00773	0.000594	0.0155	0.0161	4	50	200
Chloride	1880	119	3770	3700	800	15000	25000
Fluoride	1.18	0.603	2.36	6.86	10	150	500
Sulphate (soluble)	438	80.2	876	1310	1000	20000	50000
Total Dissolved Solids	5390	498	10800	12000	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.16	1	-	-
Dissolved Organic Carbon	7.09	<3	14.2	<30	500	800	1000

Leach Test Information

	2:1	8:1
Date Prepared	16-Aug-2013	19-Aug-2013
pH (pH Units)	8.198	7.864
Conductivity (µS/cm)	6.26	669.00
Temperature (°C)	22.40	22.90
Volume Leachant (Litres)	0.317	1.400
Volume of Eluate VE1 (Litres)	0.250	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
23/08/2013 08:44:24

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Notification of NDPs (No determination possible)

Date Received : 09/08/2013 10:39:04

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
7905005	63	0.50	CEN 2:1 Leachate (2 Stage)	Sample moisture too high
7905009	64	1.50	CEN 2:1 Leachate (2 Stage)	Sample moisture too high
7905007	67	0.50	CEN 2:1 Leachate (2 Stage)	Sample moisture too high

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM114		Leaching Procedure for CEN Two Stage BatchTest 2:1/8:1 Cumulative		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
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)		
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		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
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		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM182	CEN/TC 292 - WI 292046-chacterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils		
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		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	7904997	7904995	7904992	7904988	7904993	7904991	7905005	7905009	7905007	7905003
Customer Sample Ref.	15	16	55	56	59	60	63	64	67	68
AGS Ref.										
Depth	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
ANC at pH4 and ANC at pH 6	21-Aug-2013	19-Aug-2013	19-Aug-2013	20-Aug-2013	19-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
Anions by Kone (w)	22-Aug-2013	21-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	21-Aug-2013	21-Aug-2013	22-Aug-2013
CEN 10:1 Leachate (1 Stage)							19-Aug-2013	19-Aug-2013	19-Aug-2013	
CEN 2:1 Leachate (2 Stage)	16-Aug-2013	16-Aug-2013	16-Aug-2013	16-Aug-2013	16-Aug-2013	16-Aug-2013				16-Aug-2013
CEN 2:1 Readings	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013				20-Aug-2013
CEN 8:1 Leachate (2 Stage)	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013				20-Aug-2013
CEN 8:1 Readings	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013				20-Aug-2013
CEN Readings							20-Aug-2013	20-Aug-2013	20-Aug-2013	
Dissolved Metals by ICP-MS	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Dissolved Organic/Inorganic Carbon	22-Aug-2013	21-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	22-Aug-2013
Fluoride	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
GRO by GC-FID (S)	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Loss on Ignition in soils	21-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
Mercury Dissolved	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
Mineral Oil	23-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
PAH Value of soil	20-Aug-2013	20-Aug-2013	22-Aug-2013	16-Aug-2013	20-Aug-2013	16-Aug-2013	20-Aug-2013	22-Aug-2013	20-Aug-2013	20-Aug-2013
PCBs by GCMS	22-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013
pH	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013	15-Aug-2013
Phenols by HPLC (W)	22-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	22-Aug-2013	22-Aug-2013	23-Aug-2013	23-Aug-2013	23-Aug-2013	22-Aug-2013
Sample description	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013	12-Aug-2013
Total Dissolved Solids	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013	21-Aug-2013
Total Organic Carbon	22-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	20-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013	22-Aug-2013

CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

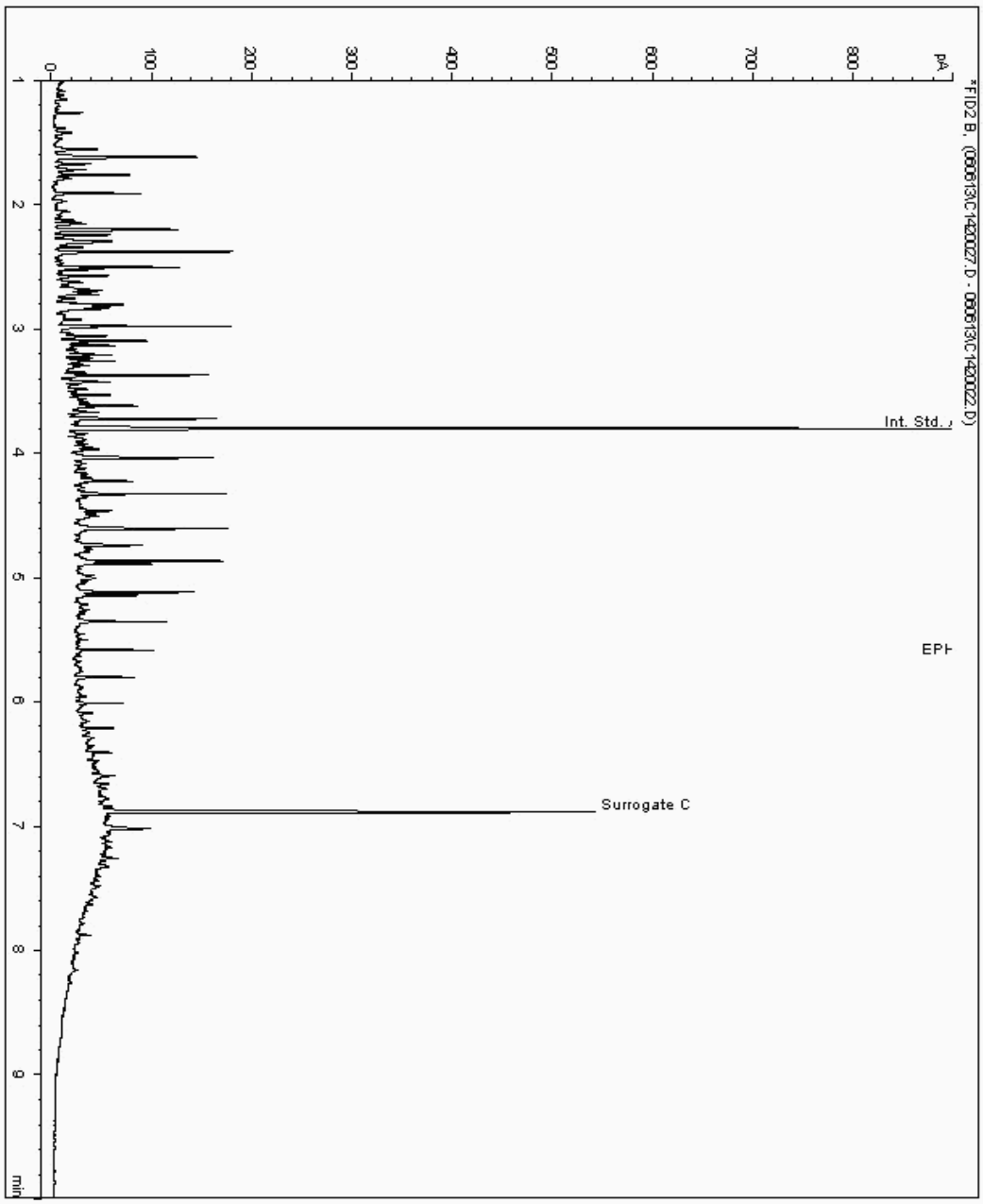
Analysis: Mineral Oil

Sample No : 7953982
Sample ID : 55

Depth : 0.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7233553-7534224
Date Acquired : 06/06/13 17:59:07 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

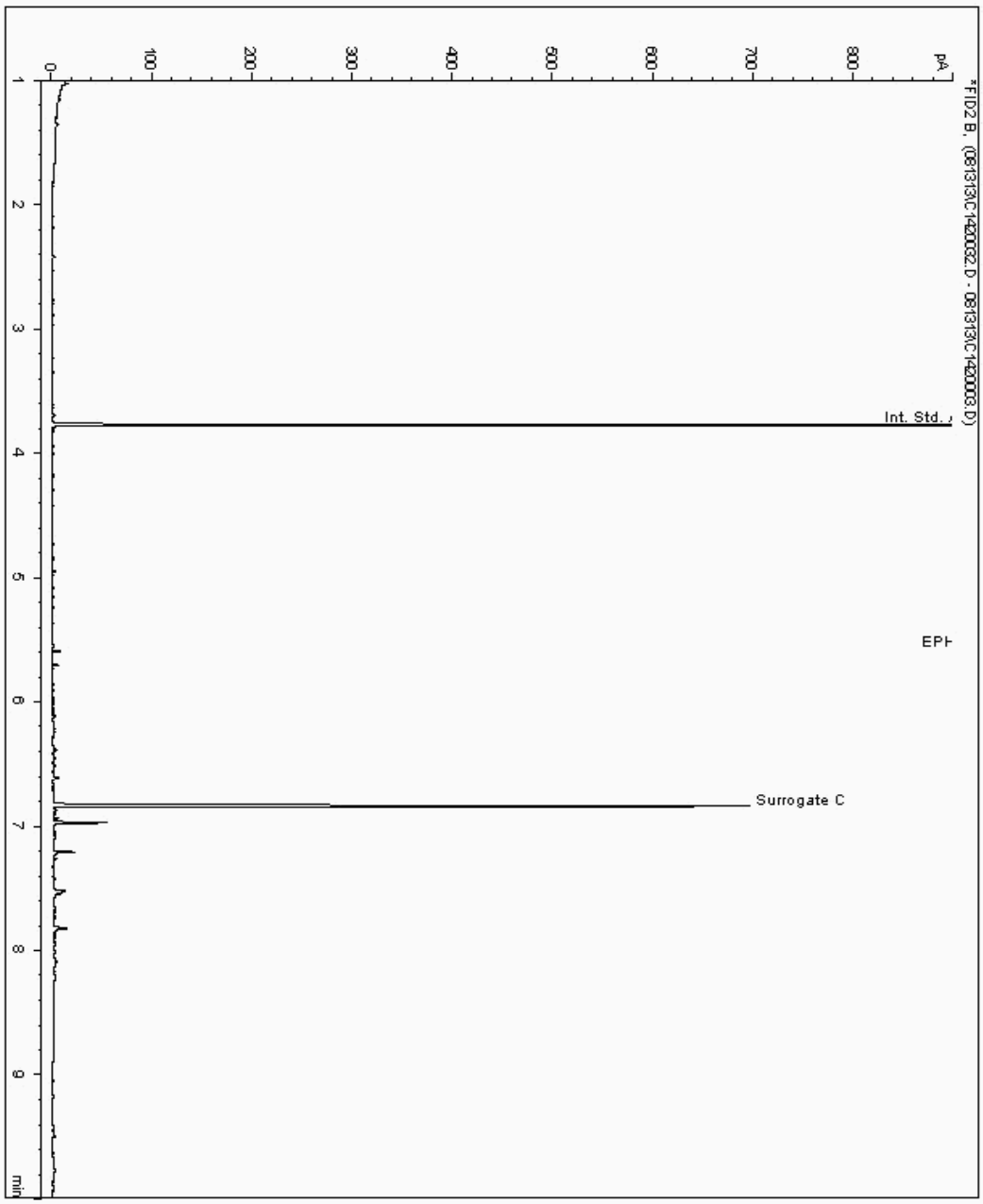
Analysis: Mineral Oil

Sample No : 7953996
Sample ID : 59

Depth : 0.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7588426-7924342
Date Acquired : 14/08/13 00:56:38 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

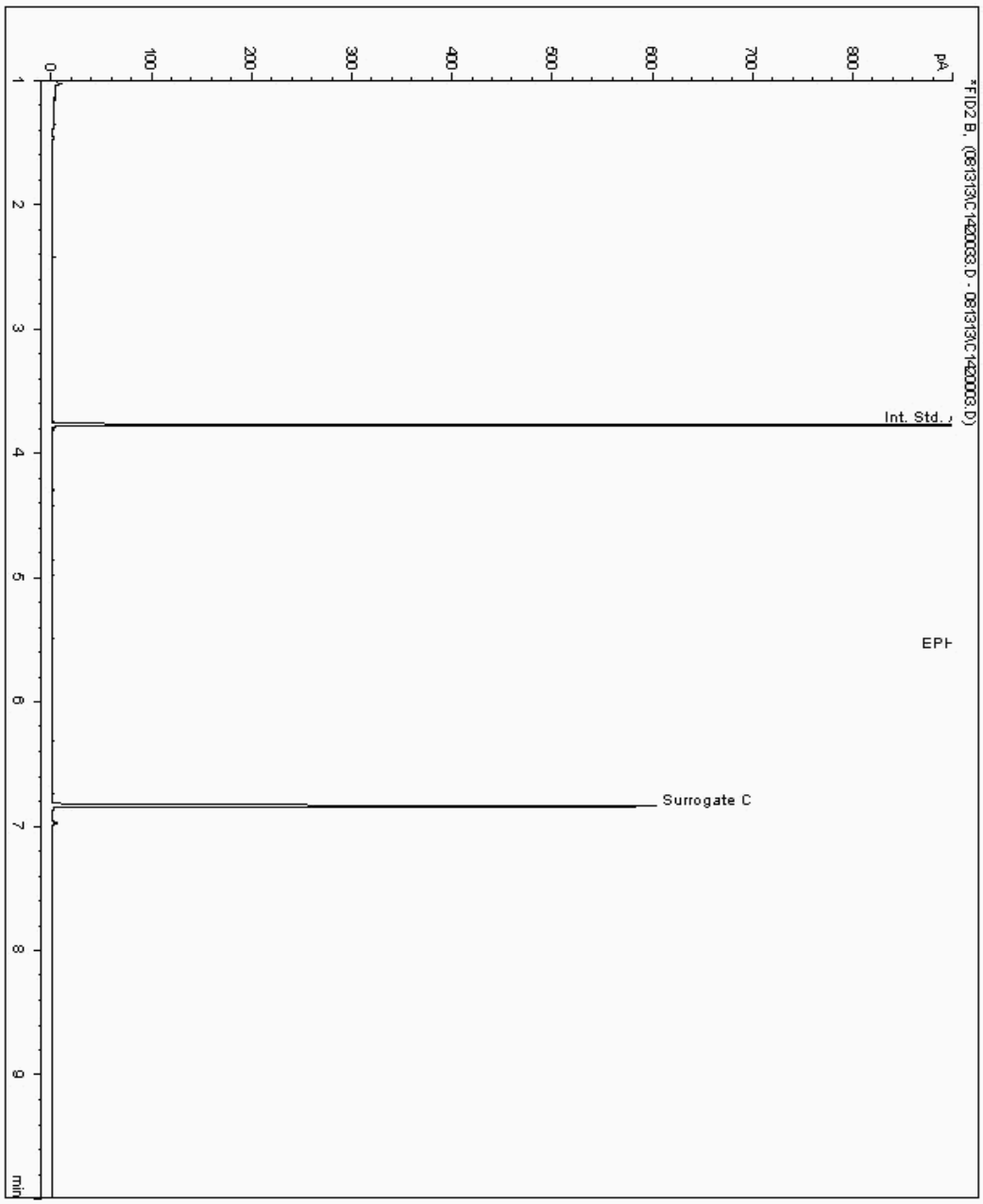
Analysis: Mineral Oil

Sample No : 7954002
Sample ID : 16

Depth : 1.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7588427-7924343
Date Acquired : 14/08/13 01:20:36 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

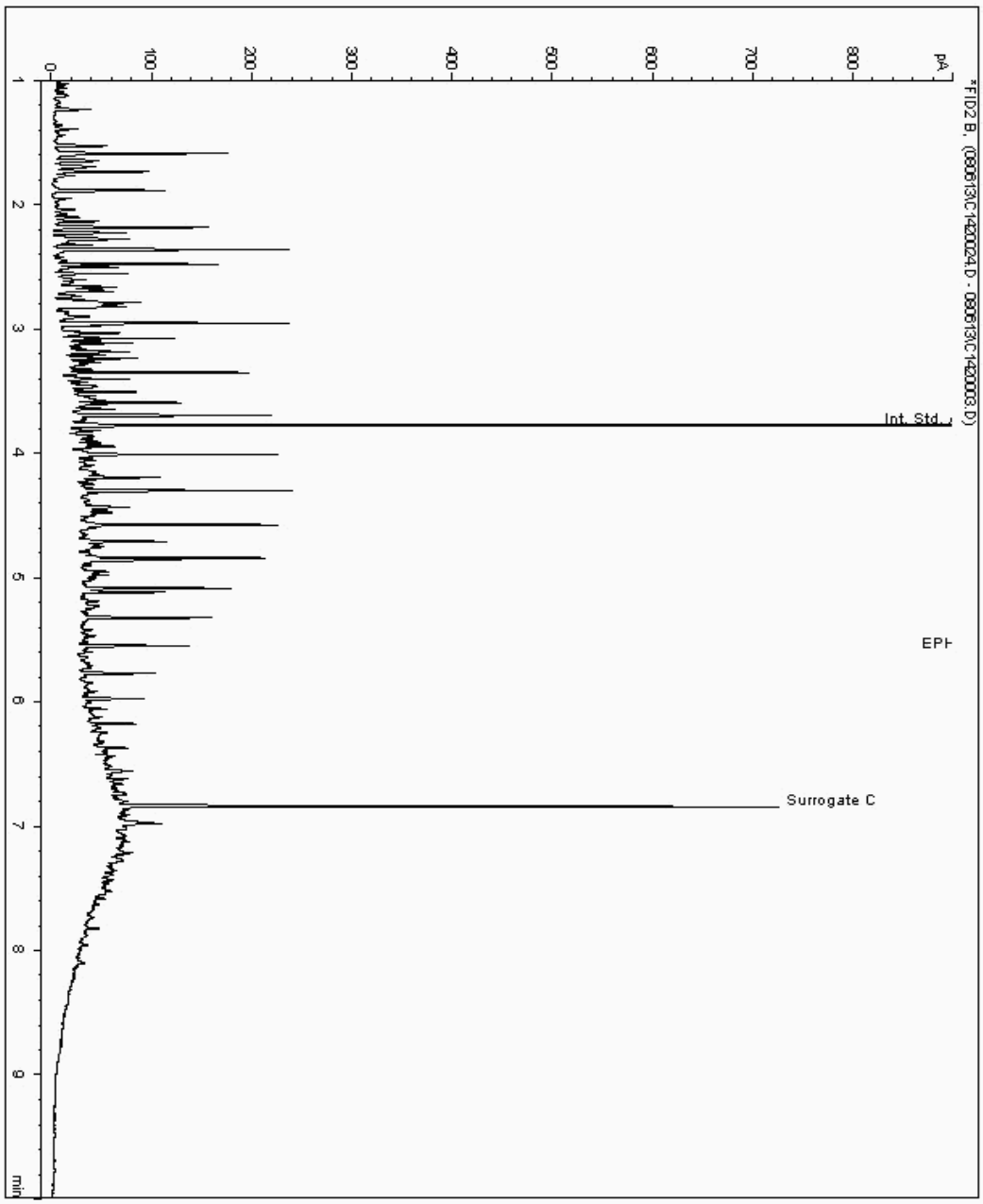
Analysis: Mineral Oil

Sample No : 7957363
Sample ID : 56

Depth : 1.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7548084-7880467
Date Acquired : 06/08/13 15:01:18 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

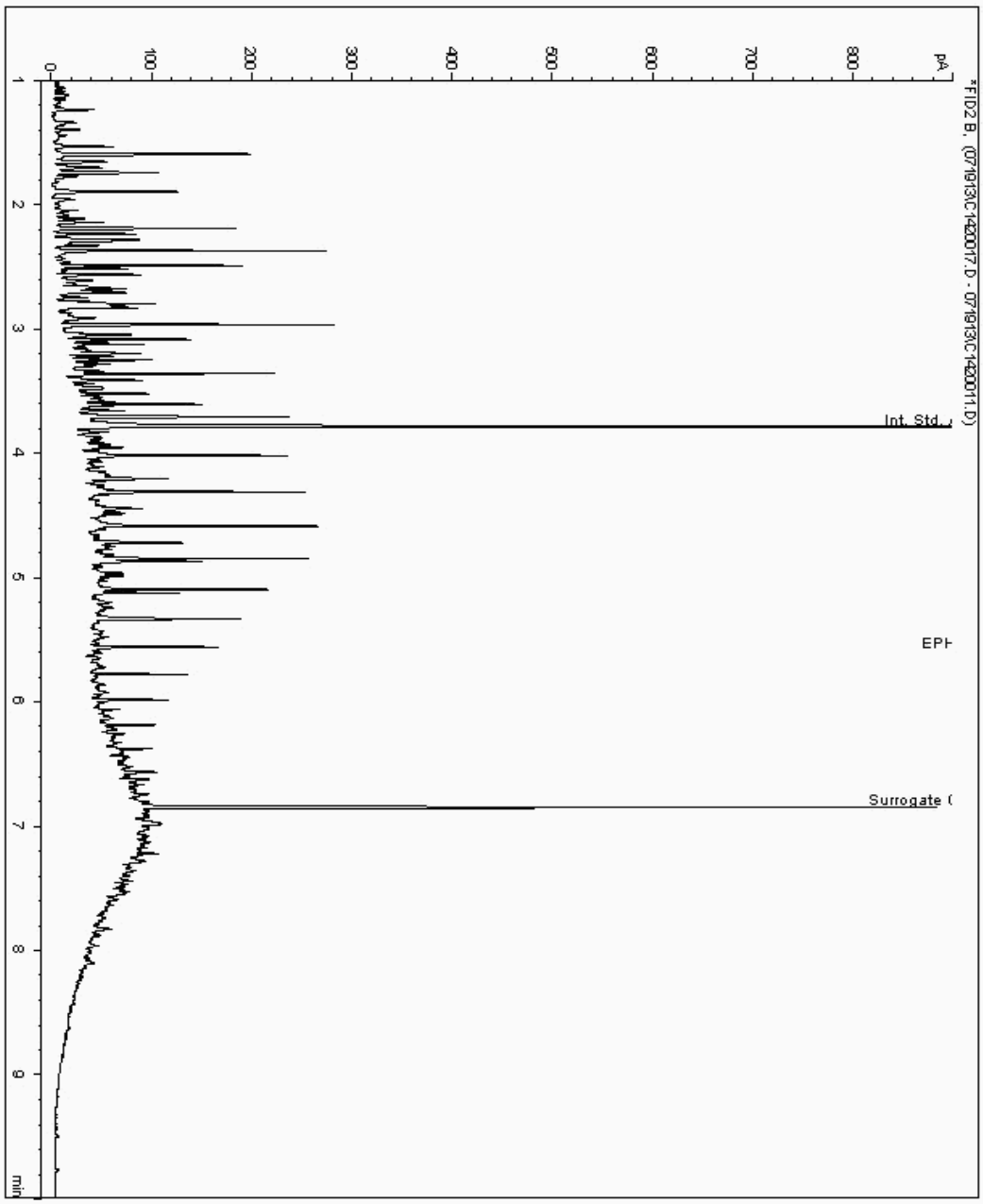
Analysis: Mineral Oil

Sample No : 7966661
Sample ID : 15

Depth : 0.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7463268-7781836
Date Acquired : 19/07/13 20:47:56 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

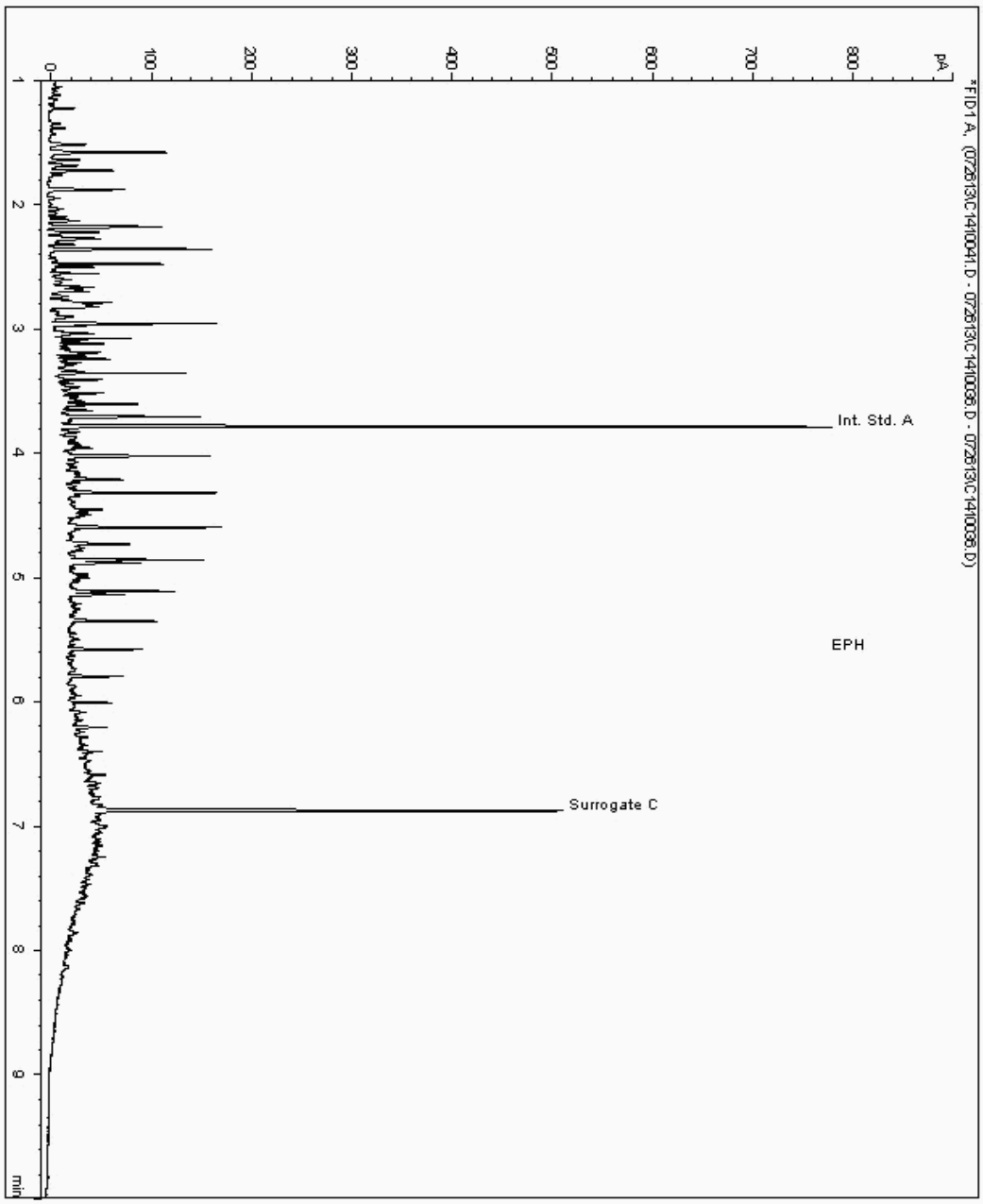
Analysis: Mineral Oil

Sample No : 7966672
Sample ID : 68

Depth : 1.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7496660-7819363
Date Acquired : 27/07/13 01:51:11 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

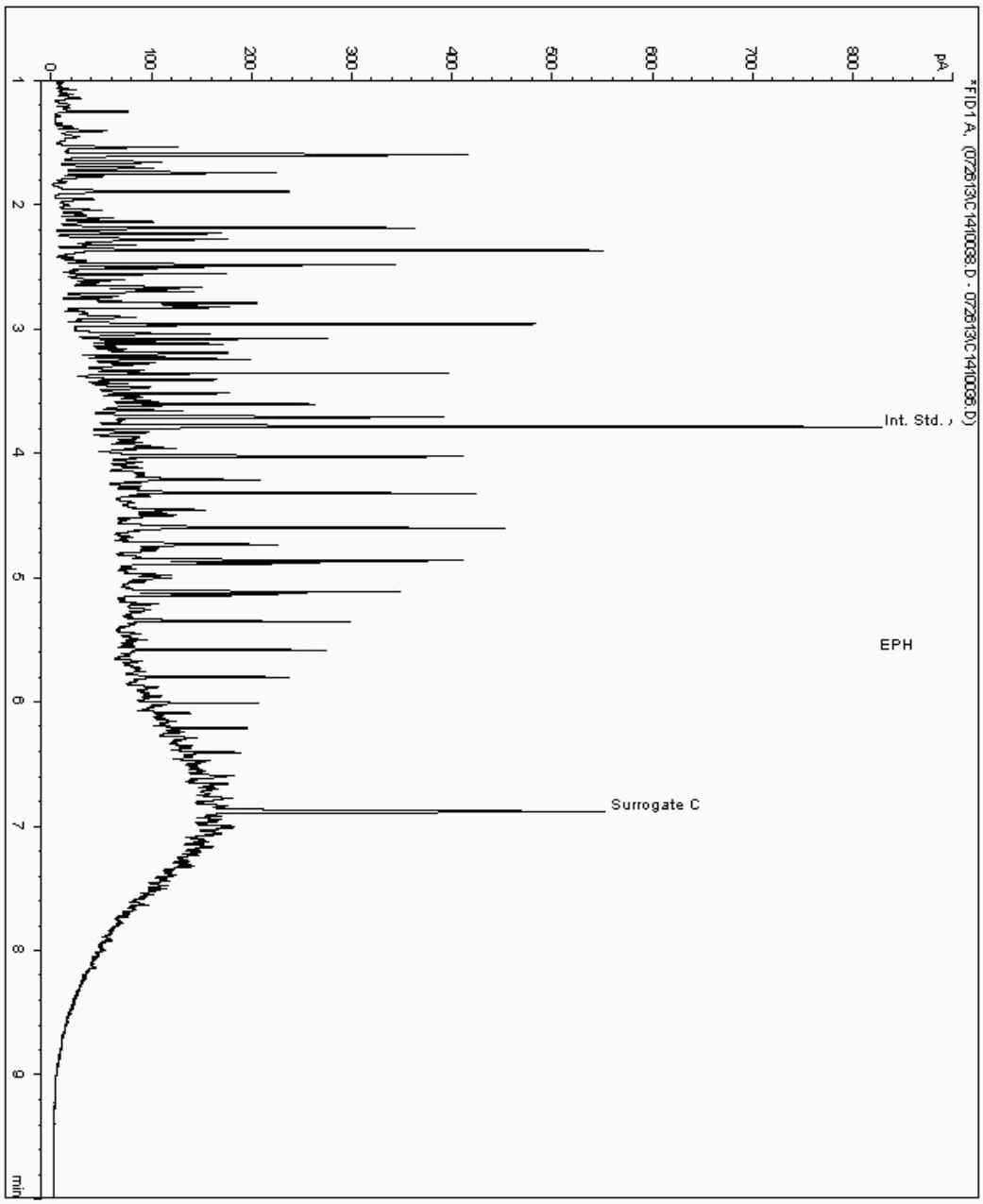
Analysis: Mineral Oil

Sample No : 7966693
Sample ID : 63

Depth : 0.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : EPH CQC 4000
Date Acquired : 27/07/13 00:36:18 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

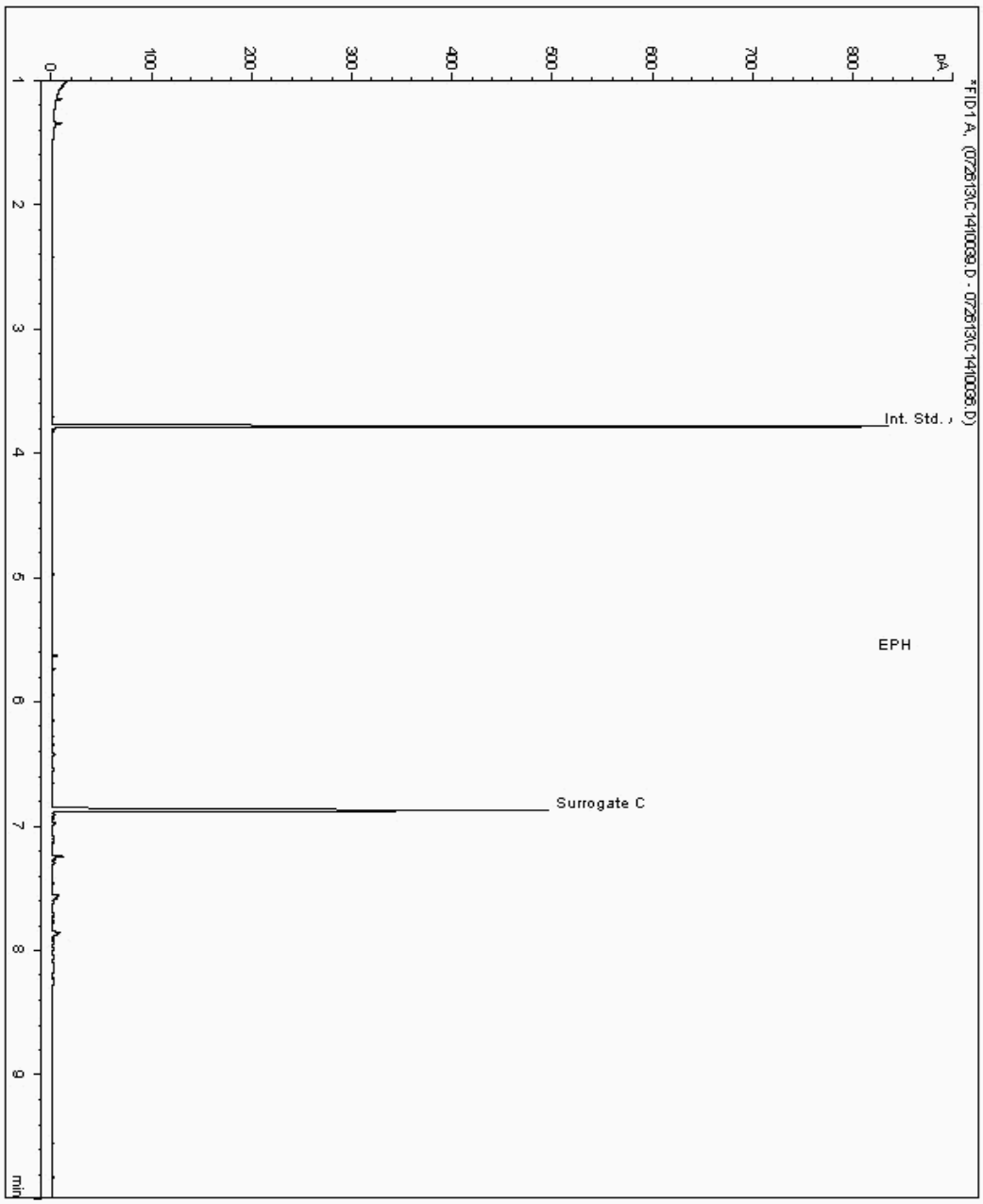
Analysis: Mineral Oil

Sample No : 7966708
Sample ID : 67

Depth : 0.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7496658-7819361
Date Acquired : 27/07/13 01:01:15 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

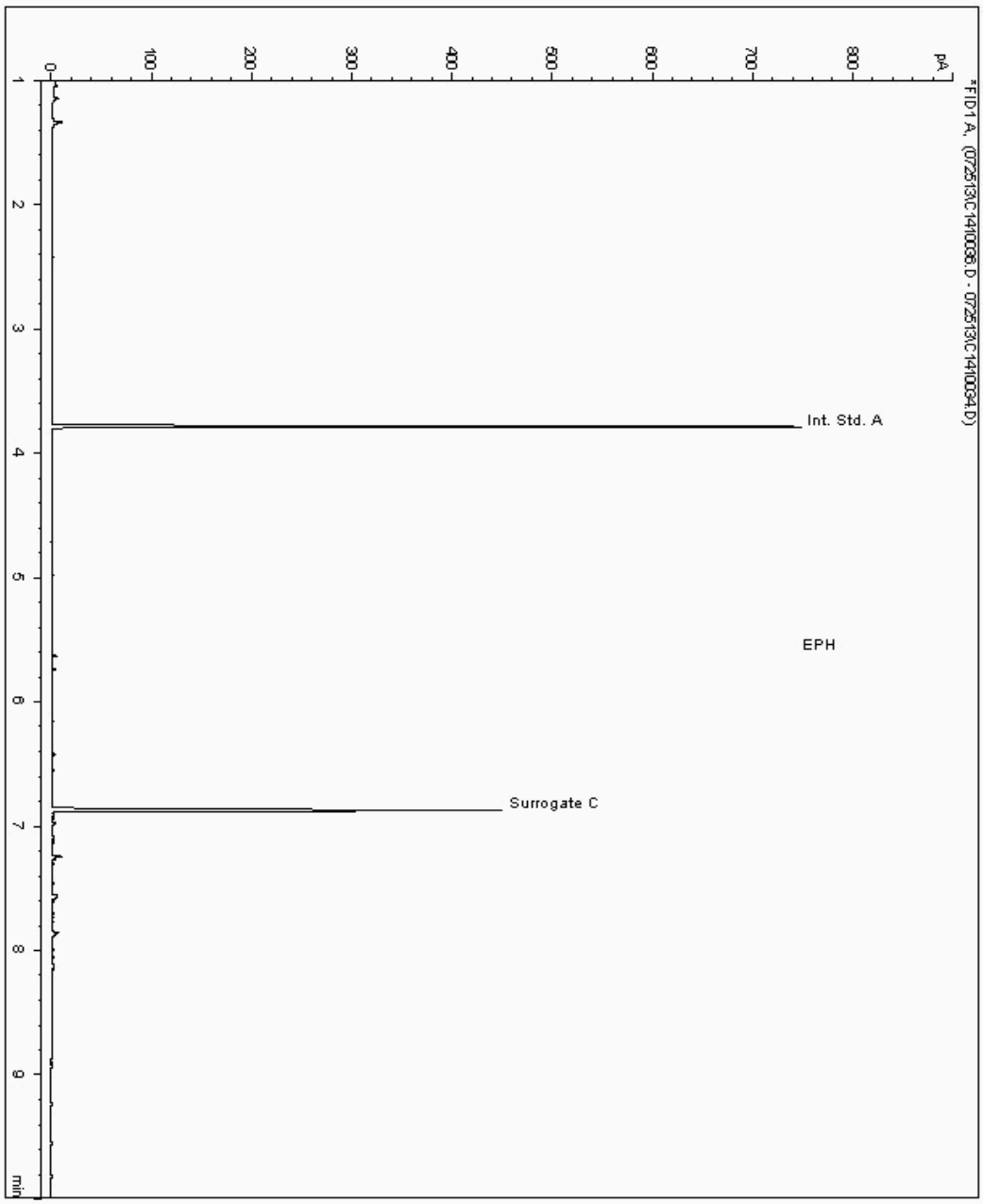
Analysis: Mineral Oil

Sample No : 7966721
Sample ID : 64

Depth : 1.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7488251-7810992
Date Acquired : 26/07/13 07:53:31 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

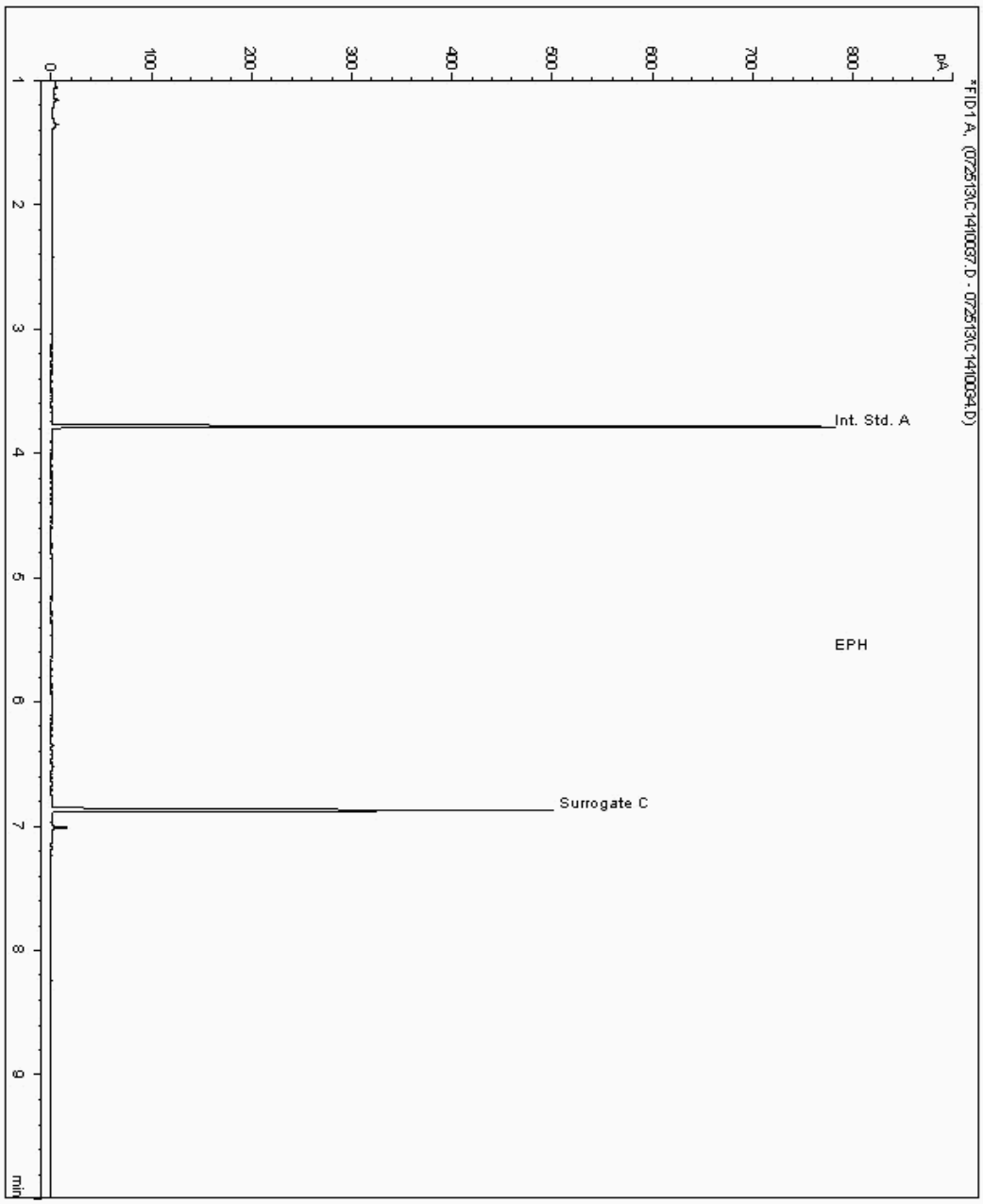
Analysis: Mineral Oil

Sample No : 7966744
Sample ID : 60

Depth : 1.50

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity : 7488252-7810993
Date Acquired : 26/07/13 08:15:59 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



CERTIFICATE OF ANALYSIS

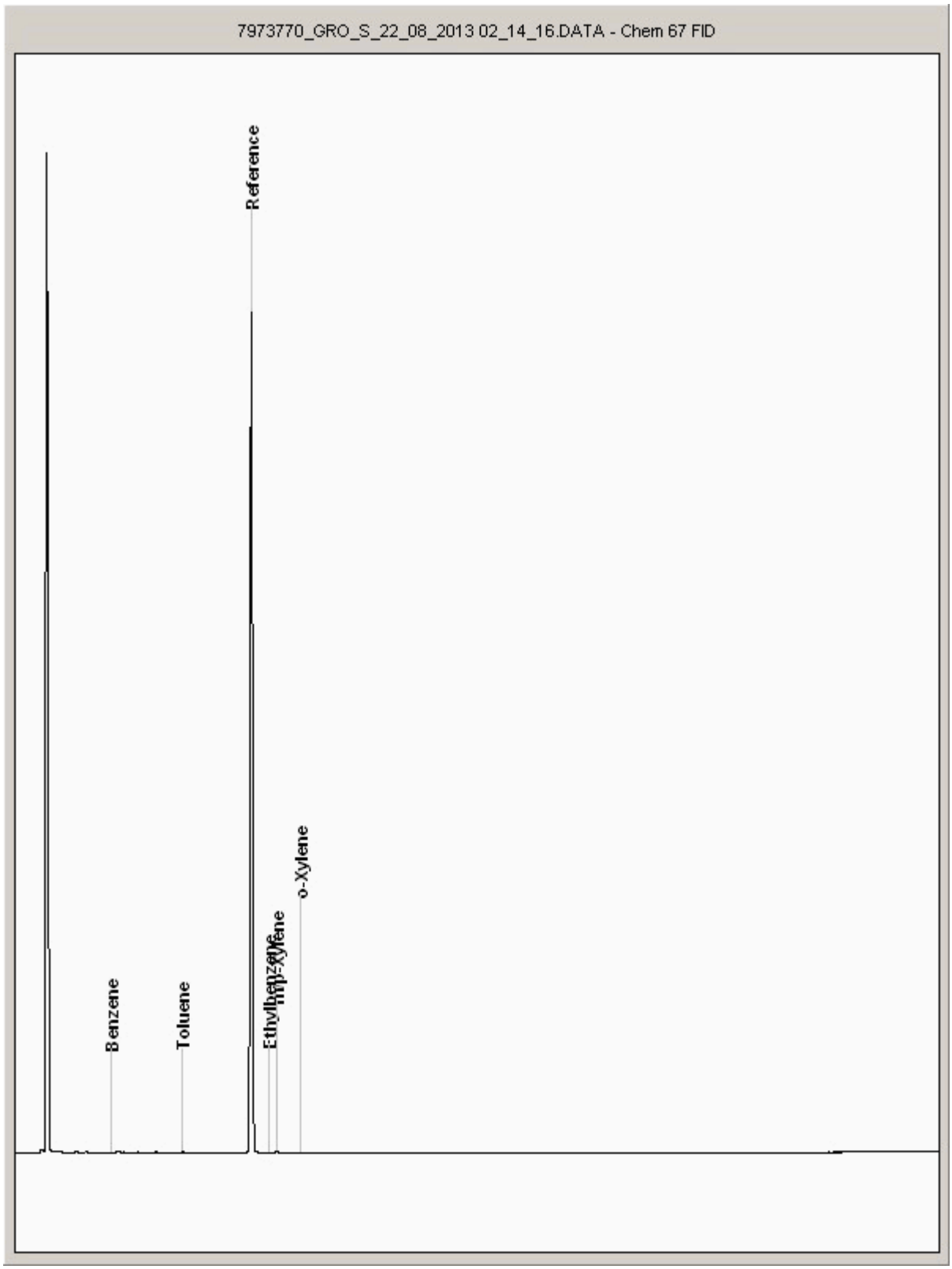
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973770
Sample ID : 55

Depth : 0.50



CERTIFICATE OF ANALYSIS

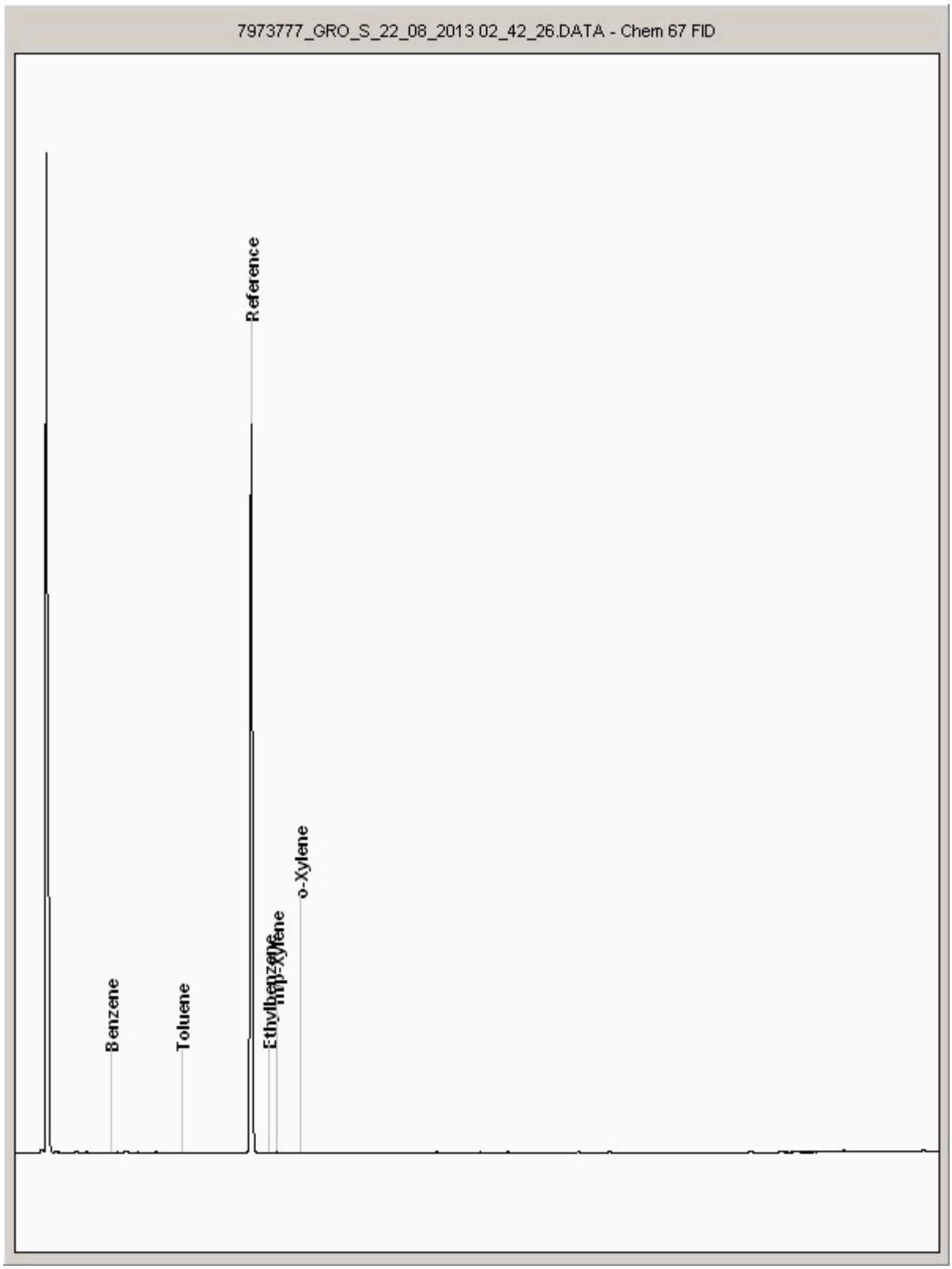
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973777
Sample ID : 60

Depth : 1.50



CERTIFICATE OF ANALYSIS

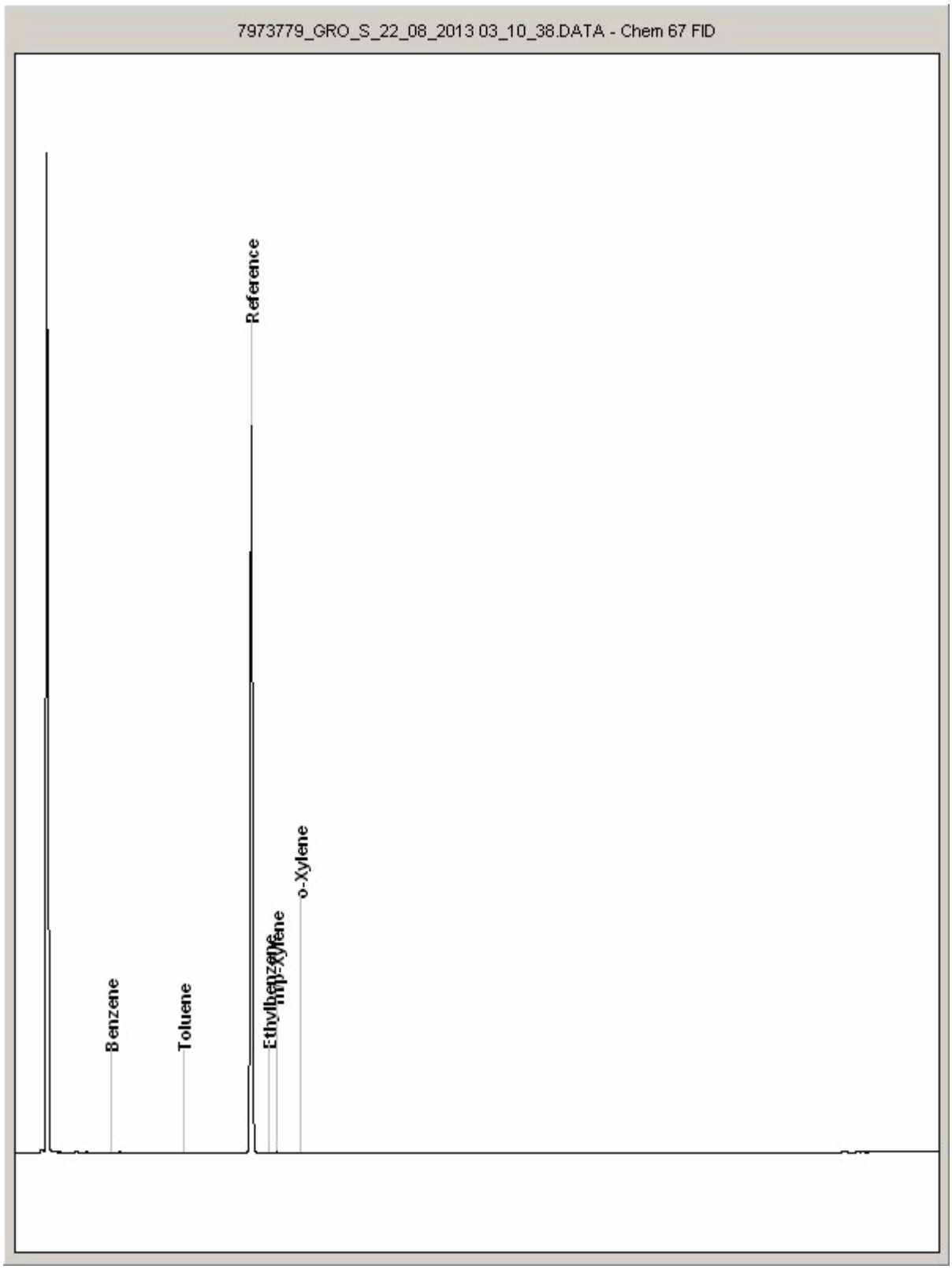
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973779
Sample ID : 16

Depth : 1.50



CERTIFICATE OF ANALYSIS

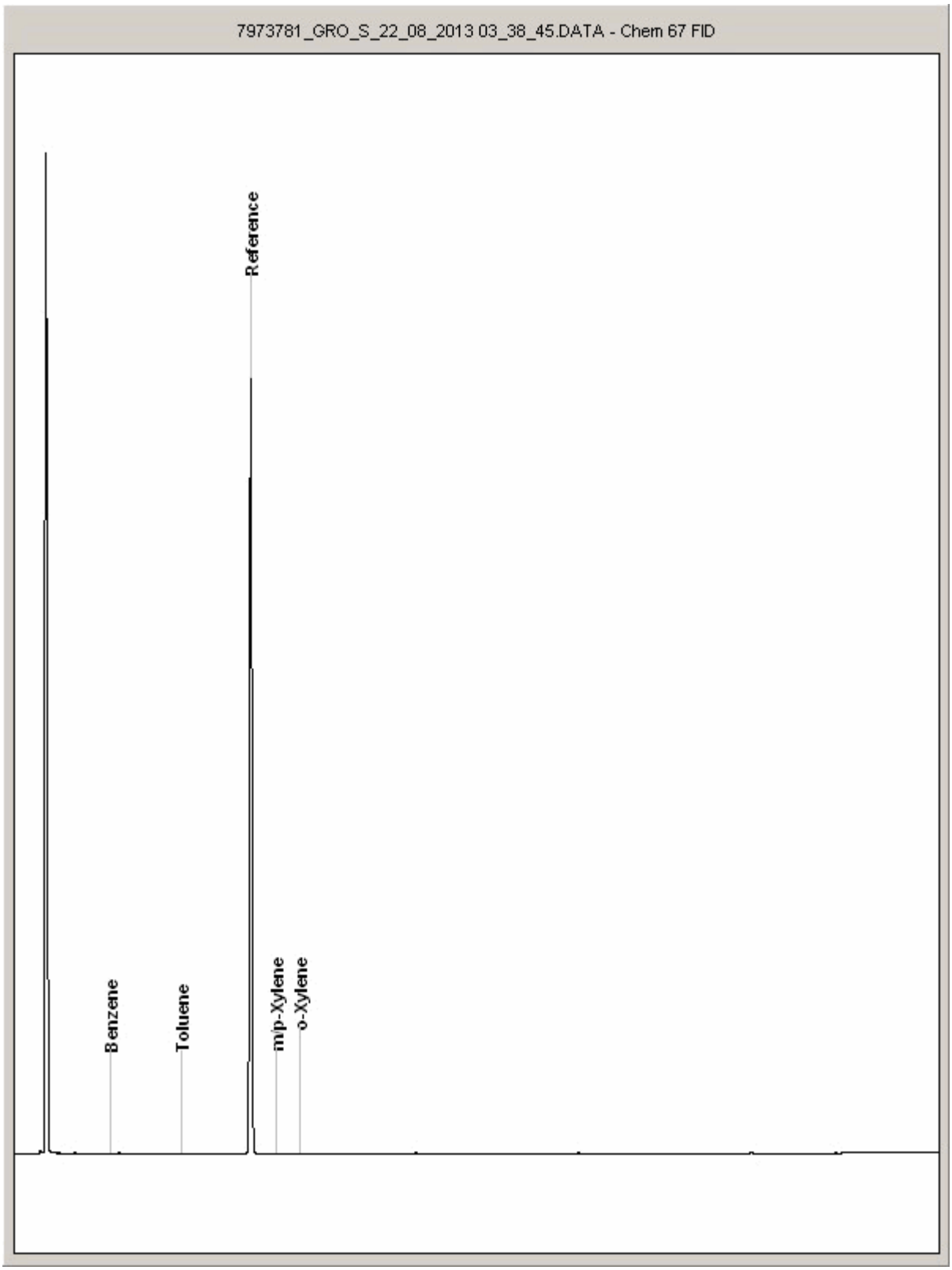
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973781
Sample ID : 56

Depth : 1.50



CERTIFICATE OF ANALYSIS

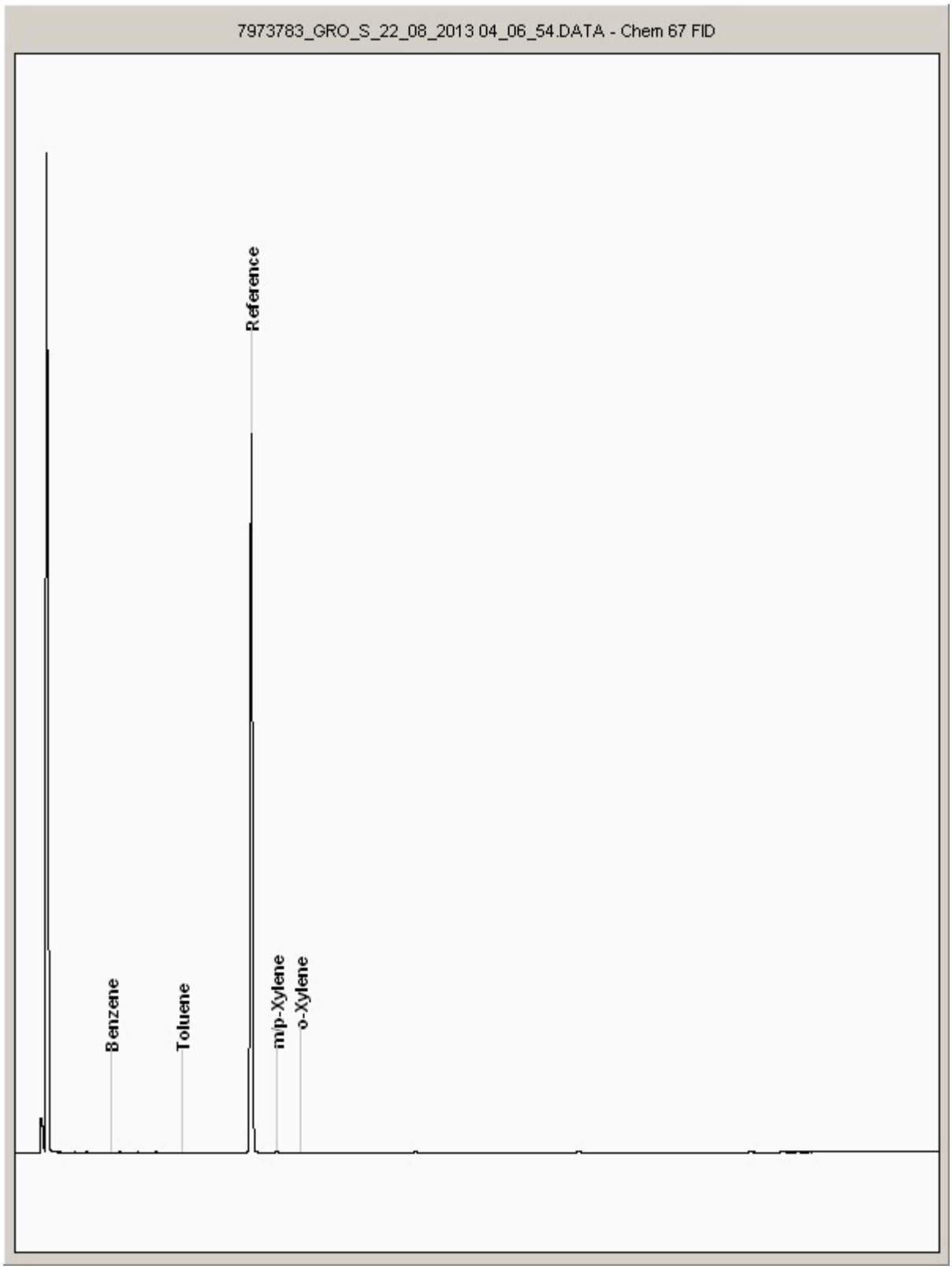
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973783
Sample ID : 59

Depth : 0.50



CERTIFICATE OF ANALYSIS

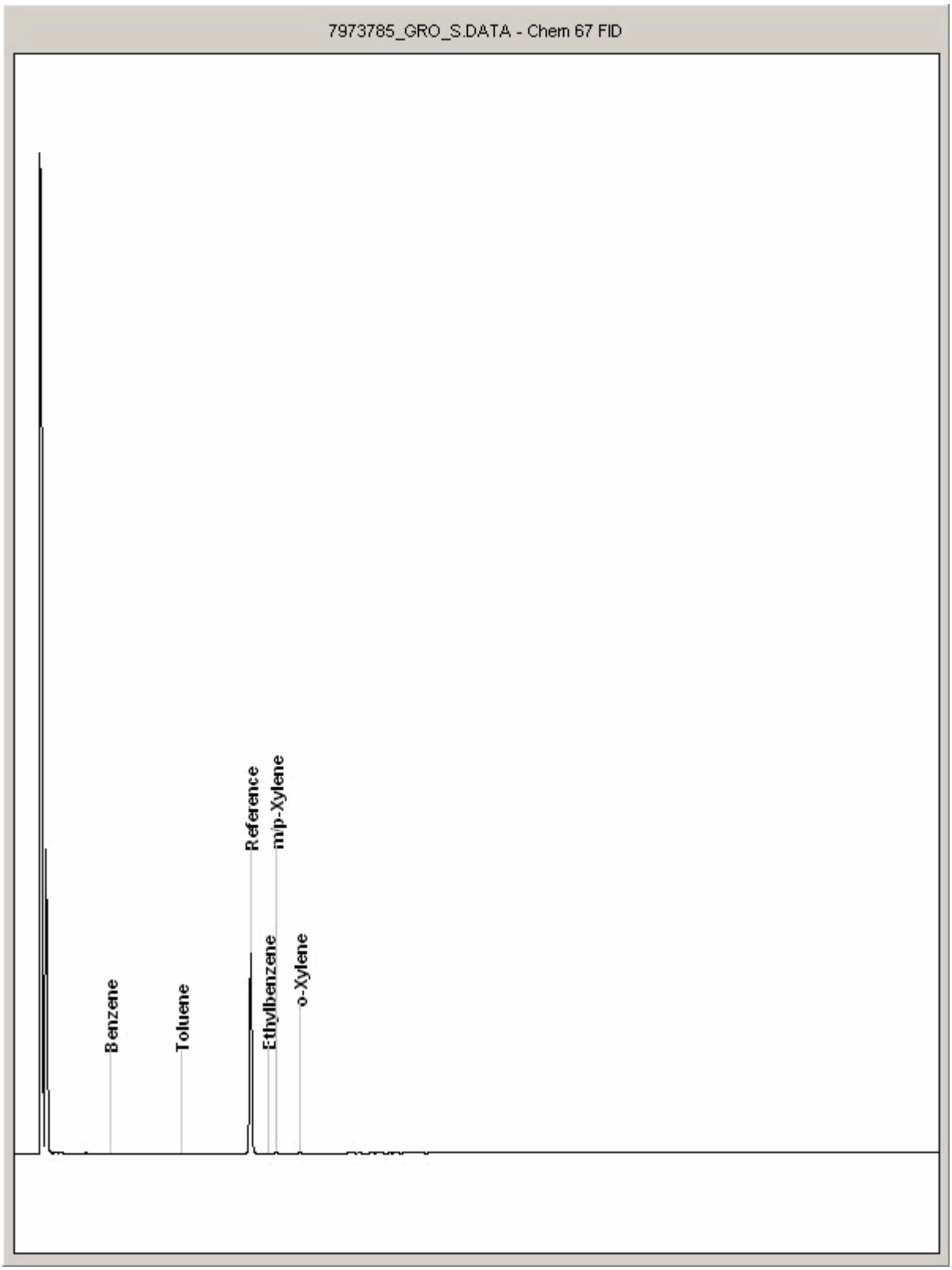
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973785
Sample ID : 67

Depth : 0.50



CERTIFICATE OF ANALYSIS

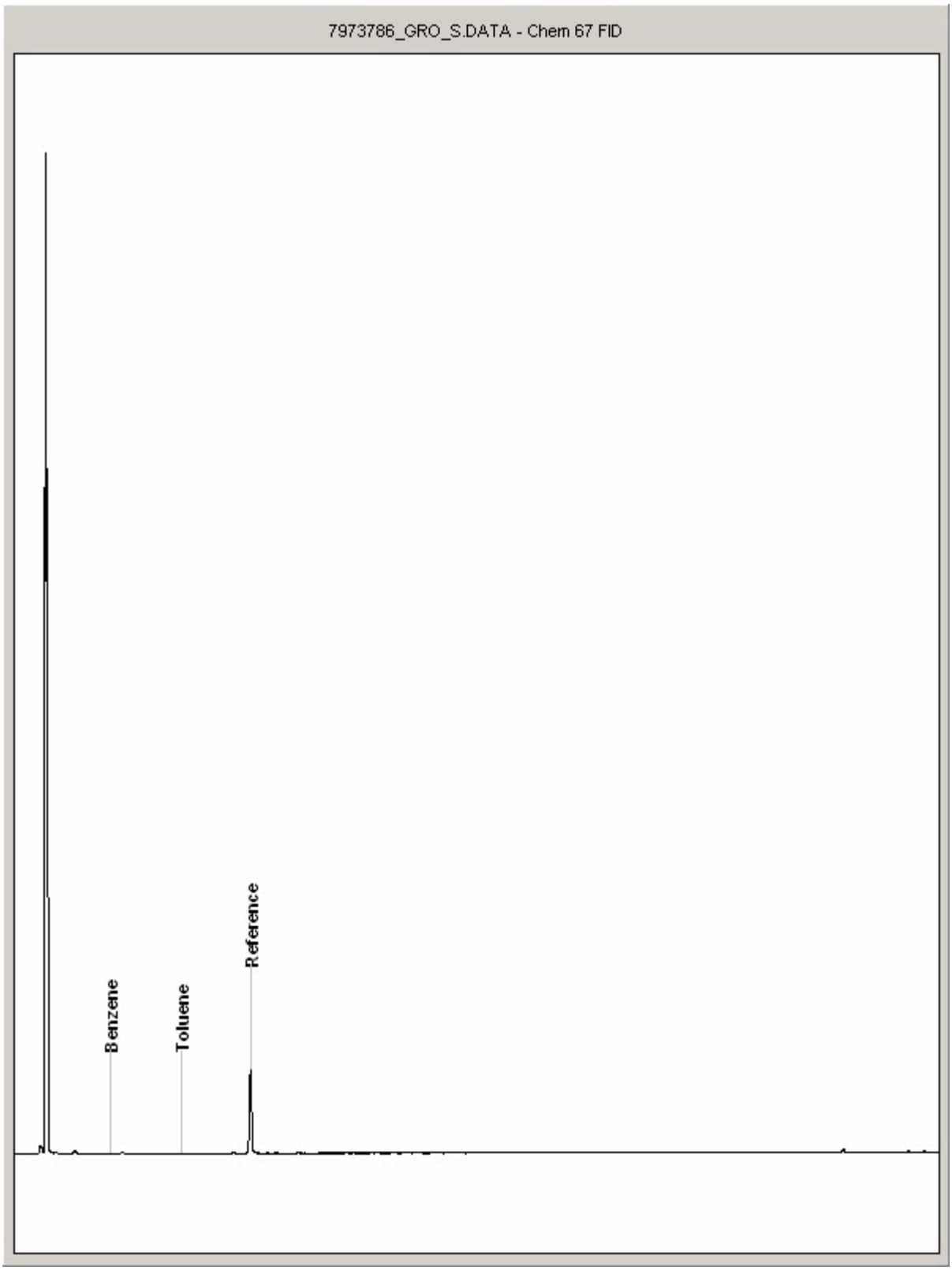
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973786
Sample ID : 68

Depth : 1.50



CERTIFICATE OF ANALYSIS

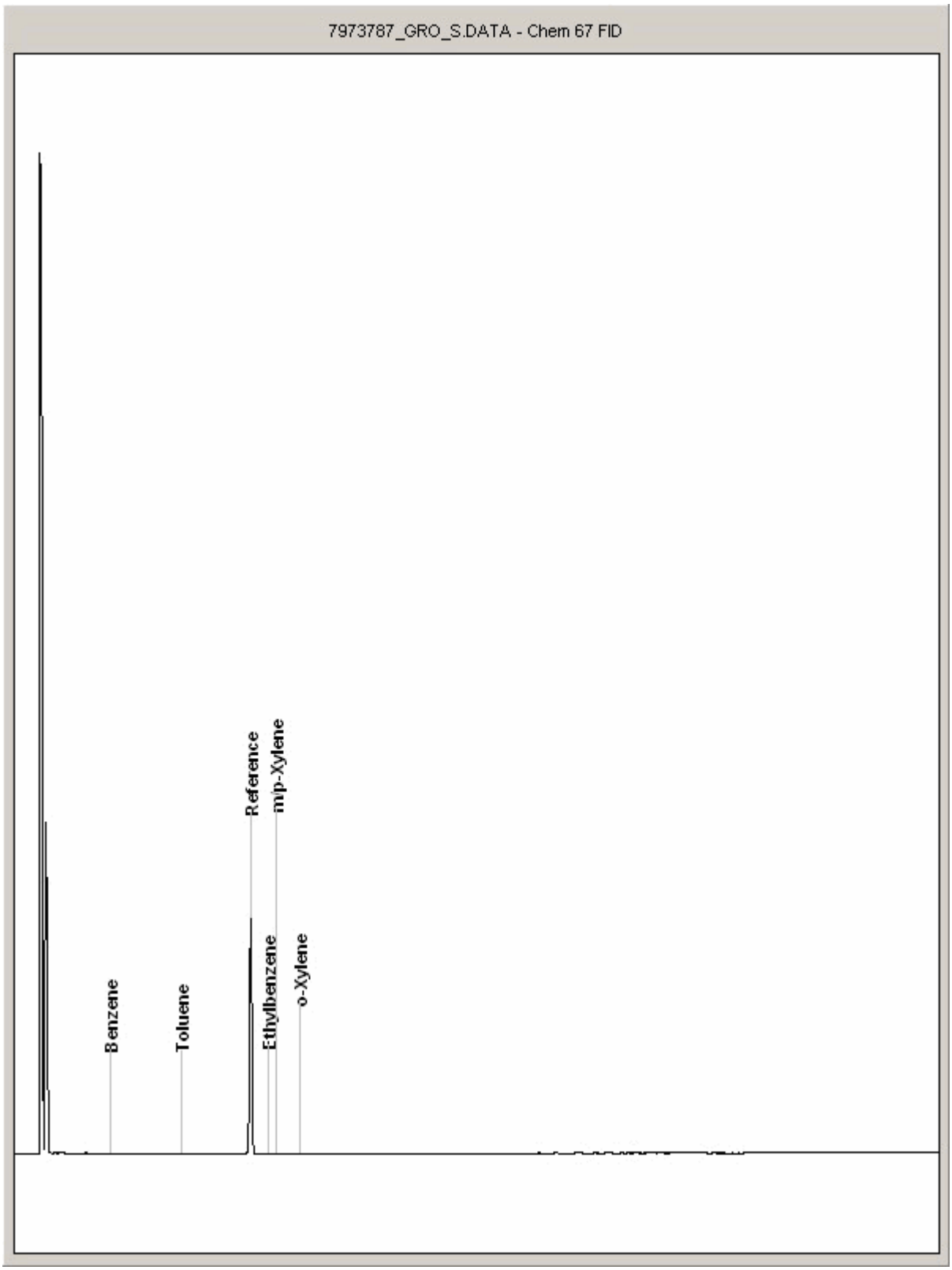
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973787
Sample ID : 63

Depth : 0.50



CERTIFICATE OF ANALYSIS

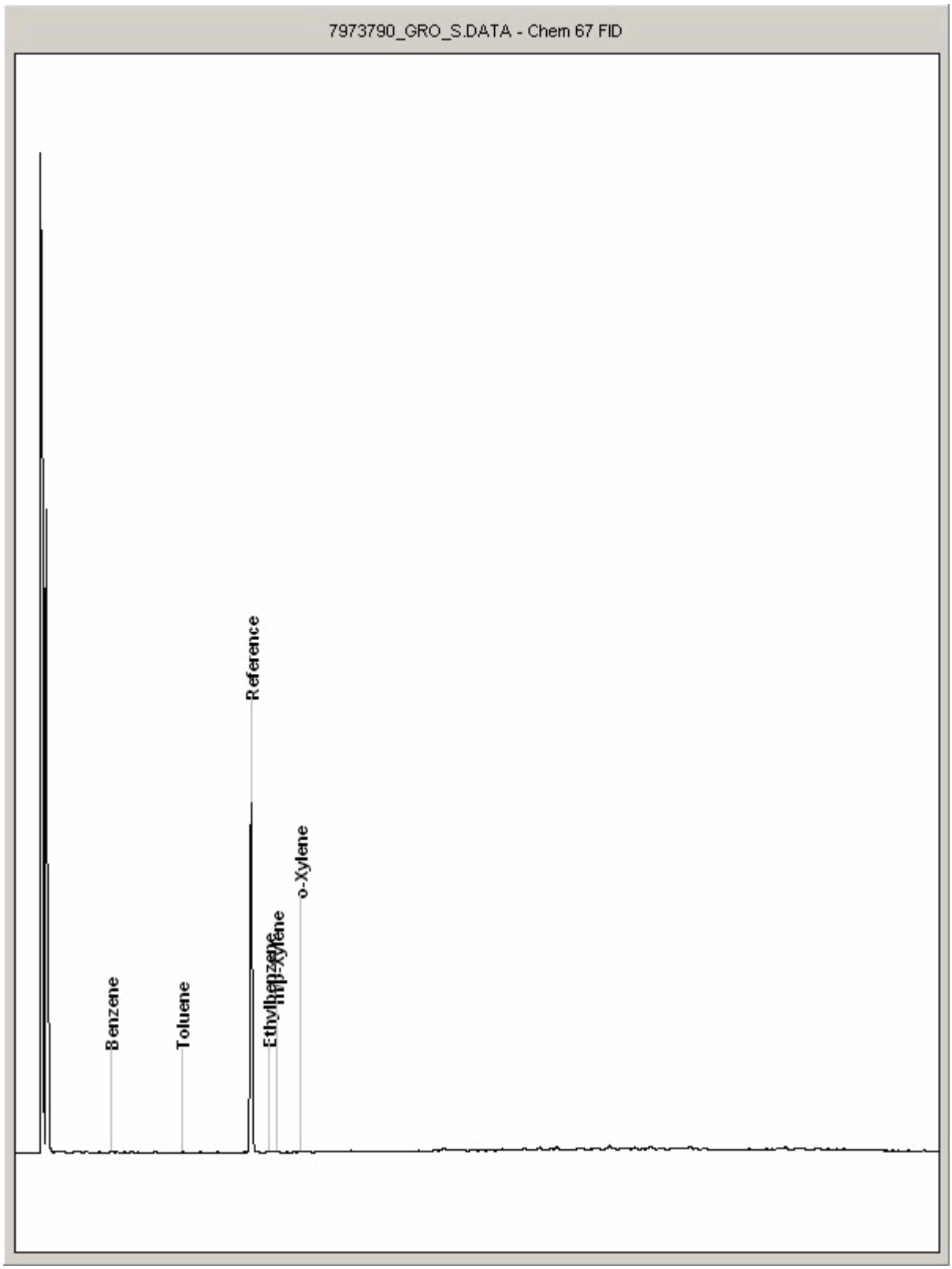
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973790
Sample ID : 64

Depth : 1.50



CERTIFICATE OF ANALYSIS

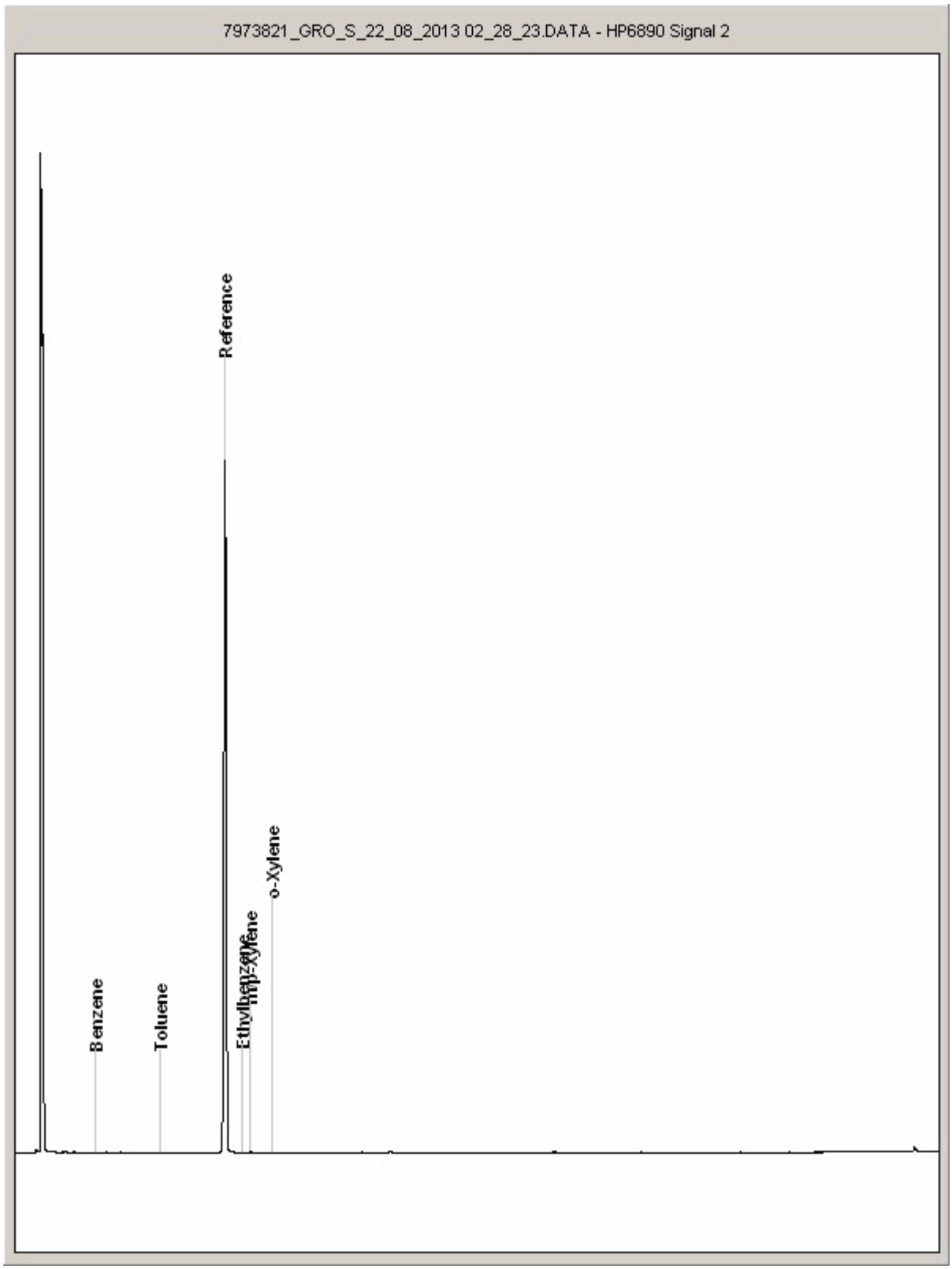
SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 7973821
Sample ID : 15

Depth : 0.50



SDG:	130809-67	**Location:**	Dublin Port	**Order Number:**	37501
Job:	D_PRIORGEOT_CRK-82	**Customer:**	Priority Geotechnical Ltd	**Report Number:**	239189
Client Reference:	PH13003B	**Attention:**	Colette Kelly	**Superseded Report:**	

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 2 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. ALcontrol Laboratories 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 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.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
§	**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 Alcontrol Laboratories (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 Alcontrol Laboratories (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.

Steve Nichols
HBR Ltd
Coggeshall Road
Earls Colne
Essex
CO6 2JX

t: 01787 222768
f: 01787 223235
e: steve.nichols@hbrlimited.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Preliminary Report Number : 14-62542

Project / Site name:	Dublin Port	**Samples received on:**	05/11/2014
Your job number:	HBRC050	**Samples instructed on:**	05/11/2014
Your order number:		**Analysis completed by:**	Not complete
Report Issue Number:	0	**Report issued on:**	18/11/2014
Samples Analysed:	2 leachate samples		

Signed: CCStone

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed: _____

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.
Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-62542

Project / Site name: Dublin Port

Lab Sample Number				388784	388785			
Sample Reference				DPMix4/03112014 Day 1	DPMix2/03112014 Day 1			
Sample Number				Tank Test	Tank Test			
Depth (m)				None Supplied	None Supplied			
Date Sampled				03/11/2014	03/11/2014			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	11.0	9.7			
Electrical Conductivity	µS/cm	10	NONE	2400	1200			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200			
Sulphate as SO_4	µg/l	100	ISO 17025	43600	34700			
Sulphide	µg/l	5	NONE	< 5.0	< 5.0			
Total Organic Carbon (TOC)	mg/l	0.1	NONE	3.94	8.43			
Biochemical Oxygen Demand	mg/l	1	ISO 17025	To follow	To follow			
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2			
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	1.8	0.38			
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	< 1.1			
Boron (dissolved)	µg/l	10	ISO 17025	45	24			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	< 0.4			
Copper (dissolved)	µg/l	0.7	ISO 17025	7.7	5.1			
Lead (dissolved)	µg/l	1	ISO 17025	1.2	< 1.0			
Lithium (dissolved)	µg/l	30	NONE	< 30	< 30			
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01	< 0.01			
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.9	5.3			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4			

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-62542

Project / Site name: Dublin Port

Lab Sample Number				388784	388785			
Sample Reference				DPMix4/03112014 Day 1	DPMix2/03112014 Day 1			
Sample Number				Tank Test	Tank Test			
Depth (m)				None Supplied	None Supplied			
Date Sampled				03/11/2014	03/11/2014			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0	< 1.0			
Toluene	µg/l	1	NONE	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	NONE	< 1.0	< 1.0			
p & m-xylene	µg/l	1	NONE	< 1.0	< 1.0			
o-xylene	µg/l	1	NONE	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10			
TPH2 (C6 - C10)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C6 - C8)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C8 - C10)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C10 - C12)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C12 - C16)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C16 - C21)	µg/l	10	NONE	< 10	< 10			
TPH Texas (C21 - C40)	µg/l	10	NONE	< 10	< 10			
PCBs by GC-MS								
PCB Congener 28	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 52	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 101	µg/l	0.02	NONE	< 0.02	< 0.02			
PCB Congener 118	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 138	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 153	µg/l	0.05	NONE	< 0.05	< 0.05			
PCB Congener 180	µg/l	0.05	NONE	< 0.05	< 0.05			
PCBs by GC-MS								
Total PCBs	µg/l	0.4	NONE	< 0.40	< 0.40			
Tributyl Tin	ng/l	1	NONE	91	190			
Dibutyl Tin	ng/l	1	NONE	31	31			
Tetrabutyl Tin	ng/l	1	NONE	< 1.0	< 1.0			
Triphenyl Tin	ng/l	1	NONE	5.0	2.1			

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Preliminary Report Number : 14-62542

Project / Site name: Dublin Port

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Biological oxygen demand of leachate	Determination of biochemical oxygen demand in leachate (5 days).	In-house method based on standard method 5210B. Samples received > 24 hrs after sampling, data may not be valid and should be interpreted with care.	L086-PL	W	ISO 17025
Boron in leachate	Determination of boron by acidification followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK	W	NONE
EF - Organotins by GC-MS/MS	Organotins by GC-MS/MS	In-house method		W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-UK	W	NONE
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Mercury Low Level in Leachate	Determination of mercury in leachate by CV-AFS.	In-house method based on USEPA method 1631	L085-UK	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in leachate	Determination of total organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Preliminary Report Number : 14-62542

Project / Site name: Dublin Port

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073W-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Steve Nichols
HBR Ltd
Coggeshall Road
Earls Colne
Essex
CO6 2JX

t: 01787 222768
f: 01787 223235
e: steve.nichols@hbrlimited.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 14-61620

Project / Site name:	Dublin Port Project HBRC050	**Samples received on:**	06/08/2014
Your job number:	HBRC050	**Samples instructed on:**	17/10/2014
Your order number:		**Analysis completed by:**	27/10/2014
Report Issue Number:	1	**Report issued on:**	27/10/2014
Samples Analysed:	1 leachate sample		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-61620

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				383334				
Sample Reference				Day 64				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/10/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	11.2				
Electrical Conductivity	µS/cm	10	NONE	1300				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	200				
Sulphate as SO_4	µg/l	100	ISO 17025	54700				
Sulphide	µg/l	5	NONE	< 5.0				
Total Organic Carbon (TOC)	mg/l	0.1	NONE	9.56				
Biochemical Oxygen Demand	mg/l	1	ISO 17025	< 1.0				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-61620

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				383334				
Sample Reference				Day 64				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/10/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	2.6				
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1				
Boron (dissolved)	µg/l	10	ISO 17025	150				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (hexavalent)	µg/l	5	NONE	< 5.0				
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	27				
Lead (dissolved)	µg/l	1	ISO 17025	2.4				
Lithium (dissolved)	µg/l	30	NONE	< 30				
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01				
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.6				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0				
Toluene	µg/l	1	NONE	< 1.0				
Ethylbenzene	µg/l	1	NONE	< 1.0				
p & m-xylene	µg/l	1	NONE	< 1.0				
o-xylene	µg/l	1	NONE	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH2 (C6 - C10)	µg/l	10	NONE	< 10				
TPH5 (C6 - C40)	µg/l	10	NONE	< 10				
TPH Texas (C6 - C8)	µg/l	10	NONE	< 10				
TPH Texas (C8 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C10 - C12)	µg/l	10	NONE	< 10				
TPH Texas (C12 - C16)	µg/l	10	NONE	< 10				
TPH Texas (C16 - C21)	µg/l	10	NONE	< 10				
TPH Texas (C21 - C40)	µg/l	10	NONE	< 10				
PCBs by GC-MS								
PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				
PCBs by GC-MS								
Total PCBs	µg/l	0.4	NONE	< 0.40				
Tributyl Tin	ng/l	1	NONE	72				
Dibutyl Tin	ng/l	1	NONE	28				
Tetrabutyl Tin	ng/l	1	NONE	1.2				
Triphenyl Tin	ng/l	1	NONE	3.7				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-61620

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Biological oxygen demand of leachate	Determination of biochemical oxygen demand in leachate (5 days).	In-house method based on standard method 5210B. Samples received > 24 hrs after sampling, data may not be valid and should be interpreted with care.	L086-PL	W	ISO 17025
Boron in leachate	Determination of boron by acidification followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK	W	NONE
EF - Organotins by GC-MS/MS	Organotins by GC-MS/MS	In-house method		W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-UK	W	NONE
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Mercury Low Level in Leachate	Determination of mercury in leachate by CV-AFS.	In-house method based on USEPA method 1631	L085-UK	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in leachate	Determination of total organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-61620

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073W-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Steve Nichols
HBR Ltd
Coggeshall Road
Earls Colne
Essex
CO6 2JX

t: 01787 222768
f: 01787 223235
e: steve.nichols@hbrlimited.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 14-60080

Project / Site name:	Dublin Port Project HBRC050	**Samples received on:**	06/08/2014
Your job number:	HBRC050	**Samples instructed on:**	18/09/2014
Your order number:		**Analysis completed by:**	01/10/2014
Report Issue Number:	1	**Report issued on:**	01/10/2014
Samples Analysed:	1 leachate sample		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-60080

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				373527				
Sample Reference				Day 36				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				18/09/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	11.5				
Electrical Conductivity	µS/cm	10	NONE	1400				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO_4	µg/l	100	ISO 17025	45200				
Sulphide	µg/l	5	NONE	< 5.0				
Total Organic Carbon (TOC)	mg/l	0.1	NONE	15.1				
Biochemical Oxygen Demand	mg/l	1	ISO 17025	< 1.0				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-60080

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				373527				
Sample Reference				Day 36				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				18/09/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.99				
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1				
Boron (dissolved)	µg/l	10	ISO 17025	69				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (hexavalent)	µg/l	5	NONE	< 5.0				
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	7.1				
Lead (dissolved)	µg/l	1	ISO 17025	1.5				
Lithium (dissolved)	µg/l	30	NONE	< 30				
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01				
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.1				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0				
Toluene	µg/l	1	NONE	< 1.0				
Ethylbenzene	µg/l	1	NONE	< 1.0				
p & m-xylene	µg/l	1	NONE	< 1.0				
o-xylene	µg/l	1	NONE	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH2 (C6 - C10)	µg/l	10	NONE	< 10				
TPH5 (C6 - C40)	µg/l	10	NONE	< 10				
TPH Texas (C6 - C8)	µg/l	10	NONE	< 10				
TPH Texas (C8 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C10 - C12)	µg/l	10	NONE	< 10				
TPH Texas (C12 - C16)	µg/l	10	NONE	< 10				
TPH Texas (C16 - C21)	µg/l	10	NONE	< 10				
TPH Texas (C21 - C40)	µg/l	10	NONE	< 10				
PCBs by GC-MS								
PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				
PCBs by GC-MS								
Total PCBs	µg/l	0.4	NONE	< 0.40				
Tributyl Tin	ng/l	1	NONE	100				
Dibutyl Tin	ng/l	1	NONE	58				
Tetrabutyl Tin	ng/l	1	NONE	2.8				
Triphenyl Tin	ng/l	1	NONE	2.7				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-60080

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Biological oxygen demand of leachate	Determination of biochemical oxygen demand in leachate (5 days).	In-house method based on standard method 5210B. Samples received > 24 hrs after sampling, data may not be valid and should be interpreted with care.	L086-PL	W	ISO 17025
Boron in leachate	Determination of boron by acidification followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK	W	NONE
EF - Organotins by GC-MS/MS	Organotins by GC-MS/MS	In-house method		W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-UK	W	NONE
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Mercury Low Level in Leachate	Determination of mercury in leachate by CV-AFS.	In-house method based on USEPA method 1631	L085-UK	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL	W	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in leachate	Determination of total organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-60080

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073W-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Steve Nichols
HBR Ltd
Coggeshall Road
Earls Colne
Essex
CO6 2JX

t: 01787 222768
f: 01787 223235
e: steve.nichols@hbrlimited.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Preliminary Report Number : 14-58262

Project / Site name:	Dublin Port Project HBRC050	**Samples received on:**	06/08/2014
Your job number:	HBRC050	**Samples instructed on:**	06/08/2014
Your order number:		**Analysis completed by:**	Not complete
Report Issue Number:	0	**Report issued on:**	14/08/2014
Samples Analysed:	1 leachate sample		

Signed: CCStone

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed: _____

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.
Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-58262

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				361793				
Sample Reference				Day 1				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	11.3				
Electrical Conductivity	µS/cm	10	NONE	1800				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	600				
Sulphate as SO_4	µg/l	100	ISO 17025	63200				
Sulphide	µg/l	5	NONE	41				
Total Organic Carbon (TOC)	mg/l	0.1	NONE	9.49				
Biochemical Oxygen Demand	mg/l	1	ISO 17025	To follow				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	2.0				
Arsenic (dissolved)	µg/l	1.1	ISO 17025	1.3				
Boron (dissolved)	µg/l	10	ISO 17025	45				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (hexavalent)	µg/l	5	NONE	< 5.0				
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	3.4				
Lead (dissolved)	µg/l	1	ISO 17025	1.4				
Lithium (dissolved)	µg/l	30	NONE	< 30				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	< 0.4				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-58262

Project / Site name: Dublin Port Project HBRC050

Lab Sample Number				361793				
Sample Reference				Day 1				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0				
Toluene	µg/l	1	NONE	< 1.0				
Ethylbenzene	µg/l	1	NONE	< 1.0				
p & m-xylene	µg/l	1	NONE	< 1.0				
o-xylene	µg/l	1	NONE	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH2 (C6 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C6 - C8)	µg/l	10	NONE	< 10				
TPH Texas (C8 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C10 - C12)	µg/l	10	NONE	< 10				
TPH Texas (C12 - C16)	µg/l	10	NONE	< 10				
TPH Texas (C16 - C21)	µg/l	10	NONE	< 10				
TPH Texas (C21 - C40)	µg/l	10	NONE	< 10				
PCBs by GC-MS								
PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				
PCBs by GC-MS								
Total PCBs	µg/l	0.4	NONE	< 0.40				
Organotins								
Tributyl Tin	ng/l	1	NONE	55				
Dibutyl Tin	ng/l	1	NONE	25				
Tetrabutyl Tin	ng/l	1	NONE	1.1				
Triphenyl Tin	ng/l	1	NONE	13				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Preliminary Report Number : 14-58262

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Biological oxygen demand of leachate	Determination of biochemical oxygen demand in leachate (5 days).	In-house method based on standard method 5210B. Samples received > 24 hrs after sampling, data may not be valid and should be interpreted with care.	L086-PL	W	ISO 17025
Boron in leachate	Determination of boron by acidification followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK		NONE
EF - Organotins by GC-MS/MS	Organotins by GC-MS/MS	In-house method		W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-UK	W	NONE
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL		NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in leachate	Determination of total organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Preliminary Report Number : 14-58262

Project / Site name: Dublin Port Project HBRC050

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073W-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Steve Nichols
HBR Ltd
Coggeshall Road
Earls Colne
Essex
CO6 2JX

t: 01787 222768
f: 01787 223235
e: steve.nichols@hbrlimited.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 14-57287

Replaces Analytical Report Number : 14-57287, issue no. 1

Project / Site name:	Dublin Port	**Samples received on:**	15/07/2014
Your job number:		**Samples instructed on:**	15/07/2014
Your order number:		**Analysis completed by:**	23/07/2014
Report Issue Number:	2	**Report issued on:**	28/07/2014
Samples Analysed:	1 leachate sample - 1 soil sample		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Customer Services Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-57287

Project / Site name: Dublin Port

Lab Sample Number				355997				
Sample Reference				Port/11072014				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				11/07/2014				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	50				
Total mass of sample received	kg	0.001	NONE	1.7				
General Inorganics								
pH	pH Units	N/A	MCERTS	7.7				
Electrical Conductivity	µS/cm	10	NONE	8400				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	NONE	< 1				
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0				
Total Sulphate as SO_4	mg/kg	100	ISO 17025	9600				
Water Soluble Sulphate (Soil Equivalent)	g/l	0.0025	MCERTS	5.4				
Water Soluble Sulphate as SO_4 (2:1)	mg/kg	2.5	MCERTS	5400				
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	2.7				
Sulphide	mg/kg	1	MCERTS	44				
Organic Matter	%	0.1	MCERTS	9.1				
Total Organic Carbon (TOC)	%	0.1	MCERTS	5.3				
Phenols by HPLC								
Catechol	µg/kg	1	NONE	< 1.0				
Resorcinol	µg/kg	1	NONE	< 1.0				
Butyl Phenols	µg/kg	1	NONE	< 1.0				
Cresols	µg/kg	1	NONE	< 1.0				
Naphthols	µg/kg	1	NONE	< 1.0				
Phenol	µg/kg	0.1	NONE	< 0.1				
Trimethylphenol	µg/kg	1	NONE	< 1.0				
Total Phenols								
Total Phenols (HPLC)	µg/kg	7	NONE	< 7.0				
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.1	MCERTS	0.29				
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10				
Fluorene	mg/kg	0.1	MCERTS	0.21				
Phenanthrene	mg/kg	0.1	MCERTS	0.88				
Anthracene	mg/kg	0.1	MCERTS	0.29				
Fluoranthene	mg/kg	0.1	MCERTS	1.1				
Pyrene	mg/kg	0.1	MCERTS	1.1				
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.73				
Chrysene	mg/kg	0.05	MCERTS	0.75				
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.55				
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.48				
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.69				
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10				
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	7.14				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-57287

Project / Site name: Dublin Port

Lab Sample Number				355997				
Sample Reference				Port/11072014				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				11/07/2014				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	NONE	8400				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4				
Boron (water soluble)	mg/kg	0.2	MCERTS	13				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.5				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	71				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130				
Lithium (aqua regia extractable)	mg/kg	0.1	NONE	33				
Mercury (aqua regia extractable)	mg/kg	0.2	NONE	< 0.2				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	650				
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	NONE	< 0.1				
TPH (C10 - C21)	mg/kg	10	NONE	120				
TPH (C21 - C40)	mg/kg	10	NONE	360				
TPH (C6 - C40)	mg/kg	10	NONE	480				
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001				
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001				
Total PCBs	mg/kg	0.007	MCERTS	< 0.007				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-57287

Project / Site name: Dublin Port

Lab Sample Number				355997				
Sample Reference				Port/11072014				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				11/07/2014				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Organotins								
Tributyl Tin	µg/kg	10	NONE	22				
Dibutyl Tin	µg/kg	10	NONE	< 10				
Tetrabutyl Tin	µg/kg	10	NONE	< 10				
Triphenyl Tin	µg/kg	10	NONE	< 10				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-57287

Project / Site name: Dublin Port

Lab Sample Number				355998				
Sample Reference				Port/11072014				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				11/07/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	8.1				
Electrical Conductivity	µS/cm	10	NONE	3500				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO_4	µg/l	100	ISO 17025	132000				
Sulphide	µg/l	5	NONE	< 5.0				
Total Organic Carbon (TOC)	mg/l	0.1	NONE	11.1				
Biochemical Oxygen Demand	mg/l	1	ISO 17025	3.4				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Butyl Phenols	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01				
Acenaphthylene	µg/l	0.01	NONE	< 0.01				
Acenaphthene	µg/l	0.01	NONE	< 0.01				
Fluorene	µg/l	0.01	NONE	< 0.01				
Phenanthrene	µg/l	0.01	NONE	< 0.01				
Anthracene	µg/l	0.01	NONE	< 0.01				
Fluoranthene	µg/l	0.01	NONE	< 0.01				
Pyrene	µg/l	0.01	NONE	< 0.01				
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01				
Chrysene	µg/l	0.01	NONE	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01				
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
Heavy Metals / Metalloids								
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.31				
Arsenic (dissolved)	µg/l	1.1	ISO 17025	4.0				
Boron (dissolved)	µg/l	10	ISO 17025	540				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (hexavalent)	µg/l	5	NONE	< 5.0				
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.4				
Copper (dissolved)	µg/l	0.7	ISO 17025	2.4				
Lead (dissolved)	µg/l	1	ISO 17025	3.0				
Lithium (dissolved)	µg/l	30	NONE	< 30				
Mercury (dissolved)	µg/L	0.01	NONE	< 0.01				
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.7				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	9.3				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 14-57287

Project / Site name: Dublin Port

Lab Sample Number				355998				
Sample Reference				Port/11072014				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				11/07/2014				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0				
Toluene	µg/l	1	NONE	< 1.0				
Ethylbenzene	µg/l	1	NONE	< 1.0				
p & m-xylene	µg/l	1	NONE	< 1.0				
o-xylene	µg/l	1	NONE	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH2 (C6 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C6 - C8)	µg/l	10	NONE	< 10				
TPH Texas (C8 - C10)	µg/l	10	NONE	< 10				
TPH Texas (C10 - C12)	µg/l	10	NONE	< 10				
TPH Texas (C12 - C16)	µg/l	10	NONE	< 10				
TPH Texas (C16 - C21)	µg/l	10	NONE	< 10				
TPH Texas (C21 - C40)	µg/l	10	NONE	< 10				
PCBs by GC-MS								
PCB Congener 28	µg/l	0.05	NONE	< 0.05				
PCB Congener 52	µg/l	0.05	NONE	< 0.05				
PCB Congener 101	µg/l	0.02	NONE	< 0.02				
PCB Congener 118	µg/l	0.05	NONE	< 0.05				
PCB Congener 138	µg/l	0.05	NONE	< 0.05				
PCB Congener 153	µg/l	0.05	NONE	< 0.05				
PCB Congener 180	µg/l	0.05	NONE	< 0.05				
PCBs by GC-MS								
Total PCBs	µg/l	0.4	NONE	< 0.40				
Tributyl Tin	ng/l	1	NONE	1000				
Dibutyl Tin	ng/l	1	NONE	120				
Tetrabutyl Tin	ng/l	1	NONE	3.0				
Triphenyl Tin	ng/l	1	NONE	< 1.0				

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-57287

Project / Site name: Dublin Port

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

Stone content of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
355997	blin Port/110720	None Supplied	None Supplied	Black sludge with vegetation. **

** Non MCerts Matrix

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-57287

Project / Site name: Dublin Port

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Biological oxygen demand of leachate	Determination of biochemical oxygen demand in leachate (5 days).	In-house method based on standard method 5210B. Samples received > 24 hrs after sampling, data may not be valid and should be interpreted with care.	L086-PL	W	ISO 17025
Boron in leachate	Determination of boron by acidification followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK		NONE
BTEX in soil	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073S-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	NONE
EF - Organotins by GC-MS/MS	Organotins by GC-MS/MS	In-house method		W	NONE
Electrical conductivity of leachate	Determination of electrical conductivity in leachate by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-UK	W	NONE
Electrical conductivity of soil	Determination of electrical conductivity in soil by addition of saturated calcium sulphate followed by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031-PL	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	NONE
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	D	MCERTS
Mercury Low Level in Leachate		In-house method based on USEPA method 1631	L085-UK		NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-57287

Project / Site name: Dublin Port

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
PCB's By GC-MS in leachate	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L028-UK	W	NONE
pH in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L070-PL		NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Stones not passing through a 10 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil	Determination of water soluble sulphate by extraction with water followed by ICP-OES. Results reported corrected for extraction ratio (soil equivalent) as g/l and mg/kg; and upon the 2:1	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by spectrophotometer.	In-house method	L049-PL	D	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in leachate	Determination of total organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	ISO 17025

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 14-57287

Project / Site name: Dublin Port

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Texas (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	NONE
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073W-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Appendix C

Soil Analytical Data

ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Mr Barry
Geotechnical & Environmental
Services
The Old Mill
22a Kilmoyle Road
Ballymoney BT53 6NR

26 February 2015

Test Report: COV/1167462/2015

Dear Mr Barry

Analysis of your sample(s) submitted on 16 February 2015 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name: C. Law

Title: Inorganics Operations Manager

1314
4398
Certificate No. GB97/10269
Environmental Management Systems
OHS 542058
FS 67435
This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

UKAS TESTING
1314
0897
4409

ALS Environmental

Mr Robert Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney
BT53 6NR

Date of Issue: **26 February 2015**

Report Number: **COV/1167462/2015** Issue **4**

Job Description: Dublin Port SI

Number of Samples included in this report **8**

Job Received: **16 February 2015**

Number of Test Results included in this report **1720**

Analysis Commenced: **18 February 2015**

Signed:

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.
(c) ALS Environmental Ltd 2015. All rights reserved. We, ALS Environmental Ltd, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	88.2	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	14	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.46	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	1.1	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	5.0	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	31	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	70	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	1.0	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	12	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	1.1	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	270	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	2.7	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	1.5	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	12	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.5	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	0.032	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	0.013	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	3.6	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	310	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	1500	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	3000	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	140	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	4900	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	0.51	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	130	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	570	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	960	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	700	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	140	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	2500	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	7400	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.32	mg/kg	20/02/2015	N	Cov	313
Acenaphthylene	<0.070	mg/kg	20/02/2015	N	Cov	313
Acenaphthene	0.22	mg/kg	20/02/2015	N	Cov	313
Fluorene	0.39	mg/kg	20/02/2015	N	Cov	313
Phenanthrene	0.89	mg/kg	20/02/2015	N	Cov	313
Anthracene	<0.35	mg/kg	20/02/2015	N	Cov	313
Fluoranthene	0.95	mg/kg	20/02/2015	N	Cov	313
Pyrene	1.1	mg/kg	20/02/2015	N	Cov	313
Benzo(a)anthracene	0.47	mg/kg	20/02/2015	N	Cov	313
Chrysene	0.45	mg/kg	20/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.78	mg/kg	20/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.29	mg/kg	20/02/2015	N	Cov	313
Benzo(a)pyrene	0.47	mg/kg	20/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.50	mg/kg	20/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Dibenz(a,h)anthracene	0.13	mg/kg	20/02/2015	N Cov	313
Benzo(g,h,i)perylene	0.43	mg/kg	20/02/2015	N Cov	313
PAH, Total of 16 EPA	7.3	mg/kg	20/02/2015	N Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	0.17	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	91	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	84	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	68	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	87	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	72	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	99	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474988** Sample **1** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	<120	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474988:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.
{/*}Raised reporting limits for EPH soils due to dilution of sample as undiluted extract over the calibration range of the instrument.
#313 PAH soils - detection limit raised due to interference from sample matrix.
The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	83.1	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	5.1	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.80	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.30	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	5.6	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	<5.0	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	6.0	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	6.4	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	30	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	1.5	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.6	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.062	mg/kg	25/02/2015	N	Cov	313
Acenaphthylene	<0.010	mg/kg	25/02/2015	N	Cov	313
Acenaphthene	0.016	mg/kg	25/02/2015	N	Cov	313
Fluorene	0.033	mg/kg	25/02/2015	N	Cov	313
Phenanthrene	0.10	mg/kg	25/02/2015	N	Cov	313
Anthracene	0.026	mg/kg	25/02/2015	N	Cov	313
Fluoranthene	0.082	mg/kg	25/02/2015	N	Cov	313
Pyrene	0.087	mg/kg	25/02/2015	N	Cov	313
Benzo(a)anthracene	0.030	mg/kg	25/02/2015	N	Cov	313
Chrysene	0.028	mg/kg	25/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.047	mg/kg	25/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.015	mg/kg	25/02/2015	N	Cov	313
Benzo(a)pyrene	0.033	mg/kg	25/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.025	mg/kg	25/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dibenz(a,h)anthracene	0.012	mg/kg	25/02/2015	N	Cov	313
Benzo(g,h,i)perylene	0.031	mg/kg	25/02/2015	N	Cov	313
PAH, Total of 16 EPA	0.63	mg/kg	25/02/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	94	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	87	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	72	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	87	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	67	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	94	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474989** Sample **2** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **29 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	150	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474989:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **C. Law** Date: **26 February 2015**
Title: **Inorganics Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	75.8	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	19	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	3.4	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.90	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	29	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	41	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	99	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	0.98	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	23	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	0.95	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	100	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	2.1	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	7.8	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	6.8	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	1.1	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	7.9	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	9.5	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	2.7	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	12	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	20	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.040	mg/kg	20/02/2015	N	Cov	313
Acenaphthylene	0.011	mg/kg	20/02/2015	N	Cov	313
Acenaphthene	<0.010	mg/kg	20/02/2015	N	Cov	313
Fluorene	0.014	mg/kg	20/02/2015	N	Cov	313
Phenanthrene	0.13	mg/kg	20/02/2015	N	Cov	313
Anthracene	0.045	mg/kg	20/02/2015	N	Cov	313
Fluoranthene	0.22	mg/kg	20/02/2015	N	Cov	313
Pyrene	0.17	mg/kg	20/02/2015	N	Cov	313
Benzo(a)anthracene	0.15	mg/kg	20/02/2015	N	Cov	313
Chrysene	0.15	mg/kg	20/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.24	mg/kg	20/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.083	mg/kg	20/02/2015	N	Cov	313
Benzo(a)pyrene	0.13	mg/kg	20/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.12	mg/kg	20/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING 1314 0897 4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Dibenz(a,h)anthracene	0.035	mg/kg	20/02/2015	N Cov	313
Benzo(g,h,i)perylene	0.096	mg/kg	20/02/2015	N Cov	313
PAH, Total of 16 EPA	1.6	mg/kg	20/02/2015	N Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	80	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	76	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	61	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	76	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	56	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	87	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474990** Sample **3** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	2700	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474990:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	82.6	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	6.6	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.80	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.42	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	3.5	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	6.0	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	2.8	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	6.1	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	17	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	1.5	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.9	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.25	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.25	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.25	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.25	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.25	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.25	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<2.5	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	2.8	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	69	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	180	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	570	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	280	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	1100	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.25	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.25	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<2.5	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	25	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	160	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	90	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	48	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	5.4	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	330	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	1400	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.079	mg/kg	20/02/2015	N	Cov	313
Acenaphthylene	<0.090	mg/kg	20/02/2015	N	Cov	313
Acenaphthene	0.31	mg/kg	20/02/2015	N	Cov	313
Fluorene	0.43	mg/kg	20/02/2015	N	Cov	313
Phenanthrene	0.64	mg/kg	20/02/2015	N	Cov	313
Anthracene	0.21	mg/kg	20/02/2015	N	Cov	313
Fluoranthene	0.62	mg/kg	20/02/2015	N	Cov	313
Pyrene	0.55	mg/kg	20/02/2015	N	Cov	313
Benzo(a)anthracene	0.27	mg/kg	20/02/2015	N	Cov	313
Chrysene	0.30	mg/kg	20/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.31	mg/kg	20/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.11	mg/kg	20/02/2015	N	Cov	313
Benzo(a)pyrene	0.21	mg/kg	20/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.14	mg/kg	20/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dibenz(a,h)anthracene	0.041	mg/kg	20/02/2015	N	Cov	313
Benzo(g,h,i)perylene	0.11	mg/kg	20/02/2015	N	Cov	313
PAH, Total of 16 EPA	4.3	mg/kg	20/02/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	93	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	84	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	71	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	88	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	76	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	99	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

1314
0897
4409

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474991** Sample **4** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 @ 4.0m**
Sample Matrix: **Soil**
Sample Date/Time: **30 January 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	120	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474991:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}VPH Soils: Result entered as a dilutuion due to original sample being over range.
#313 PAH soils - detection limit raised due to interference from sample matrix.
The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	89.9	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	11	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.53	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.86	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	9.6	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	39	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	30	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	14	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	51	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	1.3	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.4	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	9.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	2.6	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	12	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	12	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.017	mg/kg	25/02/2015	N	Cov	313
Acenaphthylene	<0.010	mg/kg	25/02/2015	N	Cov	313
Acenaphthene	<0.010	mg/kg	25/02/2015	N	Cov	313
Fluorene	<0.010	mg/kg	25/02/2015	N	Cov	313
Phenanthrene	0.035	mg/kg	25/02/2015	N	Cov	313
Anthracene	<0.010	mg/kg	25/02/2015	N	Cov	313
Fluoranthene	0.047	mg/kg	25/02/2015	N	Cov	313
Pyrene	0.042	mg/kg	25/02/2015	N	Cov	313
Benzo(a)anthracene	0.030	mg/kg	25/02/2015	N	Cov	313
Chrysene	0.030	mg/kg	25/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.050	mg/kg	25/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.019	mg/kg	25/02/2015	N	Cov	313
Benzo(a)pyrene	0.033	mg/kg	25/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.024	mg/kg	25/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dibenz(a,h)anthracene	<0.010	mg/kg	25/02/2015	N	Cov	313
Benzo(g,h,i)perylene	0.024	mg/kg	25/02/2015	N	Cov	313
PAH, Total of 16 EPA	0.35	mg/kg	25/02/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	81	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	74	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	58	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	76	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	57	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	89	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474992** Sample **5** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 1.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	120	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474992:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	93.3	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	6.6	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.35	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.66	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	5.5	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	8.4	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	17	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	12	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	35	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	1.3	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.6	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	<5.0	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.012	mg/kg	25/02/2015	N	Cov	313
Acenaphthylene	<0.010	mg/kg	25/02/2015	N	Cov	313
Acenaphthene	<0.010	mg/kg	25/02/2015	N	Cov	313
Fluorene	<0.010	mg/kg	25/02/2015	N	Cov	313
Phenanthrene	0.029	mg/kg	25/02/2015	N	Cov	313
Anthracene	<0.010	mg/kg	25/02/2015	N	Cov	313
Fluoranthene	0.026	mg/kg	25/02/2015	N	Cov	313
Pyrene	0.024	mg/kg	25/02/2015	N	Cov	313
Benzo(a)anthracene	0.010	mg/kg	25/02/2015	N	Cov	313
Chrysene	0.015	mg/kg	25/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.019	mg/kg	25/02/2015	N	Cov	313
Benzo(k)fluoranthene	<0.010	mg/kg	25/02/2015	N	Cov	313
Benzo(a)pyrene	<0.010	mg/kg	25/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	<0.010	mg/kg	25/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dibenz(a,h)anthracene	<0.010	mg/kg	25/02/2015	N	Cov	313
Benzo(g,h,i)perylene	<0.010	mg/kg	25/02/2015	N	Cov	313
PAH, Total of 16 EPA	0.13	mg/kg	25/02/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	80	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	72	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	60	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	74	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	59	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	90	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474993** Sample **6** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 @ 3.0m**
Sample Matrix: **Soil**
Sample Date/Time: **03 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	<120	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474993:

This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	84.6	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	18	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.82	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	1.1	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	16	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	53	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	140	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	0.81	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	30	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	0.55	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	320	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	4.7	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	8.4	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	85	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	14	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	99	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	2.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	6.6	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	52	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	25	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	86	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	190	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.22	mg/kg	20/02/2015	N	Cov	313
Acenaphthylene	0.060	mg/kg	20/02/2015	N	Cov	313
Acenaphthene	0.35	mg/kg	20/02/2015	N	Cov	313
Fluorene	0.27	mg/kg	20/02/2015	N	Cov	313
Phenanthrene	3.3	mg/kg	20/02/2015	N	Cov	313
Anthracene	0.81	mg/kg	20/02/2015	N	Cov	313
Fluoranthene	5.9	mg/kg	20/02/2015	N	Cov	313
Pyrene	5.1	mg/kg	20/02/2015	N	Cov	313
Benzo(a)anthracene	2.4	mg/kg	20/02/2015	N	Cov	313
Chrysene	2.4	mg/kg	20/02/2015	N	Cov	313
Benzo(b)fluoranthene	3.2	mg/kg	20/02/2015	N	Cov	313
Benzo(k)fluoranthene	1.1	mg/kg	20/02/2015	N	Cov	313
Benzo(a)pyrene	2.2	mg/kg	20/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	1.8	mg/kg	20/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Dibenz(a,h)anthracene	0.37	mg/kg	20/02/2015	N Cov	313
Benzo(g,h,i)perylene	1.4	mg/kg	20/02/2015	N Cov	313
PAH, Total of 16 EPA	31	mg/kg	20/02/2015	N Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	1.4	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	1.3	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	80	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	73	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	60	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	82	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	39	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	89	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474994** Sample **7** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 0.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	180	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474994: This sample has been analysed for VPH soils method 304, SVOC Soils method 316, VOC soils method 327, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **C. Law** Date: **26 February 2015**
Title: **Inorganics Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Dry Matter ALS	77.0	%	24/02/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	24/02/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	24/02/2015	N	S	SUBCON
Arsenic as As, dry weight	16	mg/kg	20/02/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	3.8	mg/kg	18/02/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.84	mg/kg	19/02/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	19/02/2015	N	Cov	30B
Chromium as Cr, dry weight	11	mg/kg	19/02/2015	Y	Cov	30
Copper as Cu, dry weight	50	mg/kg	19/02/2015	Y	Cov	30
Lead as Pb, dry weight	510	mg/kg	19/02/2015	Y	Cov	30
Mercury as Hg, dry weight	0.69	mg/kg	20/02/2015	Y	Cov	30C
Nickel as Ni, dry weight	20	mg/kg	19/02/2015	Y	Cov	30
Selenium as Se, dry weight	0.68	mg/kg	20/02/2015	Y	Cov	30C
Zinc as Zn, dry weight	120	mg/kg	19/02/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	19/02/2015	N	Cov	14
Organic Matter	3.7	%	23/02/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	18/02/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	19/02/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	19/02/2015	Y	Cov	16a
pH	9.0	pH units	21/02/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	19/02/2015	Y	Cov	304
Benzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Toluene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	19/02/2015	Y	Cov	304
m&p-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	30	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	6.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	36	mg/kg	19/02/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	19/02/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	19/02/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	6.5	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	33	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	14	mg/kg	19/02/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	53	mg/kg	19/02/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	90	mg/kg	19/02/2015	Y	Cov	304/317EPH
Naphthalene	0.069	mg/kg	20/02/2015	N	Cov	313
Acenaphthylene	0.018	mg/kg	20/02/2015	N	Cov	313
Acenaphthene	0.042	mg/kg	20/02/2015	N	Cov	313
Fluorene	0.046	mg/kg	20/02/2015	N	Cov	313
Phenanthrene	0.65	mg/kg	20/02/2015	N	Cov	313
Anthracene	0.13	mg/kg	20/02/2015	N	Cov	313
Fluoranthene	0.90	mg/kg	20/02/2015	N	Cov	313
Pyrene	0.82	mg/kg	20/02/2015	N	Cov	313
Benzo(a)anthracene	0.48	mg/kg	20/02/2015	N	Cov	313
Chrysene	0.54	mg/kg	20/02/2015	N	Cov	313
Benzo(b)fluoranthene	0.72	mg/kg	20/02/2015	N	Cov	313
Benzo(k)fluoranthene	0.24	mg/kg	20/02/2015	N	Cov	313
Benzo(a)pyrene	0.44	mg/kg	20/02/2015	N	Cov	313
Indeno(1,2,3-c,d)pyrene	0.39	mg/kg	20/02/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Dibenz(a,h)anthracene	0.096	mg/kg	20/02/2015	N Cov	313
Benzo(g,h,i)perylene	0.33	mg/kg	20/02/2015	N Cov	313
PAH, Total of 16 EPA	5.9	mg/kg	20/02/2015	N Cov	313
Vinyl Chloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Dichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
2,2-Dichloropropane	<0.10	mg/kg	24/02/2015	N Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chloroform	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Carbon Tetrachloride	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Benzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Trichloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromomethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Bromodichloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
Toluene	<0.10	mg/kg	24/02/2015	Y Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Tetrachloroethene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,3-Dichloropropane	<0.10	mg/kg	24/02/2015	Y Cov	327
Dibromochloromethane	<0.10	mg/kg	24/02/2015	Y Cov	327
1,2-Dibromoethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Chlorobenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y Cov	327
Ethylbenzene	<0.10	mg/kg	24/02/2015	Y Cov	327
m&p-Xylene	<0.20	mg/kg	24/02/2015	Y Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
o-Xylene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Styrene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	24/02/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	24/02/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	24/02/2015	Y	Cov	327
Aniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenol	<1.0	mg/kg	24/02/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,4-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
2-Methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
3&4-Methylphenol	Analyst Com	mg/kg	25/02/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	24/02/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Isophorone	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	24/02/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	24/02/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	24/02/2015	N	Cov	316
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Fluorene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	24/02/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
Anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
Pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	24/02/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	24/02/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	24/02/2015	Y	Cov	316
2-Fluorophenol	61	% Recovery	24/02/2015	N	Cov	316
Phenol-d6	59	% Recovery	24/02/2015	N	Cov	316
Nitrobenzene-d5	50	% Recovery	24/02/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Fluorobiphenyl	71	% Recovery	24/02/2015	N	Cov	316
2,4,6-Tribromophenol	55	% Recovery	24/02/2015	N	Cov	316
Terphenyl-d14	89	% Recovery	24/02/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1167462/2015** Issue **4**
Laboratory Number: **14474995** Sample **8** of **8**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 @ 2.5m**
Sample Matrix: **Soil**
Sample Date/Time: **05 February 2015**
Sample Received: **16 February 2015**
Analysis Complete: **25 February 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
3-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	24/02/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	24/02/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	24/02/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	24/02/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	24/02/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	24/02/2015	N	Cov	316
Benzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	24/02/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	24/02/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	24/02/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	24/02/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	24/02/2015	N	Cov	316
Sulphate as SO4, Water Soluble	620	mg/kg	19/02/2015	N	Cov	46

Analyst Comments for 14474995: This sample has been analysed for VPH soils method 304, SVOC Soils method 316, VOC soils method 327, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised.
#316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **C. Law** Date: **26 February 2015**
Title: **Inorganics Operations Manager**

ANALYST COMMENTS FOR REPORT COV/1167462/2015 Issue 4

Date of Issue: **26 February 2015**

Sample No	Analysis Comments
14474988	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}Raised reporting limits for EPH soils due to dilution of sample as undiluted extract over the calibration range of the instrument. #313 PAH soils - detection limit raised due to interference from sample matrix. The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474989	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474990	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474991	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}VPH Soils: Result entered as a dilutuion due to original sample being over range. #313 PAH soils - detection limit raised due to interference from sample matrix. The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474992	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474993	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474994	This sample has been analysed for VPH soils method 304, SVOC Soils method 316, VOC soils method 327, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}
14474995	This sample has been analysed for VPH soils method 304, SVOC Soils method 316, VOC soils method 327, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}The sample for VOC HS Soils was received in a container inappropriate for this parameter. It is therefore possible that the results provided may be compromised. #316 SVOC soils - exact result for 3&4-methylphenol unavailable due to quality failure, the indicative result is <1.0mg/kg.{*/}

Signed: 

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

DETERMINAND COMMENTS FOR REPORT COV/1167462/2015 ISSUE 4

Date of Issue : 26 February 2015

Sample No	Description	Determinand	Comments

Signed: 

Name: **C. Law** Date: **26 February 2015**

Title: **Inorganics Operations Manager**

ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Mr Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney BT53 6NR

16 March 2015

Test Report: COV/1169954/2015

Dear Mr Barry

Analysis of your sample(s) submitted on 26 February 2015 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed: A I Horobin

Name: A. Horobin

Title: Organic Operations Manager

1314
4398
Certificate No. GB97/10269
Environmental Management Systems
OHS 542058
FS 67435
This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

UKAS TESTING
1314
0897
4409

ALS Environmental

Mr Robert Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney
BT53 6NR

Date of Issue: **16 March 2015**

Report Number: **COV/1169954/2015** Issue **2**

Job Description: Dublin Port SI

Job Location: Dublin Port IED Application

Number of Samples included in this report **4**

Job Received: **26 February 2015**

Number of Test Results included in this report **864**

Analysis Commenced: **27 February 2015**

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.
(c) ALS Environmental Ltd 2015. All rights reserved. We, ALS Environmental Ltd, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Sulphur Total (S) by IR	0.055	%	13/03/2015	Y	S	SUBCON
Dry Matter ALS	90.0	%	05/03/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	05/03/2015	N	S	SUBCON
Arsenic as As, dry weight	7.1	mg/kg	06/03/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.67	mg/kg	04/03/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.83	mg/kg	04/03/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	06/03/2015	N	Cov	30B
Chromium as Cr, dry weight	11	mg/kg	04/03/2015	Y	Cov	30
Copper as Cu, dry weight	19	mg/kg	04/03/2015	Y	Cov	30
Lead as Pb, dry weight	51	mg/kg	04/03/2015	Y	Cov	30
Mercury as Hg, dry weight	0.86	mg/kg	06/03/2015	Y	Cov	30C
Nickel as Ni, dry weight	17	mg/kg	04/03/2015	Y	Cov	30
Selenium as Se, dry weight	0.63	mg/kg	06/03/2015	Y	Cov	30C
Zinc as Zn, dry weight	64	mg/kg	04/03/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	05/03/2015	N	Cov	14
Organic Matter	2.3	%	03/03/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	04/03/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	04/03/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	0.12	mg/kg	04/03/2015	Y	Cov	16a
pH	10.5	pH units	03/03/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	05/03/2015	Y	Cov	304
Benzene	0.036	mg/kg	05/03/2015	Y	Cov	304
Toluene	0.012	mg/kg	05/03/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	05/03/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
o-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	3.7	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	63	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	31	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	98	mg/kg	05/03/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	0.036	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C7 - C8	0.012	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aromatic EPH >C10 - C12	3.8	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	9.1	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	29	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	150	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	97	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	290	mg/kg	05/03/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	380	mg/kg	05/03/2015	Y	Cov	304/317EPH
Naphthalene	0.30	mg/kg	05/03/2015	N	Cov	313
Acenaphthylene	0.029	mg/kg	05/03/2015	N	Cov	313
Acenaphthene	0.47	mg/kg	05/03/2015	N	Cov	313
Fluorene	0.54	mg/kg	05/03/2015	N	Cov	313
Phenanthrene	3.6	mg/kg	05/03/2015	N	Cov	313
Anthracene	0.94	mg/kg	05/03/2015	N	Cov	313
Fluoranthene	4.2	mg/kg	05/03/2015	N	Cov	313
Pyrene	3.6	mg/kg	05/03/2015	N	Cov	313
Benzo(a)anthracene	1.8	mg/kg	05/03/2015	N	Cov	313
Chrysene	1.8	mg/kg	05/03/2015	N	Cov	313
Benzo(b)fluoranthene	2.1	mg/kg	05/03/2015	N	Cov	313
Benzo(k)fluoranthene	0.74	mg/kg	05/03/2015	N	Cov	313
Benzo(a)pyrene	1.5	mg/kg	05/03/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Indeno(1,2,3-c,d)pyrene	1.1	mg/kg	05/03/2015	N	Cov	313
Dibenz(a,h)anthracene	0.25	mg/kg	05/03/2015	N	Cov	313
Benzo(g,h,i)perylene	1.0	mg/kg	05/03/2015	N	Cov	313
PAH, Total of 16 EPA	24	mg/kg	05/03/2015	N	Cov	313
Vinyl Chloride	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Dichloromethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
trans-1,2-Dichloroethene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
2,2-Dichloropropane	<2.5	mg/kg	12/03/2015	N	Cov	327
cis-1,2-Dichloroethene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Bromochloromethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Chloroform	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1,1-Trichloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Carbon Tetrachloride	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloropropene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Benzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Trichloroethene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloropropane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Dibromomethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Bromodichloromethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
trans-1,3-Dichloropropene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Toluene	<2.5	mg/kg	12/03/2015	Y	Cov	327
cis-1,3-Dichloropropene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1,2-Trichloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Tetrachloroethene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichloropropane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Dibromochloromethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromoethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Chlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
Ethylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<5.0	mg/kg	12/03/2015	Y	Cov	327
o-Xylene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Styrene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Bromoform	<2.5	mg/kg	12/03/2015	Y	Cov	327
iso-Propylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Bromobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2,3-Trichloropropane	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<2.5	mg/kg	12/03/2015	Y	Cov	327
n-Propylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
2-Chlorotoluene	<2.5	mg/kg	12/03/2015	Y	Cov	327
4-Chlorotoluene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
tert-Butylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
sec-Butylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,4-Dichlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
p-Isopropyltoluene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
n-Butylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<2.5	mg/kg	12/03/2015	N	Cov	327
1,2,4-Trichlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Hexachlorobutadiene	<2.5	mg/kg	12/03/2015	N	Cov	327
1,2,3-Trichlorobenzene	<2.5	mg/kg	12/03/2015	Y	Cov	327
Aniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenol	<1.0	mg/kg	11/03/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
1,4-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
3&4-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	11/03/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Isophorone	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluorene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenanthrene	5.3	mg/kg	11/03/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Anthracene	1.2	mg/kg	11/03/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluoranthene	7.2	mg/kg	11/03/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Pyrene	5.7	mg/kg	11/03/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(a)anthracene	3.4	mg/kg	11/03/2015	Y	Cov	316
Chrysene	3.0	mg/kg	11/03/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(b)fluoranthene	3.4	mg/kg	11/03/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(k)fluoranthene	1.3	mg/kg	11/03/2015	Y	Cov	316
Benzo(a)pyrene	2.6	mg/kg	11/03/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	1.4	mg/kg	11/03/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(g,h,i)perylene	1.7	mg/kg	11/03/2015	Y	Cov	316
2-Fluorophenol	78	% Recovery	11/03/2015	N	Cov	316
Phenol-d6	72	% Recovery	11/03/2015	N	Cov	316
Nitrobenzene-d5	63	% Recovery	11/03/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Fluorobiphenyl	74	% Recovery	11/03/2015	N	Cov	316
2,4,6-Tribromophenol	24	% Recovery	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493083** Sample **1** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 0.85m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Terphenyl-d14	89	% Recovery	11/03/2015	N	Cov	316
3-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	11/03/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzidine	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	11/03/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	11/03/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	11/03/2015	N	Cov	316
Sulphate as SO4, Water Soluble	160	mg/kg	04/03/2015	N	Cov	46

Analyst Comments for 14493083: This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}#316 SVOC soils - low surrogate recovery observed, possibly due to interference from sample matrix.
Reporting limits raised for VOC HS soils due to nature of sample matrix.{*/}

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Sulphur Total (S) by IR	0.105	%	13/03/2015	Y	S	SUBCON
Dry Matter ALS	77.8	%	05/03/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	05/03/2015	N	S	SUBCON
Arsenic as As, dry weight	9.7	mg/kg	06/03/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	7.2	mg/kg	04/03/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.61	mg/kg	04/03/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	06/03/2015	N	Cov	30B
Chromium as Cr, dry weight	19	mg/kg	04/03/2015	Y	Cov	30
Copper as Cu, dry weight	25	mg/kg	04/03/2015	Y	Cov	30
Lead as Pb, dry weight	64	mg/kg	04/03/2015	Y	Cov	30
Mercury as Hg, dry weight	0.92	mg/kg	06/03/2015	Y	Cov	30C
Nickel as Ni, dry weight	17	mg/kg	04/03/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	06/03/2015	Y	Cov	30C
Zinc as Zn, dry weight	110	mg/kg	04/03/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	05/03/2015	N	Cov	14
Organic Matter	1.8	%	03/03/2015	Y	Cov	36
Mono Phenols, Total DW	1.9	mg/kg	04/03/2015	Y	Cov	40A
Sulphide	4.7	mg/kg	04/03/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	1.2	mg/kg	04/03/2015	Y	Cov	16a
pH	9.1	pH units	03/03/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	05/03/2015	Y	Cov	304
Benzene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Toluene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	05/03/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
o-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	4.2	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	47	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	9.2	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	60	mg/kg	05/03/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	11	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	46	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	12	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	70	mg/kg	05/03/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	130	mg/kg	05/03/2015	Y	Cov	304/317EPH
Naphthalene	0.095	mg/kg	05/03/2015	N	Cov	313
Acenaphthylene	0.046	mg/kg	05/03/2015	N	Cov	313
Acenaphthene	0.068	mg/kg	05/03/2015	N	Cov	313
Fluorene	0.094	mg/kg	05/03/2015	N	Cov	313
Phenanthrene	0.45	mg/kg	05/03/2015	N	Cov	313
Anthracene	0.23	mg/kg	05/03/2015	N	Cov	313
Fluoranthene	1.4	mg/kg	05/03/2015	N	Cov	313
Pyrene	1.6	mg/kg	05/03/2015	N	Cov	313
Benzo(a)anthracene	0.77	mg/kg	05/03/2015	N	Cov	313
Chrysene	0.60	mg/kg	05/03/2015	N	Cov	313
Benzo(b)fluoranthene	1.1	mg/kg	05/03/2015	N	Cov	313
Benzo(k)fluoranthene	0.39	mg/kg	05/03/2015	N	Cov	313
Benzo(a)pyrene	0.80	mg/kg	05/03/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Indeno(1,2,3-c,d)pyrene	0.60	mg/kg	05/03/2015	N	Cov	313
Dibenz(a,h)anthracene	0.15	mg/kg	05/03/2015	N	Cov	313
Benzo(g,h,i)perylene	0.58	mg/kg	05/03/2015	N	Cov	313
PAH, Total of 16 EPA	9.0	mg/kg	05/03/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	12/03/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Benzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Toluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.20	mg/kg	12/03/2015	Y	Cov	327
o-Xylene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Styrene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	12/03/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Aniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenol	<1.0	mg/kg	11/03/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
1,4-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
3&4-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	11/03/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Isophorone	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluorene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	11/03/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2-Fluorophenol	65	% Recovery	11/03/2015	N	Cov	316
Phenol-d6	61	% Recovery	11/03/2015	N	Cov	316
Nitrobenzene-d5	54	% Recovery	11/03/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Fluorobiphenyl	69	% Recovery	11/03/2015	N	Cov	316
2,4,6-Tribromophenol	71	% Recovery	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493084** Sample **2** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 6.00m**
Sample Matrix: **Soil**
Sample Date/Time: **13 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Terphenyl-d14	89	% Recovery	11/03/2015	N	Cov	316
3-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	11/03/2015	N	Cov	316
1-Naphthylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Naphthylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenacetin	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Aminobiphenyl	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzidine	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	11/03/2015	N	Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	11/03/2015	N	Cov	316
3-Methylcholanthrene	<1.0	mg/kg	11/03/2015	N	Cov	316
Sulphate as SO4, Water Soluble	370	mg/kg	04/03/2015	N	Cov	46

Analyst Comments for 14493084: This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Sulphur Total (S) by IR	0.0164	%	13/03/2015	Y	S	SUBCON
Dry Matter ALS	92.4	%	05/03/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	05/03/2015	N	S	SUBCON
Arsenic as As, dry weight	14	mg/kg	06/03/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	0.26	mg/kg	04/03/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.59	mg/kg	04/03/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	06/03/2015	N	Cov	30B
Chromium as Cr, dry weight	25	mg/kg	04/03/2015	Y	Cov	30
Copper as Cu, dry weight	23	mg/kg	04/03/2015	Y	Cov	30
Lead as Pb, dry weight	11	mg/kg	04/03/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	06/03/2015	Y	Cov	30C
Nickel as Ni, dry weight	28	mg/kg	04/03/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	06/03/2015	Y	Cov	30C
Zinc as Zn, dry weight	75	mg/kg	04/03/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	05/03/2015	N	Cov	14
Organic Matter	0.80	%	03/03/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	04/03/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	04/03/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	<0.10	mg/kg	04/03/2015	Y	Cov	16a
pH	8.5	pH units	03/03/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	05/03/2015	Y	Cov	304
Benzene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Toluene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	05/03/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
o-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	0.11	mg/kg	05/03/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	45	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	56	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	100	mg/kg	05/03/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	85	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	150	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	240	mg/kg	05/03/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	340	mg/kg	05/03/2015	Y	Cov	304/317EPH
Naphthalene	<0.010	mg/kg	05/03/2015	N	Cov	313
Acenaphthylene	<0.010	mg/kg	05/03/2015	N	Cov	313
Acenaphthene	<0.010	mg/kg	05/03/2015	N	Cov	313
Fluorene	<0.010	mg/kg	05/03/2015	N	Cov	313
Phenanthrene	0.029	mg/kg	05/03/2015	N	Cov	313
Anthracene	<0.010	mg/kg	05/03/2015	N	Cov	313
Fluoranthene	0.028	mg/kg	05/03/2015	N	Cov	313
Pyrene	0.029	mg/kg	05/03/2015	N	Cov	313
Benzo(a)anthracene	0.013	mg/kg	05/03/2015	N	Cov	313
Chrysene	0.014	mg/kg	05/03/2015	N	Cov	313
Benzo(b)fluoranthene	0.021	mg/kg	05/03/2015	N	Cov	313
Benzo(k)fluoranthene	<0.010	mg/kg	05/03/2015	N	Cov	313
Benzo(a)pyrene	0.014	mg/kg	05/03/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Indeno(1,2,3-c,d)pyrene	0.012	mg/kg	05/03/2015	N	Cov	313
Dibenz(a,h)anthracene	<0.010	mg/kg	05/03/2015	N	Cov	313
Benzo(g,h,i)perylene	0.015	mg/kg	05/03/2015	N	Cov	313
PAH, Total of 16 EPA	0.18	mg/kg	05/03/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	12/03/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Benzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Toluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.20	mg/kg	12/03/2015	Y	Cov	327
o-Xylene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Styrene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	12/03/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Aniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenol	<1.0	mg/kg	11/03/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
1,4-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
3&4-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	11/03/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Isophorone	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluorene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	11/03/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2-Fluorophenol	84	% Recovery	11/03/2015	N	Cov	316
Phenol-d6	69	% Recovery	11/03/2015	N	Cov	316
Nitrobenzene-d5	64	% Recovery	11/03/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Fluorobiphenyl	83	% Recovery	11/03/2015	N	Cov	316
2,4,6-Tribromophenol	40	% Recovery	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493085** Sample **3** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 0.50m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Terphenyl-d14	90	% Recovery	11/03/2015	N Cov	316
3-Nitroaniline	<1.0	mg/kg	11/03/2015	N Cov	316
Pentachlorobenzene	<1.0	mg/kg	11/03/2015	N Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	11/03/2015	N Cov	316
1-Naphthylamine	<1.0	mg/kg	11/03/2015	N Cov	316
2-Naphthylamine	<1.0	mg/kg	11/03/2015	N Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	11/03/2015	N Cov	316
4-Nitroaniline	<1.0	mg/kg	11/03/2015	N Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	11/03/2015	N Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	11/03/2015	N Cov	316
Phenacetin	<1.0	mg/kg	11/03/2015	N Cov	316
4-Aminobiphenyl	<1.0	mg/kg	11/03/2015	N Cov	316
Benzidine	<1.0	mg/kg	11/03/2015	N Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	11/03/2015	N Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	11/03/2015	N Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	11/03/2015	N Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	11/03/2015	N Cov	316
3-Methylcholanthrene	<1.0	mg/kg	11/03/2015	N Cov	316
Sulphate as SO4, Water Soluble	<120	mg/kg	04/03/2015	N Cov	46

Analyst Comments for 14493085: This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Sulphur Total (S) by IR	0.0345	%	13/03/2015	Y	S	SUBCON
Dry Matter ALS	81.9	%	05/03/2015	N	S	SUBCON
PCB 28	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 52	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 101	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 118	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 138	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 153	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
PCB 180	<0.0030	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 6 PCBs	<0.018	mg/kg DW	05/03/2015	N	S	SUBCON
Sum of 7 PCBs	<0.021	mg/kg DW	05/03/2015	N	S	SUBCON
Arsenic as As, dry weight	5.1	mg/kg	06/03/2015	Y	Cov	30/30C
Boron as B, hot water sol dw	1.8	mg/kg	04/03/2015	Y	Cov	6
Cadmium as Cd, dry weight	0.22	mg/kg	04/03/2015	Y	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	06/03/2015	N	Cov	30B
Chromium as Cr, dry weight	6.6	mg/kg	04/03/2015	Y	Cov	30
Copper as Cu, dry weight	5.4	mg/kg	04/03/2015	Y	Cov	30
Lead as Pb, dry weight	10	mg/kg	04/03/2015	Y	Cov	30
Mercury as Hg, dry weight	<0.60	mg/kg	06/03/2015	Y	Cov	30C
Nickel as Ni, dry weight	8.5	mg/kg	04/03/2015	Y	Cov	30
Selenium as Se, dry weight	<0.50	mg/kg	06/03/2015	Y	Cov	30C
Zinc as Zn, dry weight	26	mg/kg	04/03/2015	Y	Cov	30
Cyanide, Free	<3.4	mg/kg	05/03/2015	N	Cov	14
Organic Matter	0.24	%	03/03/2015	Y	Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	04/03/2015	Y	Cov	40A
Sulphide	<3.1	mg/kg	04/03/2015	Y	Cov	47
Thiocyanate as SCN, Dry Weight	0.14	mg/kg	04/03/2015	Y	Cov	16a
pH	9.2	pH units	03/03/2015	Y	Cov	39
MTBE (Methyl-tert-Butyl Ether)	<0.010	mg/kg	05/03/2015	Y	Cov	304
Benzene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Toluene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Ethylbenzene	<0.010	mg/kg	05/03/2015	Y	Cov	304

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
o-Xylene	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C5 - C6	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C6 - C8	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aliphatic VPH >C8 - C10	0.20	mg/kg	05/03/2015	Y	Cov	304
Aliphatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C12 - C16	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C16 - C35	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic EPH >C35 - C44	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	<5.0	mg/kg	05/03/2015	Y	Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C7 - C8	<0.010	mg/kg	05/03/2015	Y	Cov	304
Aromatic VPH >C8 - C10	<0.10	mg/kg	05/03/2015	Y	Cov	304
Aromatic EPH >C10 - C12	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C12 - C16	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C16 - C21	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C21 - C35	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic EPH >C35 - C44	<1.0	mg/kg	02/03/2015	Y	Cov	317EPH
Aromatic VPH/EPH >C5 - C44	<5.0	mg/kg	05/03/2015	Y	Cov	304/317EPH
VPH/EPH >C5 - C44	<5.0	mg/kg	05/03/2015	Y	Cov	304/317EPH
Naphthalene	0.014	mg/kg	05/03/2015	N	Cov	313
Acenaphthylene	<0.010	mg/kg	05/03/2015	N	Cov	313
Acenaphthene	0.020	mg/kg	05/03/2015	N	Cov	313
Fluorene	0.020	mg/kg	05/03/2015	N	Cov	313
Phenanthrene	0.072	mg/kg	05/03/2015	N	Cov	313
Anthracene	0.022	mg/kg	05/03/2015	N	Cov	313
Fluoranthene	0.12	mg/kg	05/03/2015	N	Cov	313
Pyrene	0.11	mg/kg	05/03/2015	N	Cov	313
Benzo(a)anthracene	0.046	mg/kg	05/03/2015	N	Cov	313
Chrysene	0.045	mg/kg	05/03/2015	N	Cov	313
Benzo(b)fluoranthene	0.057	mg/kg	05/03/2015	N	Cov	313
Benzo(k)fluoranthene	0.021	mg/kg	05/03/2015	N	Cov	313
Benzo(a)pyrene	0.041	mg/kg	05/03/2015	N	Cov	313

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Indeno(1,2,3-c,d)pyrene	0.026	mg/kg	05/03/2015	N	Cov	313
Dibenz(a,h)anthracene	<0.010	mg/kg	05/03/2015	N	Cov	313
Benzo(g,h,i)perylene	0.026	mg/kg	05/03/2015	N	Cov	313
PAH, Total of 16 EPA	0.64	mg/kg	05/03/2015	N	Cov	313
Vinyl Chloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
2,2-Dichloropropane	<0.10	mg/kg	12/03/2015	N	Cov	327
cis-1,2-Dichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chloroform	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Carbon Tetrachloride	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Benzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Trichloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromomethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromodichloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
trans-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Toluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
cis-1,3-Dichloropropene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2-Trichloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Tetrachloroethene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Dibromochloromethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromoethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Chlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,1,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
Ethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
m&p-Xylene	<0.20	mg/kg	12/03/2015	Y	Cov	327
o-Xylene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Styrene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromoform	<0.10	mg/kg	12/03/2015	Y	Cov	327
iso-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Bromobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,3-Trichloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,1,2,2-Tetrachloroethane	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Propylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
2-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
4-Chlorotoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
tert-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
sec-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,4-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
p-Isopropyltoluene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
n-Butylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2-Dibromo-3-chloropropane	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,3,5-Trichlorobenzene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,4-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
1,2,4-Trimethylbenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Hexachlorobutadiene	<0.10	mg/kg	12/03/2015	N	Cov	327
1,2,3-Trichlorobenzene	<0.10	mg/kg	12/03/2015	Y	Cov	327
Aniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Picoline	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenol	<1.0	mg/kg	11/03/2015	N	Cov	316
o&p-Toluidine	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,3-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzyl Alcohol	<1.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
1,4-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
3&4-Methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Dibenzofuran	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2-Dichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroisopropyl)-ether	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitroso-di-n-propylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachloroethane	<1.0	mg/kg	11/03/2015	N	Cov	316
Nitrobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Isophorone	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dimethylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Acetophenone	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Nitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
bis-(2-Chloroethoxy)-methane	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4-Trichlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4-Dinitrophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Naphthalene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorobutadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloro-3-methylphenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Methylnaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,6-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
n-Nitrosopiperidine	<1.0	mg/kg	11/03/2015	N	Cov	316
2,4,5-Trichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Chloronaphthalene	<1.0	mg/kg	11/03/2015	N	Cov	316
Dimethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
2,6-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzoic Acid	<1.0	mg/kg	11/03/2015	N	Cov	316
Acenaphthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,4-Dinitrotoluene	<1.0	mg/kg	11/03/2015	N	Cov	316
Diethyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Nitrophenol	<4.0	mg/kg	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
4-Chlorophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluorene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Carbazole	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Bromophenyl Phenyl Ether	<1.0	mg/kg	11/03/2015	N	Cov	316
Hexachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
4-Chloroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
Pentachlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Phenanthrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2,6-Dichlorophenol	<1.0	mg/kg	11/03/2015	N	Cov	316
Anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Di-n-butyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
n-Nitrosodibutylamine	<1.0	mg/kg	11/03/2015	N	Cov	316
Pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Butyl Benzyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(a)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Chrysene	<1.0	mg/kg	11/03/2015	Y	Cov	316
bis-(2-Ethylhexyl)-phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
1,2,4,5-Tetrachlorobenzene	<1.0	mg/kg	11/03/2015	N	Cov	316
Di-n-octyl Phthalate	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(b)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Hexachlorocyclopentadiene	<1.0	mg/kg	11/03/2015	N	Cov	316
Benzo(k)fluoranthene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(a)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Indeno(1,2,3-c,d)pyrene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Dibenz(a,h)anthracene	<1.0	mg/kg	11/03/2015	Y	Cov	316
Benzo(g,h,i)perylene	<1.0	mg/kg	11/03/2015	Y	Cov	316
2-Fluorophenol	87	% Recovery	11/03/2015	N	Cov	316
Phenol-d6	74	% Recovery	11/03/2015	N	Cov	316
Nitrobenzene-d5	61	% Recovery	11/03/2015	N	Cov	316
2-Nitroaniline	<1.0	mg/kg	11/03/2015	N	Cov	316
2-Fluorobiphenyl	84	% Recovery	11/03/2015	N	Cov	316
2,4,6-Tribromophenol	67	% Recovery	11/03/2015	N	Cov	316

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1169954/2015** Issue **2**
Laboratory Number: **14493086** Sample **4** of **4**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 5.00m**
Sample Matrix: **Soil**
Sample Date/Time: **11 February 2015**
Sample Received: **26 February 2015**
Analysis Complete: **13 March 2015**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Terphenyl-d14	94	% Recovery	11/03/2015	N Cov	316
3-Nitroaniline	<1.0	mg/kg	11/03/2015	N Cov	316
Pentachlorobenzene	<1.0	mg/kg	11/03/2015	N Cov	316
1,2-Diphenylhydrazine	<1.0	mg/kg	11/03/2015	N Cov	316
1-Naphthylamine	<1.0	mg/kg	11/03/2015	N Cov	316
2-Naphthylamine	<1.0	mg/kg	11/03/2015	N Cov	316
2,3,4,6-Tetrachlorophenol	<1.0	mg/kg	11/03/2015	N Cov	316
4-Nitroaniline	<1.0	mg/kg	11/03/2015	N Cov	316
2-Methyl-4,6-dinitrophenol	<1.0	mg/kg	11/03/2015	N Cov	316
diphenylamine&diphenylnitrosam	<1.0	mg/kg	11/03/2015	N Cov	316
Phenacetin	<1.0	mg/kg	11/03/2015	N Cov	316
4-Aminobiphenyl	<1.0	mg/kg	11/03/2015	N Cov	316
Benzidine	<1.0	mg/kg	11/03/2015	N Cov	316
Dimethylaminoazobenzene	<1.0	mg/kg	11/03/2015	N Cov	316
n-Nitrosodimethylamine	<1.0	mg/kg	11/03/2015	N Cov	316
3,3-Dichlorobenzidine	<1.0	mg/kg	11/03/2015	N Cov	316
7,12-Dimethylbenz(a)anthracene	<1.0	mg/kg	11/03/2015	N Cov	316
3-Methylcholanthrene	<1.0	mg/kg	11/03/2015	N Cov	316
Sulphate as SO4, Water Soluble	580	mg/kg	04/03/2015	N Cov	46

Analyst Comments for 14493086: This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

ANALYST COMMENTS FOR REPORT COV/1169954/2015 Issue 2

Date of Issue: **16 March 2015**

Sample No	Analysis Comments
14493083	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised. {/*}#316 SVOC soils - low surrogate recovery observed, possibly due to interference from sample matrix. Reporting limits raised for VOC HS soils due to nature of sample matrix.{*/}
14493084	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.
14493085	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.
14493086	This sample has been analysed for VPH soils method 304, PAH soils method 313, SVOC Soils method 316, EPH soils method 317EPH, VOC soils method 327, Thiocyanate as SCN, Dry Weight, Cyanide, Free, pH outside recommended stability times. It is therefore possible that the results provided may be compromised.

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

DETERMINAND COMMENTS FOR REPORT COV/1169954/2015 ISSUE 2

Date of Issue : 16 March 2015

Sample No	Description	Determinand	Comments

Signed: A I Horobin

Name: **A. Horobin** Date: **16 March 2015**

Title: **Organic Operations Manager**

Appendix D

Water Analytical Data

ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Mr Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney BT53 6NR

05 March 2015

Test Report: COV/1168645/2015

Dear Mr Barry

Analysis of your sample(s) submitted on the 20 February 2015 is still being completed. We have enclosed an Interim report(s) detailing the analysis completed to date.

Please be aware that all results contained in the Interim report(s) are provisional and therefore could be subject to change.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

Yours Sincerely,

Signed:

Name:

Title:

1314
4398
Certificate No. GB97/10269
Environmental Management Systems
OHS 542058
FS 67435
This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

1314
0897
4409

Mr Robert Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney
BT53 6NR

INTERIM REPORT

Date of Issue: **05 March 2015**

Report Number: **COV/1168645/2015** Issue **1**

Job Description: Dublin Port SI

Job Location: Dublin Port

Number of Samples included in this report **17**

Job Received: **20 February 2015**

Number of Test Results included in this report **1173**

Analysis Commenced: **To Follow**

Signed:

Name:

Date: **05 March 2015**

Title:

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.
(c) ALS Environmental Ltd 2015. All rights reserved. We, ALS Environmental Ltd, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483491** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01D 3.7m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	1.36	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	14.5	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.5	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	24500	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1380	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483491** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01D 3.7m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483491** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01D 3.7m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	<0.01	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	41	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483491: Reporting limit raised for low level filtered Copper and Lead due to sample interference.
Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised.
.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483492** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01 S 4.6M**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0022	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	0.39	ug/l	02/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	9.4	ug/l	02/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<0.50	ug/l	02/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	9.40	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	8.8	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	5310	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	258	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.005	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483492** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01 S 4.6M**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	28	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	28	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	28	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	28	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	28	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.025	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	0.012	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.011	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	0.011	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	0.063	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	0.021	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	0.014	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483492** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 01 S 4.6M**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.052	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	0.056	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	0.264	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	12	ug/l	02/03/2015	Y	Cov	WAS060

Analyst Comments for 14483492: Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised.
Reporting limits raised for PCB results due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483493** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 02 3.5m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0009	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	0.09	ug/l	02/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	3.3	ug/l	02/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<0.50	ug/l	02/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.30	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.5	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	2850	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	436	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.005	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483493** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 02 3.5m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	13	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	13	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	13	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	13	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	13	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	0.011	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483493** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 02 3.5m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	0.044	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	0.055	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	5.4	ug/l	02/03/2015	Y	Cov	WAS060

Analyst Comments for 14483493: Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised.
Reporting limits raised for PCB results due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483494** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 04 3.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Benzene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Toluene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
m&p-Xylene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
o-Xylene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Tributyl Tin	0.0132	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	0.27	ug/l	02/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	7.0	ug/l	02/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	5.07	ug/l	02/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	10.0	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	254	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.5	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	16800	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1610	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.009	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.008	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.009	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.013	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.010	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.008	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.013	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C6 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C8 - 10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C7	To Follow	ug/l	01/01/0001	N	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483494** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 04 3.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C8 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic EPH >C10 - C12	<200	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<200	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<200	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<200	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<200	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<200	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<200	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Acenaphthene	0.532	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.13	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	0.088	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.023	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.016	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.015	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	0.017	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	0.176	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	0.627	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	<0.64	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483494** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 04 3.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.430	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	0.159	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	2.08	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	32	ug/l	02/03/2015	Y	Cov	WAS060

Analyst Comments for 14483494: Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised. The total PAH does not include Naphthalene and Acenaphthylene as the reporting limits for these compounds have been raised due to interference.
Reporting limits raised for PCB results due to nature of sample matrix.
Raised reporting limits for EPH waters due to the nature of the sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483495** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 05d 3.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	10.0	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.7	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	33900	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2060	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483495** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 05d 3.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Acenaphthylene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (a) anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (g,h,i) perylene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (a) pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (b) fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (k) fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Chrysene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Dibenz (a,h) anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Fluorene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Indeno (1,2,3) cd pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Naphthalene	To Follow	ug/l	01/01/0001	N	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483495** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 05d 3.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
PAH, Total	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Arsenic, trace Filtered as As	57	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483495: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483496** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06d 1.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	02/03/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0010	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	02/03/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	02/03/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	8.20	ug/l	02/03/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	220	ug/l	02/03/2015	Y	Cov	WAS049
pH	7.4	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	37300	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1560	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.009	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.008	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.009	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.013	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.010	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.008	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.013	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483496** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06d 1.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	82	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	208	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	202	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<20	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	492	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<20	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<20	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<20	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<20	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<20	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<20	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	492	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	492	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<20	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	492	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Acenaphthylene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (a) anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (g,h,i) perylene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (a) pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (b) fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Benzo (k) fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Chrysene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Dibenz (a,h) anthracene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Fluoranthene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Fluorene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Indeno (1,2,3) cd pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Naphthalene	To Follow	ug/l	01/01/0001	N	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483496** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06d 1.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Pyrene	To Follow	ug/l	01/01/0001	N	Cov	GEO19
PAH, Total	To Follow	ug/l	01/01/0001	N	Cov	GEO19
Arsenic, trace Filtered as As	63	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483496: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.
Reporting limits raised for LL TINS due to nature of sample matrix.
Reporting limits raised for PCB results due to nature of sample matrix.Raised reporting limits for EPH waters due to the nature of the sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483497** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06s 1.4m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	7.50	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	8.4	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	40600	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2420	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483497** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06s 1.4m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.549	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	0.015	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	0.485	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	2.25	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	2.42	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	2.13	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	2.13	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	1.48	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	1.79	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.661	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	4.68	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	0.239	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	1.34	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	0.123	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483497** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 06s 1.4m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	1.97	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	3.90	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	26	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	63	ug/l	05/03/2015	Y	Cov	WAS060

Analyst Comments for 14483497:

Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.
A dilution was performed for the following PAH compounds: Fluoranthene, Pyrene, Benzo(b)fluoranthene, Benzo(a)pyrene and Indeno(123cd)pyrene. As these results are above the validated calibration range of the method, they maybe an underestimate as the extraction efficiencies at these levels are unknown. Consequently, the PAH total result may also be an underestimate.
.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483498** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07d 3.0m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Benzene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Toluene	To Follow	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
o-Xylene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	1.40	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.90	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.8	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	39600	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2400	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C6 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C8 - 10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C7	To Follow	ug/l	01/01/0001	N	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483498** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07d 3.0m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C8 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Acenaphthene	0.082	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	0.011	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.012	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.011	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	0.028	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	0.030	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	0.074	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483498** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07d 3.0m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.045	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	0.027	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	0.319	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	60	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483498: Reporting limit raised for low level filtered Copper and Lead due to sample interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483499** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07s 1.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.00	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.8	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	29200	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1540	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483499** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07s 1.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.697	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	0.011	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	0.026	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.036	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.027	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.028	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.029	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.015	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	0.034	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.012	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	0.402	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	0.015	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.027	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483499** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 07s 1.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.032	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	0.178	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	1.57	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	46	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483499: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483500** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08d 3.8m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	8.70	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.7	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	28000	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1270	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483500** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08d 3.8m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.078	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	0.068	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.206	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.153	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.216	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.217	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.108	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	0.164	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.046	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	0.416	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	0.062	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.167	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	0.118	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483500** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08d 3.8m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.299	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	0.375	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	2.69	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	51	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483500: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483501** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08s 2.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Benzene	To Follow	ug/l	03/03/2015	N	Cov	GEO45
Toluene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
m&p-Xylene	To Follow	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Tributyl Tin	0.0005	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	10.9	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	8.1	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	26600	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1220	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.005	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.004	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.006	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C6 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C8 - 10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C7	To Follow	ug/l	01/01/0001	N	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483501** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08s 2.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C8 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aromatic VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
VPH >C5 - C10	To Follow	ug/l	01/01/0001	N	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	To Follow	ug/l	01/01/0001	N	Cov	GEO45/GEO4
Acenaphthene	0.905	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	0.136	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	0.495	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	0.428	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	0.137	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483501** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 08s 2.6m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.605	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	0.423	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	3.13	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	44	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483501:

Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.
Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix.
Reporting limits raised for PCB results due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483502** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10d 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	10.8	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.7	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	38100	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2100	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	05/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	05/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483502** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10d 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.011	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	0.034	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483502** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10d 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.010	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	0.055	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	64	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483502: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483503** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10s 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	9.60	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	7.7	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	38300	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2070	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 52	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 101	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 118	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 138	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 153	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 180	To Follow	ug/l	01/01/0001	N	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483503** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10s 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.010	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	0.034	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483503** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 10s 3.2m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	0.044	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	52	ug/l	05/03/2015	Y	Cov	WAS060

Analyst Comments for 14483503: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483504** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12d 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0019	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	2.50	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	8.80	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	9.0	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	22000	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1080	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 52	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 101	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 118	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 138	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 153	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 180	To Follow	ug/l	01/01/0001	N	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483504** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12d 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.154	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483504** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12d 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	0.154	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	44	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483504: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483505** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12s 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0019	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	2.10	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	9.80	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	9.0	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	22000	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	1060	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 52	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 101	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 118	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 138	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 153	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 180	To Follow	ug/l	01/01/0001	N	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483505** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12s 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	14	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	14	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	14	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	14	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	14	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.186	ug/l	04/03/2015	Y	Cov	GEO19
Acenaphthylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Chrysene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Fluoranthene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Fluorene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Naphthalene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483505** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH 12s 2.3m**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
Pyrene	<0.10	ug/l	04/03/2015	Y	Cov	GEO19
PAH, Total	0.186	ug/l	04/03/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	42	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483505: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Date: **05 March 2015**
Title:

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483506** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0032	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.20	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	8.0	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	39600	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2360	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 52	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 101	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 118	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 138	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 153	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 180	To Follow	ug/l	01/01/0001	N	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483506** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	0.012	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483506** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.013	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	0.013	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	0.037	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	71	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483506: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Title: Date: **05 March 2015**

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483507** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	27/02/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	24/02/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Benzene	<1	ug/l	03/03/2015	N	Cov	GEO45
Toluene	<1	ug/l	03/03/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	03/03/2015	N	Cov	GEO45
Tributyl Tin	0.0008	ug/l	03/03/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	03/03/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/03/2015	Y	S	SUBCON
Aluminium, Filtered as Al	0.1	mg/l	24/02/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	03/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	24/02/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	03/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	03/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.20	ug/l	24/02/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	24/02/2015	Y	Cov	WAS049
pH	8.3	pH units	23/02/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	37900	uS/cm	23/02/2015	Y	Cov	WAS039
Sulphate as SO4	2240	mg/l	22/02/2015	N	Cov	WAS036
PCB 28	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 52	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 101	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 118	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 138	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 153	To Follow	ug/l	01/01/0001	N	Cov	GEO47
PCB 180	To Follow	ug/l	01/01/0001	N	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	03/03/2015	Y	Cov	GEO45

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483507** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	03/03/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	05/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	05/03/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Fluoranthene	0.015	ug/l	26/02/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	26/02/2015	Y	Cov	GEO19

Certificate of Analysis

INTERIM REPORT

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1168645/2015** Issue **1**
Laboratory Number: **14483507** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **20 February 2015**
Sample Received: **20 February 2015**
Analysis Complete:

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.013	ug/l	26/02/2015	Y	Cov	GEO19
Pyrene	0.022	ug/l	26/02/2015	Y	Cov	GEO19
PAH, Total	0.049	ug/l	26/02/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	72	ug/l	03/03/2015	Y	Cov	WAS060

Analyst Comments for 14483507: Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: Title: Date: **05 March 2015**

ANALYST COMMENTS FOR REPORT COV/1168645/2015 Issue 1

INTERIM REPORT Date of Issue: **05 March 2015**

Sample No	Analysis Comments
14483491	Reporting limit raised for low level filtered Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised. .
14483492	Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised. Reporting limits raised for PCB results due to nature of sample matrix.
14483493	Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised. Reporting limits raised for PCB results due to nature of sample matrix.
14483494	Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container. It is therefore possible that the results provided could be compromised. The total PAH does not include Naphthalene and Acenaphthylene as the reporting limits for these compounds have been raised due to interference. Reporting limits raised for PCB results due to nature of sample matrix. Raised reporting limits for EPH waters due to the nature of the sample matrix.
14483495	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. .
14483496	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Reporting limits raised for LL TINS due to nature of sample matrix. Reporting limits raised for PCB results due to nature of sample matrix.Raised reporting limits for EPH waters due to the nature of the sample matrix.
14483497	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. A dilution was performed for the following PAH compounds: Fluoranthene, Pyrene, Benzo(b)fluoranthene, Benzo(a)pyrene and Indeno(123cd)pyrene. As these results are above the validated calibration range of the method, they maybe an underestimate as the extraction efficiencies at these levels are unknown. Consequently, the PAH total result may also be an underestimate. .
14483498	Reporting limit raised for low level filtered Copper and Lead due to sample interference. .
14483499	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. .
14483500	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. .
14483501	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix. Reporting limits raised for PCB results due to nature of sample matrix.
14483502	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. .
14483503	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.
14483504	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix.
14483505	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference. Sub sample for PAH taken from a container inappropriate for this parameter due to quality failure on the original sample taken from the glass container and re-analysed outside recommended stability times. It is therefore possible that the results provided could be compromised. Reporting limits raised for PAH due to nature of sample matrix.
14483506	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.
14483507	Reporting limit raised for low level filtered Cadmium, Copper and Lead due to sample interference.

Signed: Name: Date: **05 March 2015**

Title:

DETERMINAND COMMENTS FOR REPORT COV/1168645/2015 ISSUE 1

INTERIM REPORT Date of Issue : 05 March 2015

Sample No	Description	Determinand	Comments

Signed:

Name:

Title:

Date: **05 March 2015**

ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Mr Barry
Geotechnical & Environmental
Services
The Old Mill
22a Kilmoyle Road
Ballymoney BT53 6NR

17 April 2015

Test Report: COV/1176002/2015

Dear Mr Barry

Analysis of your sample(s) submitted on 25 March 2015 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name: P. Pepper

Title: Organic Team Leader

1314
4398
Certificate No. GB97/10269
Environmental Management Systems
OHS 542058
FS 67435
This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

UKAS TESTING
1314
0897
4409

ALS Environmental

Mr Robert Barry
Geotechnical & Environmental Services
The Old Mill
22a Kilmoyle Road
Ballymoney
BT53 6NR

Date of Issue: **17 April 2015**

Report Number: **COV/1176002/2015** Issue **2**

Job Description: Dublin Port SI

Job Location: Dublin Port IED Application Alexandra

Number of Samples included in this report **17**

Job Received: **25 March 2015**

Number of Test Results included in this report **1173**

Analysis Commenced: **26 March 2015**

Signed:

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.
(c) ALS Environmental Ltd 2015. All rights reserved. We, ALS Environmental Ltd, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534329** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (S) 4.00m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0008	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.07	ug/l	30/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	5.3	ug/l	30/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<0.50	ug/l	30/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	4.20	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.6	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	605	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate, total as SO4 by I.C.	38.70	mg/l	09/04/2015	Y	Cov	CON27
PCB 28	<0.004	ug/l	31/03/2015	Y	Cov	GEO47
PCB 52	<0.004	ug/l	31/03/2015	Y	Cov	GEO47
PCB 101	<0.004	ug/l	31/03/2015	Y	Cov	GEO47
PCB 118	<0.006	ug/l	31/03/2015	Y	Cov	GEO47
PCB 138	<0.005	ug/l	31/03/2015	Y	Cov	GEO47
PCB 153	<0.004	ug/l	31/03/2015	Y	Cov	GEO47
PCB 180	<0.006	ug/l	31/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534329** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (S) 4.00m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.011	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.012	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.021	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.016	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.015	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	0.011	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.015	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.033	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	0.016	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.019	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534329** Sample **1** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (S) 4.00m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.036	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.028	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.231	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	6.2	ug/l	30/03/2015	Y	Cov	WAS060

Analyst Comments for 14534329: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Sulphate analysed by ion chromatography due to interference with turbidimetric determination.
Reporting limits raised for GCMSMS Pesticides due to nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534330** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (D) 3.75m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	6.50	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	31200	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	1650	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	31/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	31/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534330** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (D) 3.75m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.011	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534330** Sample **2** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH1 (D) 3.75m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.021	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.032	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	33	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534330: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534331** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 3.62m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0007	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.07	ug/l	30/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<1.9	ug/l	30/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<0.50	ug/l	30/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	5.50	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	1880	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	282	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	31/03/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	31/03/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	31/03/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534331** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 3.62m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	15	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	15	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	15	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	15	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	15	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.05	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534331** Sample **3** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH2 3.62m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.018	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.018	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	5.6	ug/l	30/03/2015	Y	Cov	WAS060

Analyst Comments for 14534331: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. .The total PAH does not include Naphthalene as the reporting limit for this compound has been raised due to interference from sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534332** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 4.70m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	2	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0010	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.07	ug/l	30/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<1.9	ug/l	30/03/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	3.34	ug/l	30/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	4.20	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	19.8	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.5	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	43400	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	180	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	36	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	36	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534332** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 4.70m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	39	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	39	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	75	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	476	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	889	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	377	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	1740	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	376	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	536	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	134	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	39	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	1090	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	2830	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	1776	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	1129	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	2905	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	1.42	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.41	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	0.308	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.462	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.209	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.368	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.371	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.194	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	0.315	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.10	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	1.12	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	1.68	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.208	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<1.4	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534332** Sample **4** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH4 4.70m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.968	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	1.05	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	8.67	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	15	ug/l	30/03/2015	Y	Cov	WAS060

Analyst Comments for 14534332: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. The total PAH does not include Naphthalene and Acenaphthylene as the reporting limits for these compounds have been raised due to interference from sample matrix. The reporting limits for the rest of PAH compounds have also been raised due to the nature of sample matrix.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534333** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 (D) 3.80m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	3.50	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.2	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	30000	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	1500	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534333** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 (D) 3.80m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534333** Sample **5** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH5 (D) 3.80m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	<0.01	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	34	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534333: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534334** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (S) 2.10m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	7.40	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	20.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	41900	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2330	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534334** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (S) 2.10m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.074	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	0.068	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.245	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.239	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.297	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.291	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.141	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	0.231	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.061	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.513	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	0.045	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.225	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.044	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534334** Sample **6** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (S) 2.10m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.323	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.463	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	3.26	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	54	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534334: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534335** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (D) 10.20m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	3.90	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	41500	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	1600	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534335** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (D) 10.20m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.045	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	0.017	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.034	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	0.024	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.017	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534335** Sample **7** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH6 (D) 10.20m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.060	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.036	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.233	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	51	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534335: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534336** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (S) 1.56m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	3.90	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.0	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	43500	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2440	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534336** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (S) 1.56m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.083	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	0.085	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.515	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.544	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.707	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.663	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.316	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	0.536	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.128	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	1.05	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	0.038	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.570	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.011	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534336** Sample **8** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (S) 1.56m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.413	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.880	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	6.54	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	59	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534336: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534337** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (D) 4.17m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	<3.00	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	38100	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	1930	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534337** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (D) 4.17m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.024	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.033	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.057	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.049	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.047	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.022	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	0.026	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	0.015	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.065	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.056	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.015	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

1314
0897
4409

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534337** Sample **9** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH7 (D) 4.17m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.036	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.066	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.510	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	45	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534337: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534338** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (S) 3.65m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	10/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0004	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	10/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	10/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	11.2	ug/l	10/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	33.8	ug/l	10/04/2015	Y	Cov	WAS049
pH	8.2	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	29400	uS/cm	27/03/2015	Y	Cov	WAS039
Sulphate as SO4	1430	mg/l	27/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534338** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (S) 3.65m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	13	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	13	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	13	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	13	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	13	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.206	ug/l	10/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.014	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Chrysene	0.015	ug/l	10/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluoranthene	0.215	ug/l	10/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534338** Sample **10** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (S) 3.65m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.017	ug/l	10/04/2015	Y	Cov	GEO19
Pyrene	0.167	ug/l	10/04/2015	Y	Cov	GEO19
PAH, Total	0.634	ug/l	10/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	41	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534338: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534339** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (D) 3.52m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	10/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	10/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	10/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	4.90	ug/l	10/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	10/04/2015	Y	Cov	WAS049
pH	8.2	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	28000	uS/cm	27/03/2015	Y	Cov	WAS039
Sulphate as SO4	1200	mg/l	27/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	02/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	02/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534339** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (D) 3.52m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	0.026	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	0.029	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	0.033	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	0.036	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	0.019	ug/l	10/04/2015	Y	Cov	GEO19
Chrysene	0.034	ug/l	10/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluoranthene	0.068	ug/l	10/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	0.026	ug/l	10/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534339** Sample **11** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH8 (D) 3.52m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.042	ug/l	10/04/2015	Y	Cov	GEO19
Pyrene	0.065	ug/l	10/04/2015	Y	Cov	GEO19
PAH, Total	0.378	ug/l	10/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	40	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534339: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534340** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH10 (D) 4.30m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	10/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	10/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	10/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	8.40	ug/l	10/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	10/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	37100	uS/cm	27/03/2015	Y	Cov	WAS039
Sulphate as SO4	2000	mg/l	27/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534340** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH10 (D) 4.30m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534340** Sample **12** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH10 (D) 4.30m**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
PAH, Total	<0.01	ug/l	10/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	50	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534340: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534341** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (S) 3.22m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0018	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	2.30	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	5.90	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.2	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	41000	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2130	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534341** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (S) 3.22m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	0.179	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	0.014	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	0.010	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.031	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	0.035	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.015	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534341** Sample **13** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (S) 3.22m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.055	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	0.024	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.362	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	54	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534341: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: Name: **P. Pepper** Date: **17 April 2015**
Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534342** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (D) 2.40m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	0.0003	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	4.30	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	39400	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2110	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534342** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (D) 2.40m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	0.015	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534342** Sample **14** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BH12 (D) 2.40m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.015	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	60	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534342: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534343** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BHC 11.05m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	11.1	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	18.2	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	43100	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2150	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	07/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	07/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534343** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BHC 11.05m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	0.011	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534343** Sample **15** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **BHC 11.05m**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	0.015	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	0.026	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	60	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534343: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534344** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	10/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	10/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	10/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	<3.00	ug/l	10/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	10/04/2015	Y	Cov	WAS049
pH	8.2	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	28800	uS/cm	27/03/2015	Y	Cov	WAS039
Sulphate as SO4	1580	mg/l	27/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	09/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	09/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534344** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	31/03/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534344** Sample **16** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Upstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **24 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	10/04/2015	Y	Cov	GEO19
PAH, Total	<0.01	ug/l	10/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	33	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534344: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534345** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Chromium - Hexavalent	<5.00	ug/l	26/03/2015	N	Cov	WAS031
Lithium, Filtered as Li	<0.200	mg/l	07/04/2015	Y	Cov	WAS049
Ethylbenzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Benzene	<1	ug/l	13/04/2015	N	Cov	GEO45
Toluene	<1	ug/l	13/04/2015	N	Cov	GEO45
m&p-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
o-Xylene	<1	ug/l	13/04/2015	N	Cov	GEO45
Tributyl Tin	<0.0002	ug/l	16/04/2015	N	Cov	GEO57
Methyl Tertiary Butyl Ether	<1	ug/l	13/04/2015	N	Cov	GEO45
Mercury, Low Level Filtered	<0.010	ug/l	02/04/2015	Y	S	SUBCON
Aluminium, Filtered as Al	<0.1	mg/l	07/04/2015	Y	Cov	WAS049
Cadmium, trace Filtered as Cd	<0.70	ug/l	31/03/2015	Y	Cov	WAS060
Chromium, Filtered as Cr	<2.00	ug/l	07/04/2015	Y	Cov	WAS049
Copper, trace Filtered as Cu	<19	ug/l	02/04/2015	Y	Cov	WAS060
Lead, Ultra-low Filtered as Pb	<5.00	ug/l	31/03/2015	Y	Cov	WAS060
Nickel, Filtered as Ni	<3.00	ug/l	07/04/2015	Y	Cov	WAS049
Zinc, Filtered as Zn	<18.0	ug/l	07/04/2015	Y	Cov	WAS049
pH	8.1	pH units	27/03/2015	Y	Cov	WAS039
Conductivity- Electrical 20C	44600	uS/cm	28/03/2015	Y	Cov	WAS039
Sulphate as SO4	2510	mg/l	26/03/2015	N	Cov	WAS036
PCB 28	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 52	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 101	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 118	<0.003	ug/l	09/04/2015	Y	Cov	GEO47
PCB 138	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 153	<0.002	ug/l	09/04/2015	Y	Cov	GEO47
PCB 180	<0.003	ug/l	09/04/2015	Y	Cov	GEO47
Aliphatic VPH >C5 - C6	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C6 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C8 - 10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C7	<10	ug/l	13/04/2015	Y	Cov	GEO45

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534345** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Aromatic VPH >C7 - C8	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C8 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aromatic VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
VPH >C5 - C10	<10	ug/l	13/04/2015	Y	Cov	GEO45
Aliphatic EPH >C10 - C12	<10	ug/l	07/04/2015	N	Cov	GEO46
Aliphatic EPH >C12 - C16	<10	ug/l	07/04/2015	N	Cov	GEO46
Aliphatic EPH >C16 - C35	<10	ug/l	07/04/2015	N	Cov	GEO46
Aliphatic EPH >C35 - C44	<10	ug/l	07/04/2015	N	Cov	GEO46
Aliphatic EPH >C10 - C44	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C10 - C12	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C12 - C16	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C16 - C21	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C21 - C35	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C35 - C44	<10	ug/l	07/04/2015	N	Cov	GEO46
Aromatic EPH >C10 - C44	<10	ug/l	07/04/2015	N	Cov	GEO46
EPH >C10 - C44	<10	ug/l	07/04/2015	N	Cov	GEO46
Aliphatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Aromatic VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
VPH/EPH >C5 - C44	<10	ug/l	13/04/2015	N	Cov	GEO45/GEO4
Acenaphthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Acenaphthylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (g,h,i) perylene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (a) pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (b) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Benzo (k) fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Chrysene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Dibenz (a,h) anthracene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluoranthene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Fluorene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Indeno (1,2,3) cd pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Naphthalene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19

Certificate of Analysis

UKAS TESTING
1314
0897
4409

ALS Environmental

Report Number: **COV/1176002/2015** Issue **2**
Laboratory Number: **14534345** Sample **17** of **17**

Sample Source: **Geotechnical & Environmental Services**
Sample Point Description:
Sample Description: **Downstream**
Sample Matrix: **Ground Water**
Sample Date/Time: **23 March 2015**
Sample Received: **25 March 2015**
Analysis Complete: **16 April 2015**

Test Description	Result	Units	Analysis Date	Accreditation		Method
Phenanthrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
Pyrene	<0.01	ug/l	08/04/2015	Y	Cov	GEO19
PAH, Total	<0.01	ug/l	08/04/2015	N	Cov	GEO19
Arsenic, trace Filtered as As	58	ug/l	31/03/2015	Y	Cov	WAS060

Analyst Comments for 14534345: This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

.

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.
Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

ALS Environmental Ltd
Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

ANALYST COMMENTS FOR REPORT COV/1176002/2015 Issue 2

Date of Issue: **17 April 2015**

Sample No	Analysis Comments
14534329	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Sulphate analysed by ion chromatography due to interference with turbidimetric determination. Reporting limits raised for GCMSMS Pesticides due to nature of sample matrix.
14534330	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534331	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. .The total PAH does not include Naphthalene as the reporting limit for this compound has been raised due to interference from sample matrix.
14534332	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. The total PAH does not include Naphthalene and Acenaphthylene as the reporting limits for these compounds have been raised due to interference from sample matrix. The reporting limits for the rest of PAH compounds have also been raised due to the nature of sample matrix.
14534333	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534334	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534335	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534336	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534337	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534338	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .
14534339	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference. .

ANALYST COMMENTS FOR REPORT COV/1176002/2015 Issue 2

Date of Issue: **17 April 2015**

Sample No	Analysis Comments
14534340	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534341	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534342	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534343	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534344	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, Aluminium, Filtered as Al, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.
14534345	This sample has been analysed for PAH Waters method GEO19, VPH Waters method GEO45, Pesticides method GEO47, pH, Lithium, Filtered as Li outside recommended stability times. It is therefore possible that the results provided may be compromised. Reporting limit raised for low level filt Cadmium, Copper and Lead due to sample matrix interference.

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

DETERMINAND COMMENTS FOR REPORT COV/1176002/2015 ISSUE 2

Date of Issue : 17 April 2015

Sample No	Description	Determinand	Comments

Signed: 

Name: **P. Pepper** Date: **17 April 2015**

Title: **Organic Team Leader**

Appendix E

Hydrualic Conductivity Data and Tidal Hydrographs

Your Ref: Dublin Port IED Application
Our Ref: PM15-1010A
Date: 12th March 2015

Robert Barry
Geotechnical & Environmental Services
The Old Mill
22A Kilmoyle Road
Ballybogey
County Antrim
BT53 6NR

Dear Robert

HYDROGEOLOGICAL TESTING: SLUG TESTS – DUBLIN PORT IED APPLICATION

Pentland Macdonald Ltd completed hydraulic conductivity testing (slug tests) at nine installed boreholes at Dublin Port during February and March 2015.

I am pleased to attach the results of the testing to this letter.

Testing Completed / Restrictions

A total of nine boreholes were drilled at two discrete locations at Dublin Port by GES. These were variously installed with single or dual installations resulting in a total of 16 standpipes comprising:

- BH1 Shallow and Deep
- BH2
- BH4
- BH5 Shallow and Deep
- BH6 Shallow and Deep
- BH7 Shallow and Deep
- BH8 Shallow and Deep
- BH10 Shallow and Deep
- BH12 Shallow and Deep

Hydraulic conductivity testing (slug testing) was completed at 12 of the standpipes. The testing comprised firstly introducing a plastic 'slug' (or displacer) into the water column, causing an almost instantaneous rise in water levels (head) in the boreholes, and monitoring the recovery back to original water level at close time intervals using electronic data loggers (falling head test). Subsequently the slug / displacer was rapidly removed causing an almost instantaneous drop in water levels in the boreholes, and again the recovery back to the starting water level was monitored at close time intervals (rising head test).

Pentland Macdonald Ltd
The Courtyard, 16 Downshire Road, Holywood, Co. Down, BT18 9LX
Tel: (028) 9042 4000 Fax: (028) 9042 2100
Mail: enquiries@pentland-macdonald.com Web: www.pentland-macdonald.com
Company No: NI055369

The rate at which the levels recover can be used to calculate hydraulic conductivity by using the Hvorslev Method of calculation. Appendix I attached presents a series of hydrographs of the slug tests and Appendix II presents the calculation of the hydraulic conductivity (presented in m/min) for the twelve falling head tests and twelve rising head tests based upon the Hvorslev Method.

Testing could not be completed at 'BH5 Shallow' or 'BH7 Shallow' due to the standpipes being dry (i.e. they terminated above the water table). At 'BH6 Shallow' testing could not be completed as an obstruction in the standpipe (or slight curvature) prevented the insertion of the plastic slug. At 'BH10 Shallow' tidal influence on water levels outweighed the effect of the testing and so evaluation of the data was not possible.

It should be noted that at several locations the falling / rising head data appears to have been impacted to some degree by tidal influence (see Appendix I).

Summary of Results

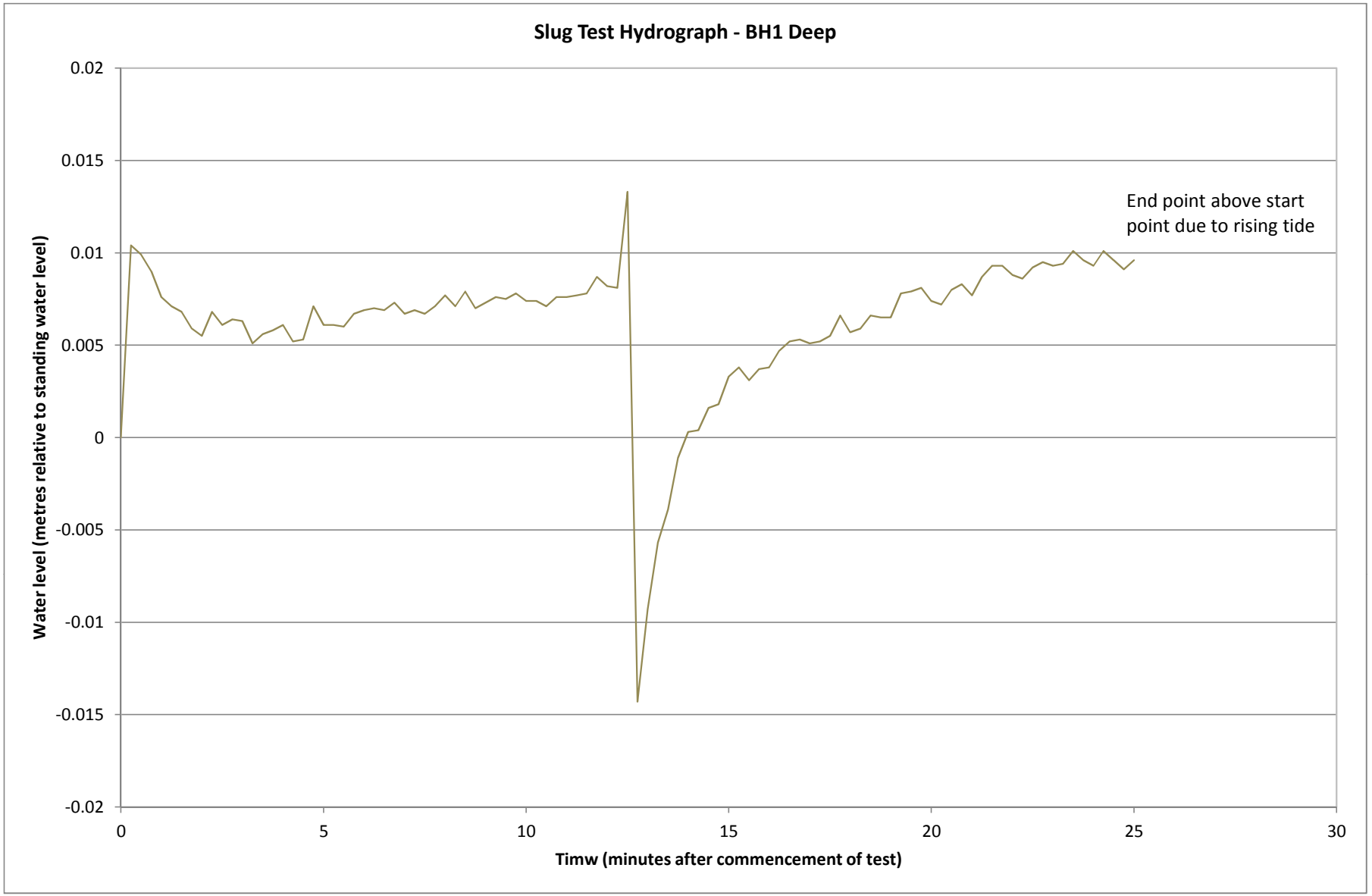
The table below summarises the results of the slug testing (with hydraulic conductivities presented in m/sec) an presents an average value of the falling head test and rising head test results for each standpipe.

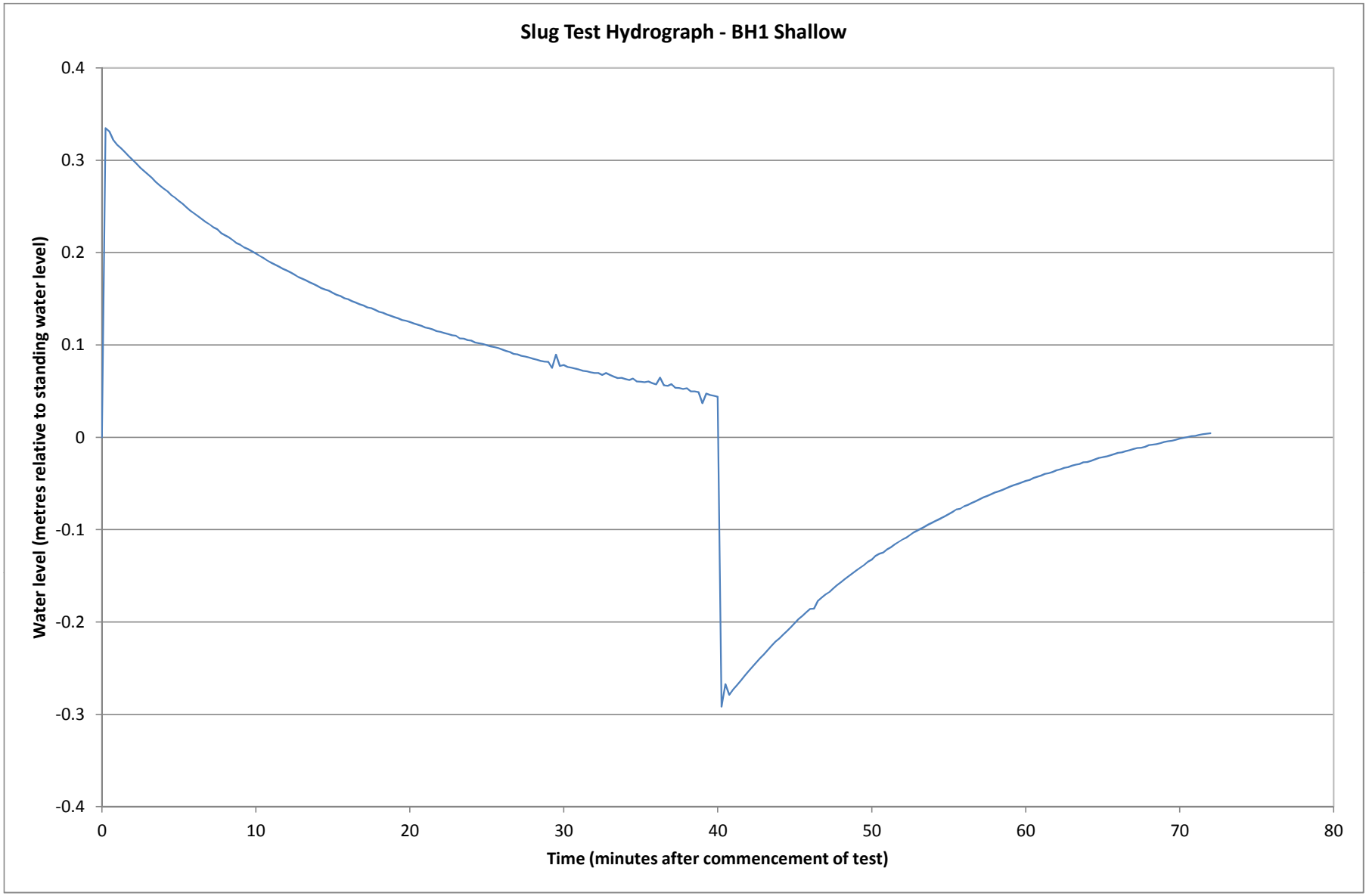
Standpipe	Calculated Hydraulic Conductivity (Falling Head Test) (m/sec)	Calculated Hydraulic Conductivity (Rising Head Test) (m/sec)	Average (m/sec)
BH1 Shallow	2.12E-07	2.90E-07	2.51E-07
BH1 Deep	1.04E-06	2.48E-06	1.76E-06
BH2	9.93E-07	1.49E-06	1.24E-06
BH4	2.42E-07	3.50E-07	2.96E-07
BH5 Deep	6.88E-06	2.58E-06	4.73E-06
BH6 Deep	1.11E-05	4.20E-06	7.66E-06
BH7 Deep	3.75E-06	2.02E-06	2.88E-06
BH8 Shallow	1.03E-07	1.18E-07	1.10E-07
BH8 Deep	1.04E-05	1.49E-06	5.96E-06
BH10 Deep	1.80E-05	1.19E-05	1.50E-05
BH12 Shallow	1.39E-07	4.03E-07	2.71E-07
BH12 Shallow	3.40E-06	2.45E-06	2.93E-06

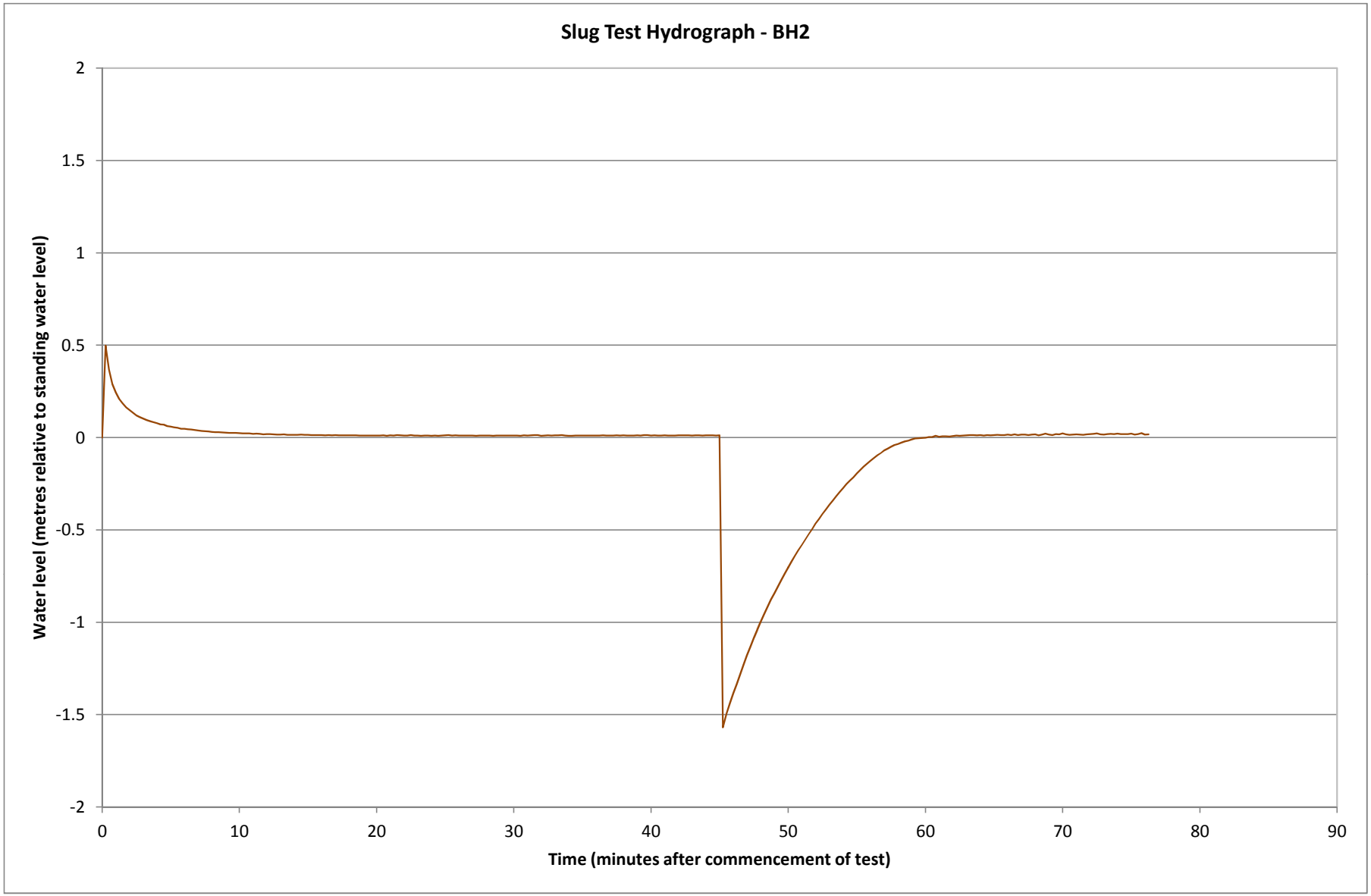
I trust you find the above satisfactory, however, should you require any further information, please feel free to contact me.

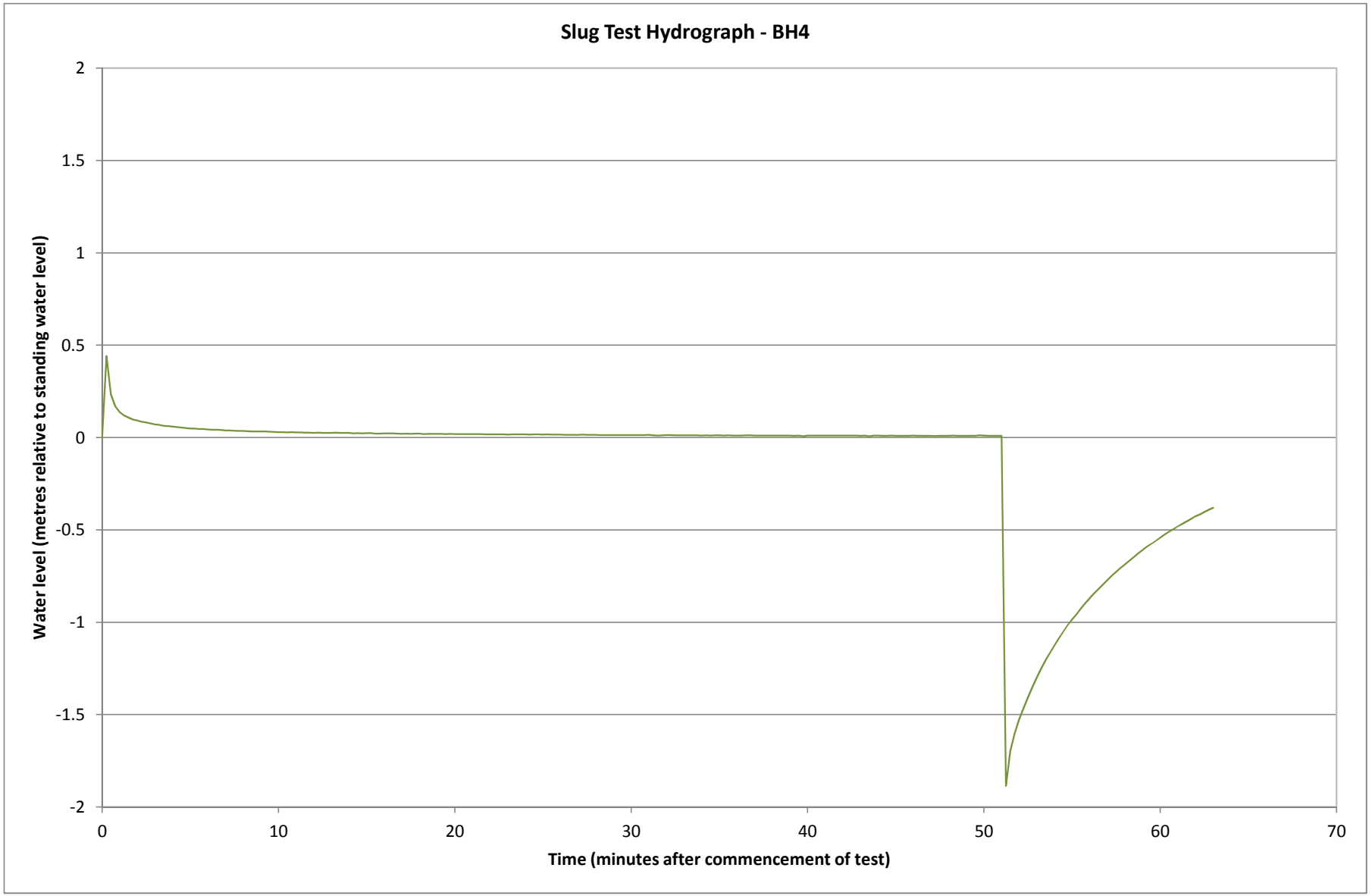
Yours sincerely

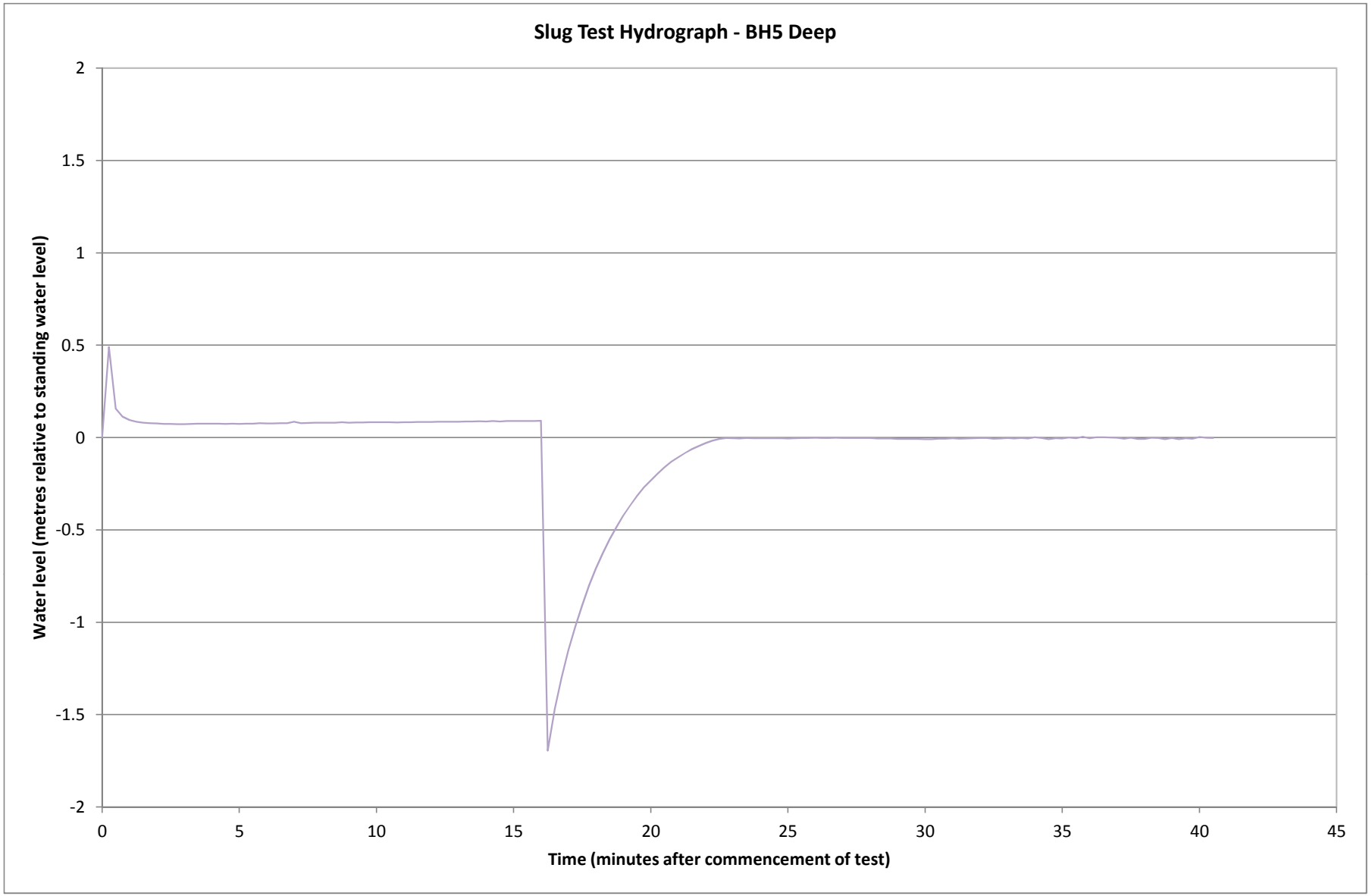
Tim Pentland
Director
Pentland Macdonald Ltd

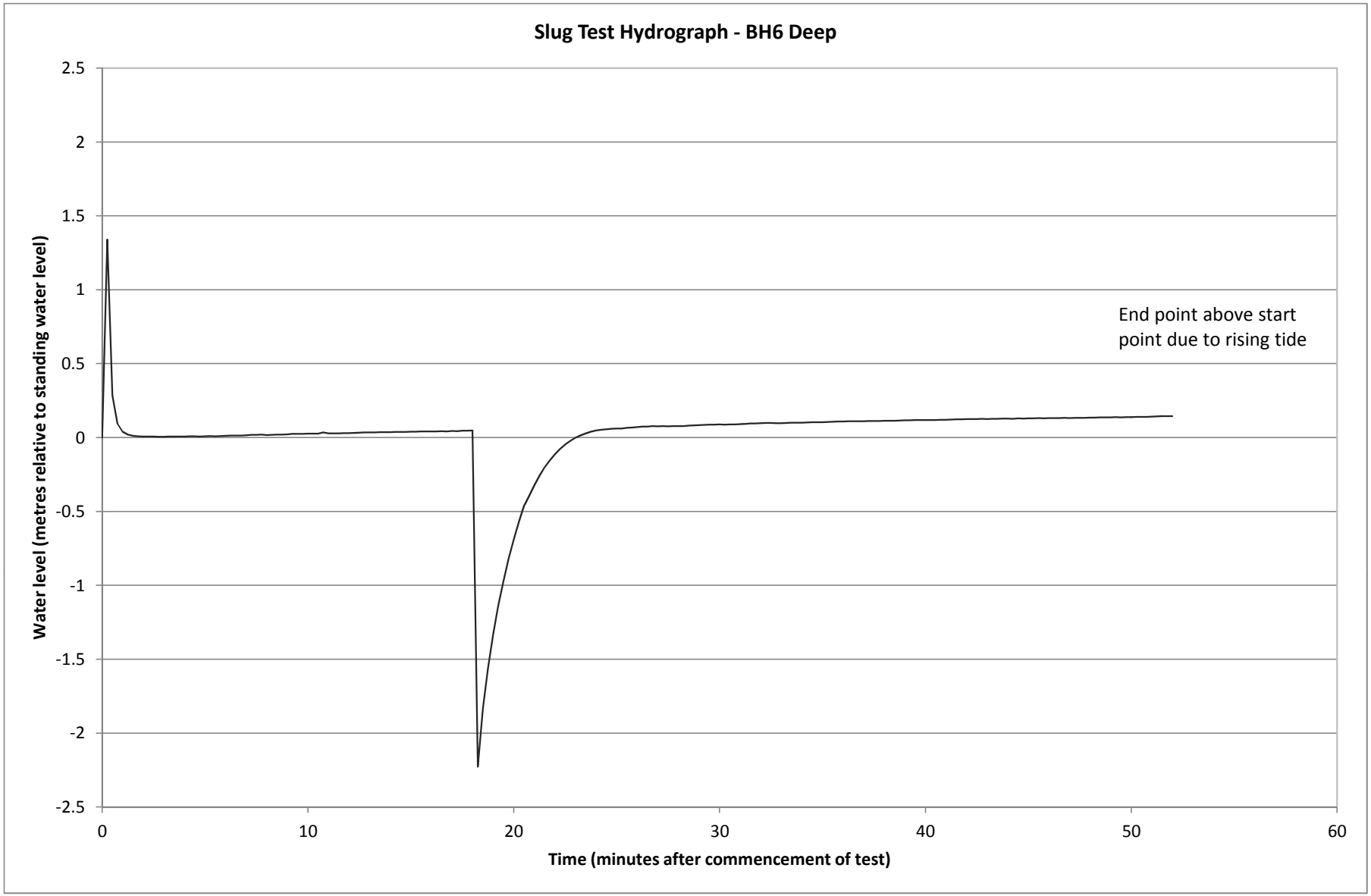

Slug Test Hydrograph - BH1 Deep
0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
-0.02
Water level (metres relative to standing water level)
0
5
10
15
20
25
30
Timw (minutes after commencement of test)
End point above start point due to rising tide

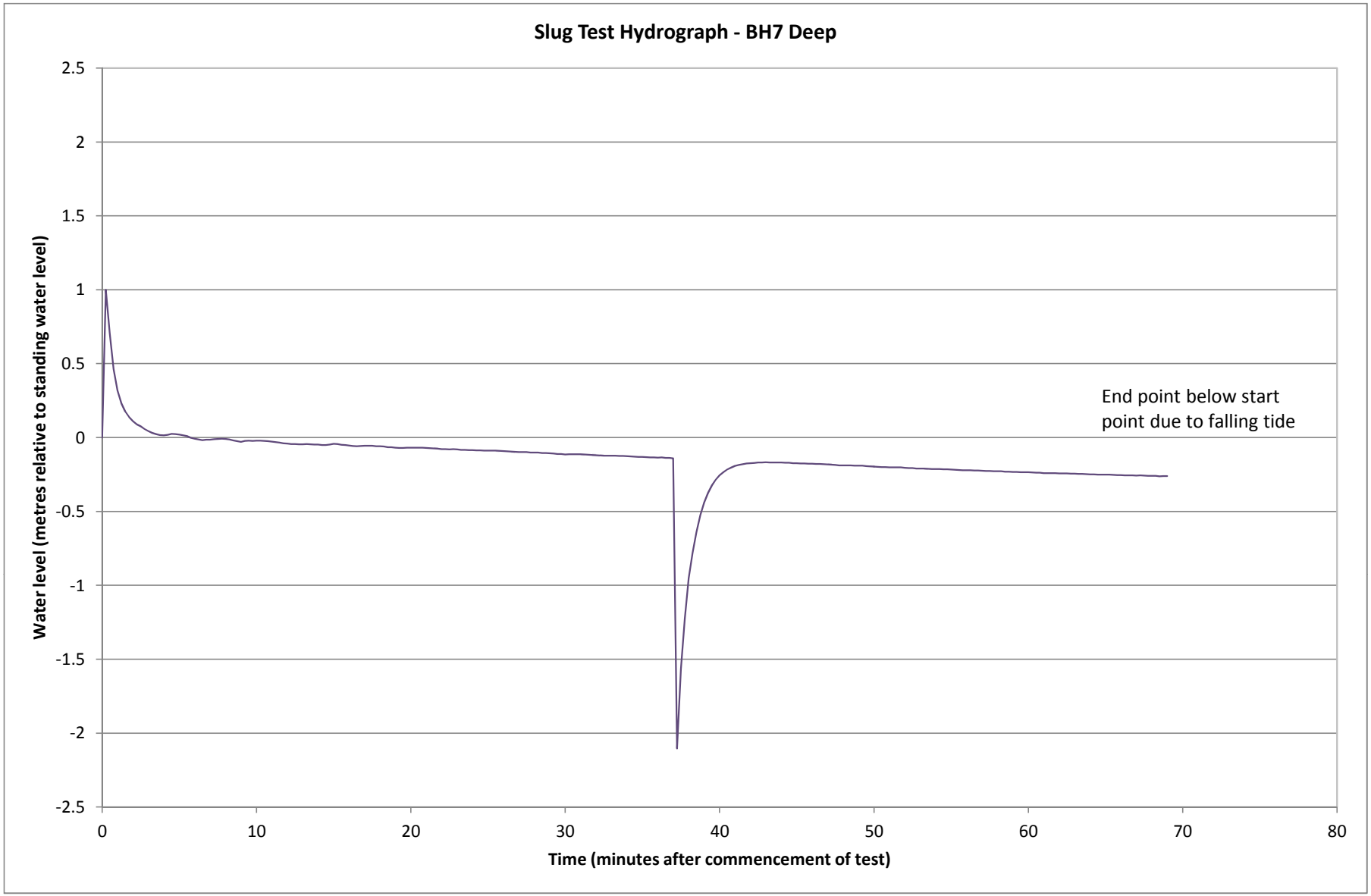

Slug Test Hydrograph - BH1 Shallow
Water level (metres relative to standing water level)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
10
20
30
40
50
60
70
80
Time (minutes after commencement of test)

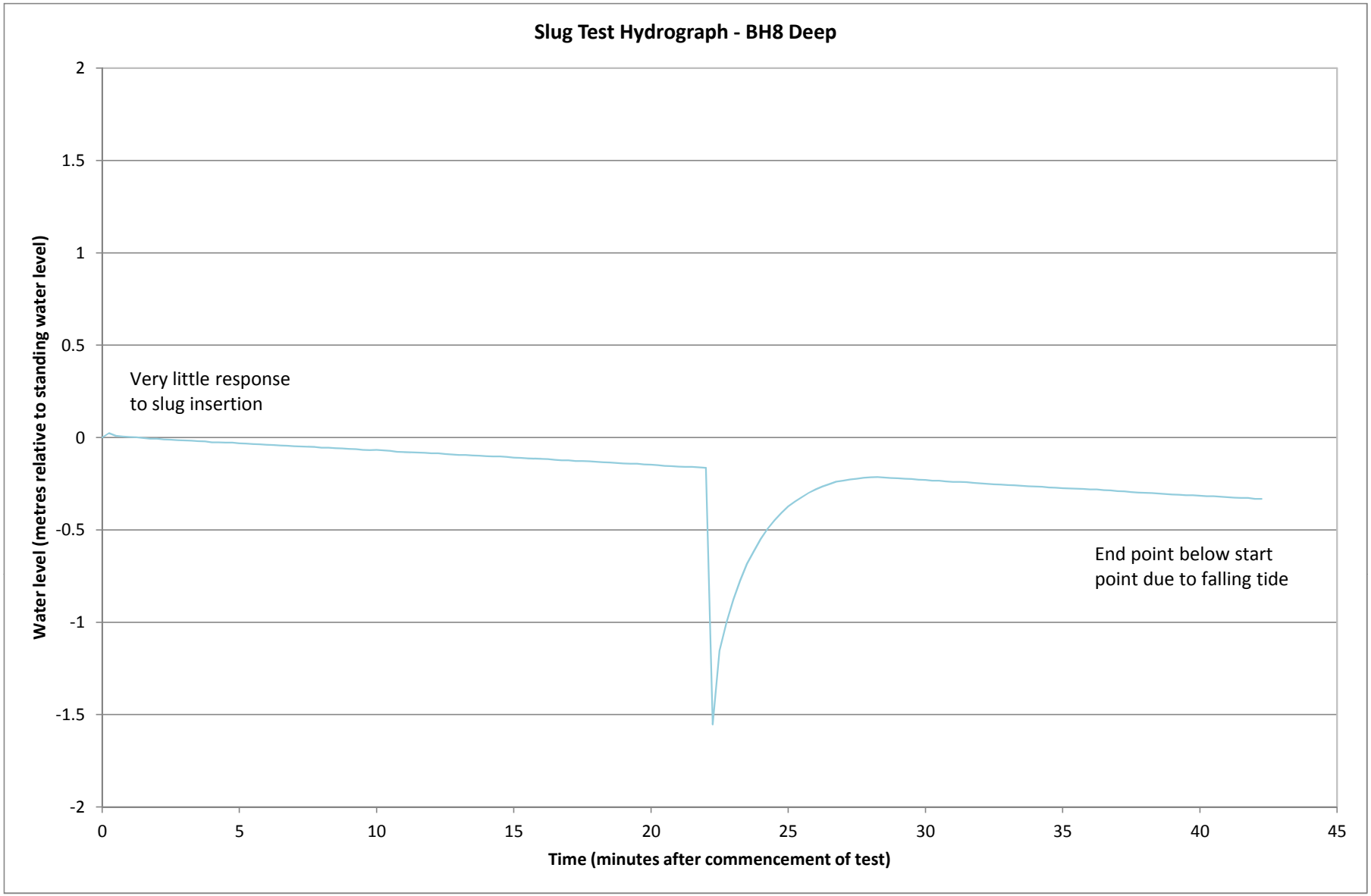

Slug Test Hydrograph - BH2
Water level (metres relative to standing water level)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
80
90
Time (minutes after commencement of test)

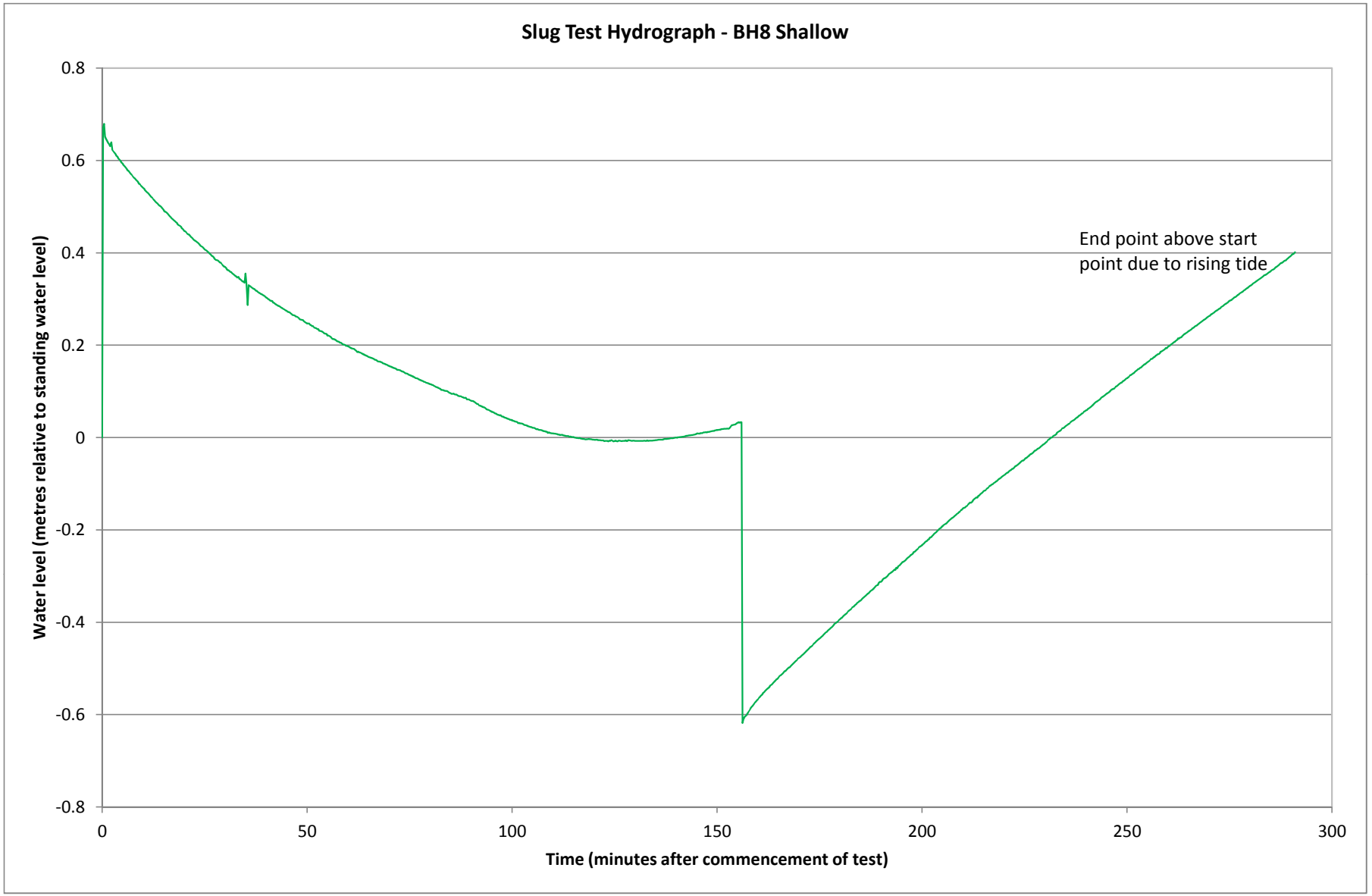

Slug Test Hydrograph - BH4
Water level (metres relative to standing water level)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
Time (minutes after commencement of test)

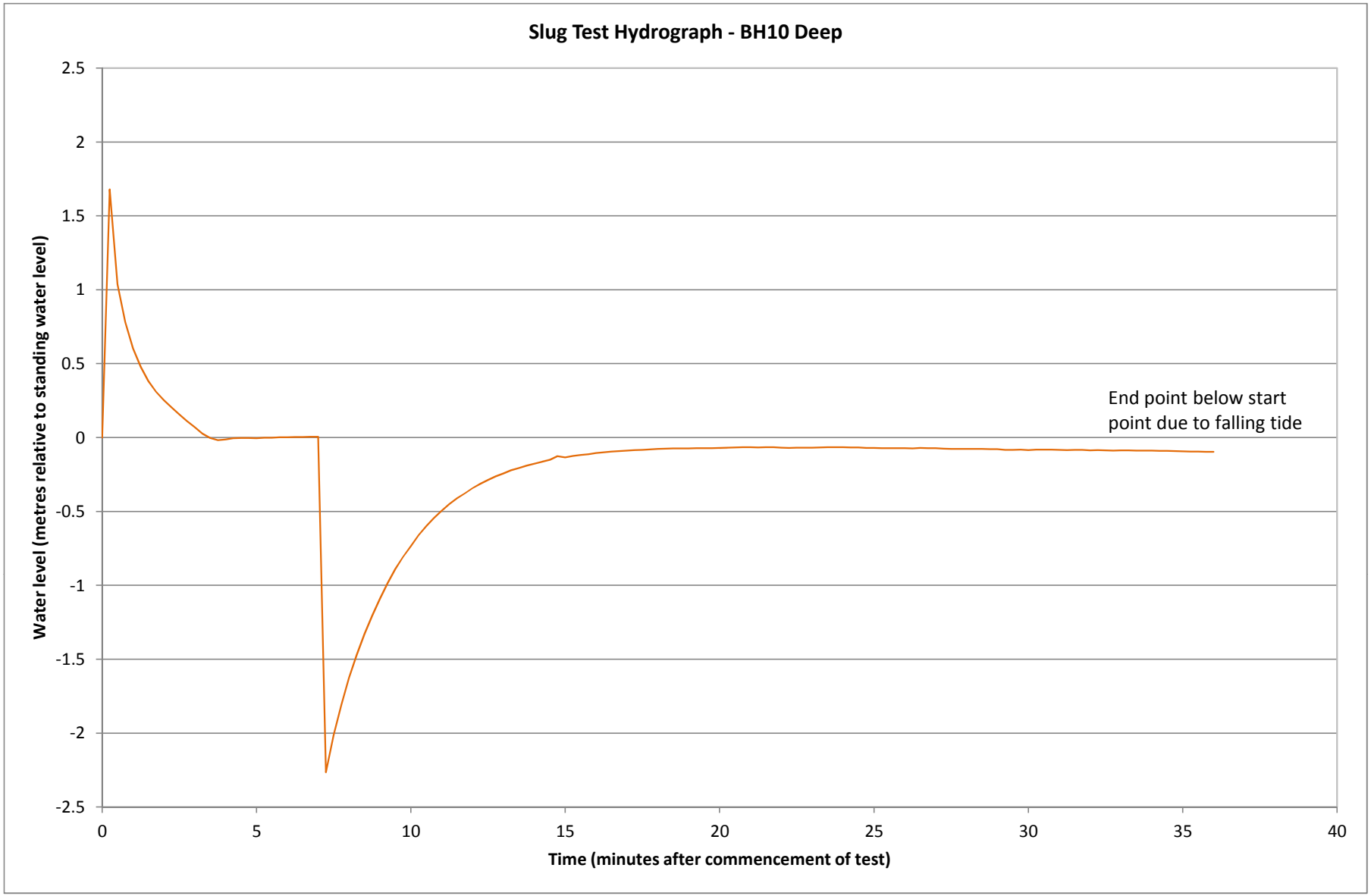

Slug Test Hydrograph - BH5 Deep
Water level (metres relative to standing water level)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
5
10
15
20
25
30
35
40
45
Time (minutes after commencement of test)

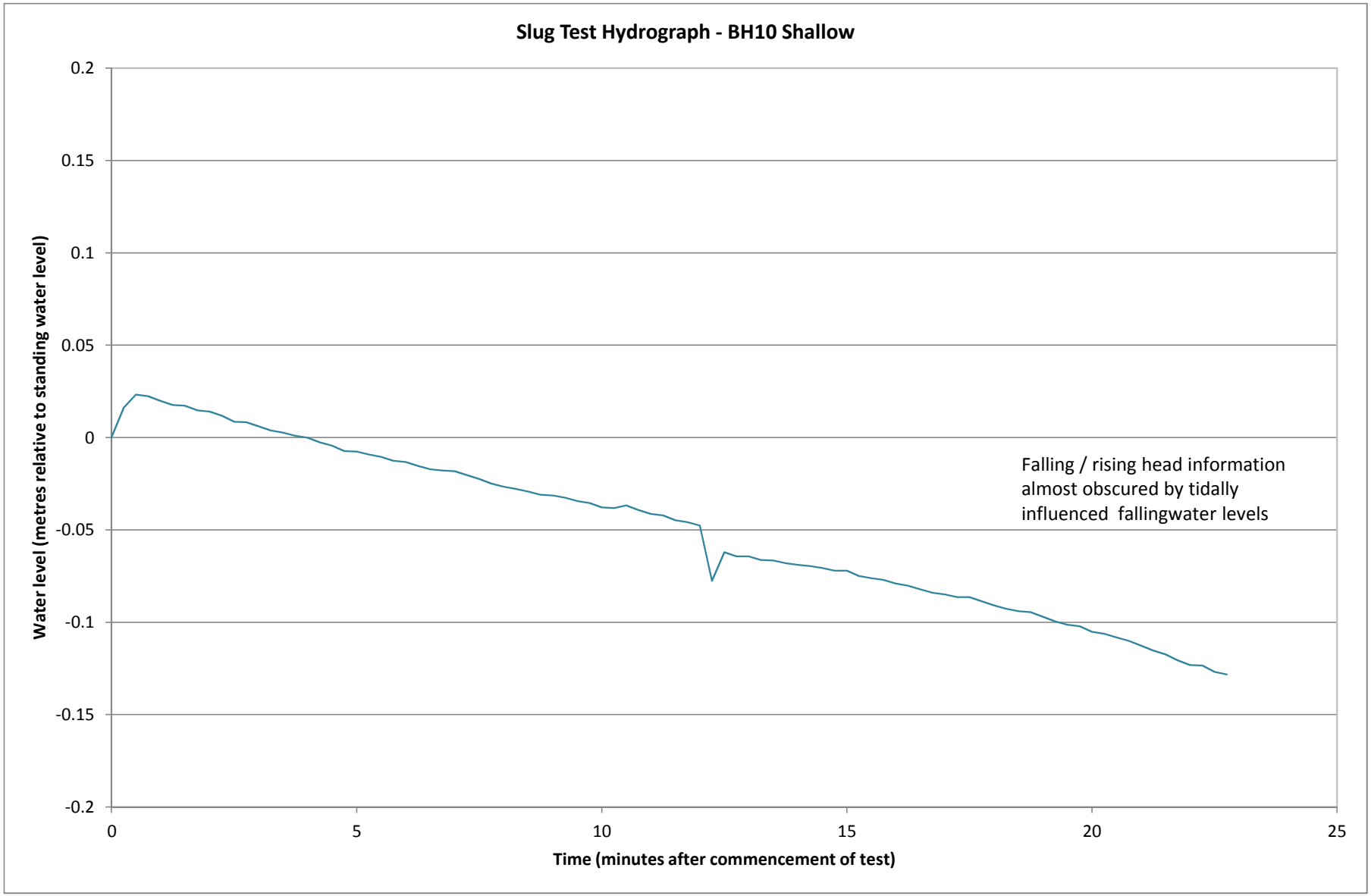

Slug Test Hydrograph - BH6 Deep
Water level (metres relative to standing water level)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
10
20
30
40
50
60
Time (minutes after commencement of test)
End point above start point due to rising tide

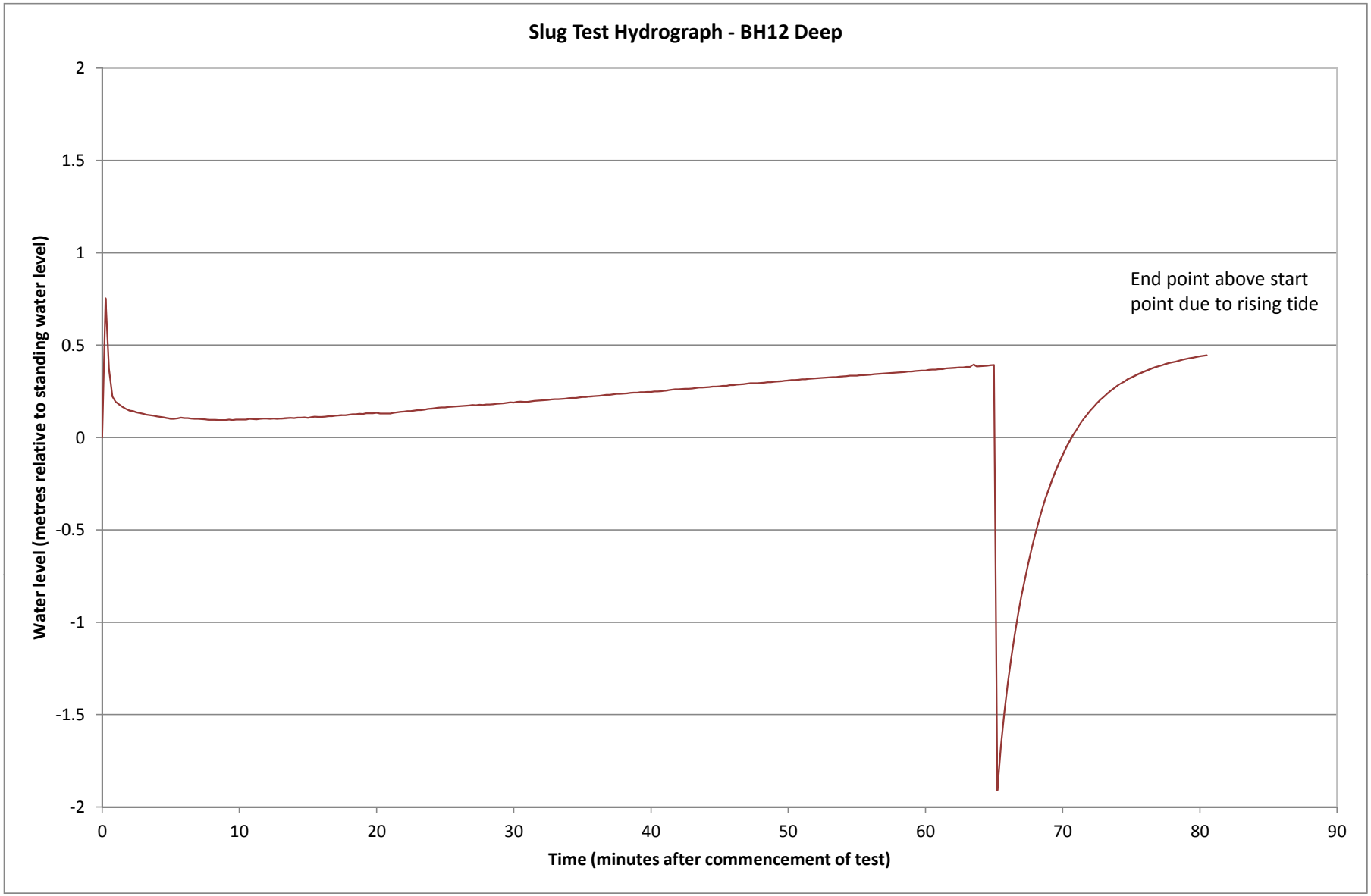

Slug Test Hydrograph - BH7 Deep
Water level (metres relative to standing water level)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
10
20
30
40
50
60
70
80
Time (minutes after commencement of test)
End point below start point due to falling tide

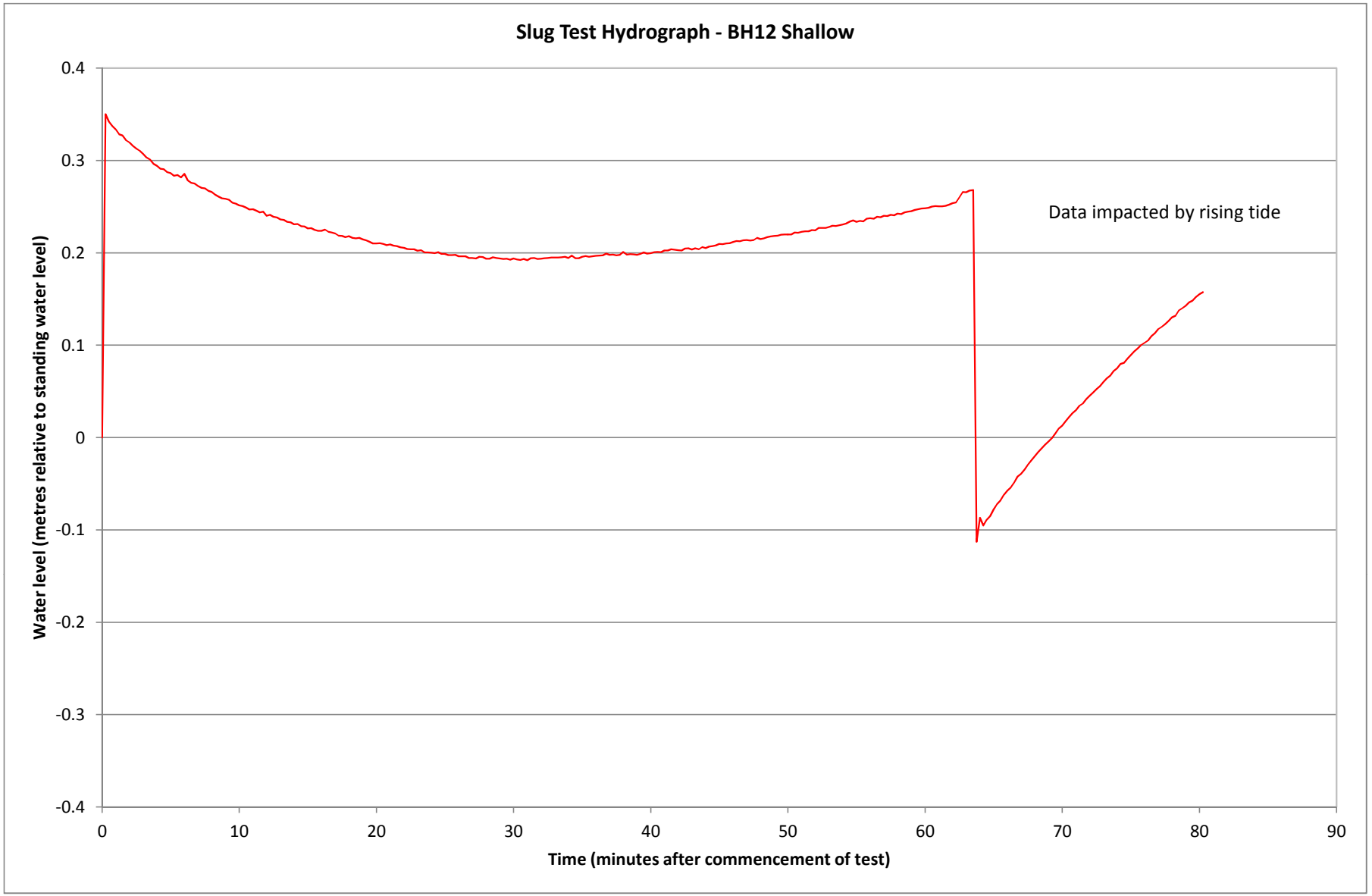

Slug Test Hydrograph - BH8 Deep
Water level (metres relative to standing water level)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
5
10
15
20
25
30
35
40
45
Time (minutes after commencement of test)
Very little response
to slug insertion
End point below start
point due to falling tide


Slug Test Hydrograph - BH8 Shallow
Water level (metres relative to standing water level)
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
0
50
100
150
200
250
300
Time (minutes after commencement of test)
End point above start point due to rising tide


Slug Test Hydrograph - BH10 Deep
Water level (metres relative to standing water level)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
5
10
15
20
25
30
35
40
Time (minutes after commencement of test)
End point below start point due to falling tide

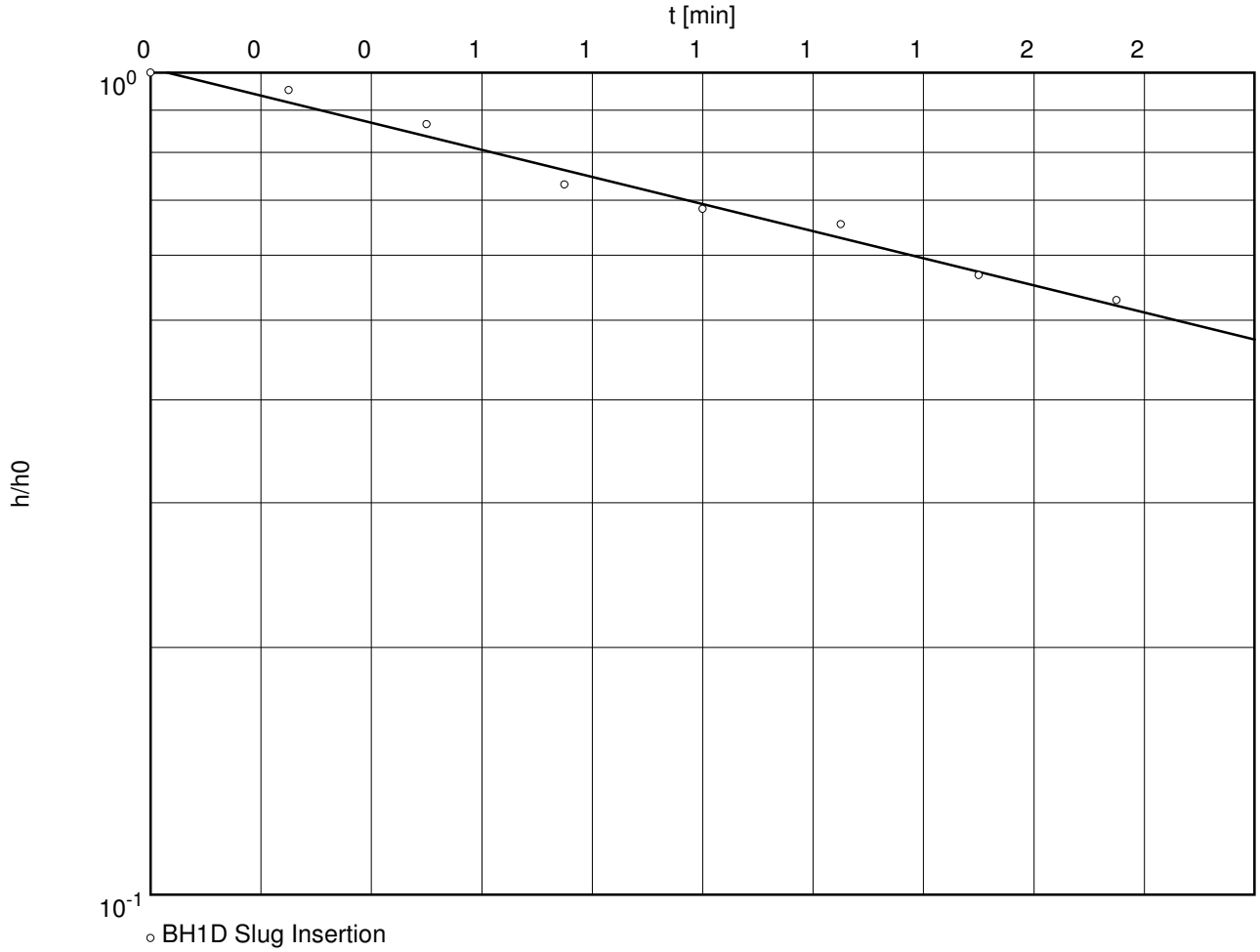

Slug Test Hydrograph - BH10 Shallow
Water level (metres relative to standing water level)
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
0
5
10
15
20
25
Time (minutes after commencement of test)
Falling / rising head information almost obscured by tidally influenced fallingwater levels


Slug Test Hydrograph - BH12 Deep
Water level (metres relative to standing water level)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
80
90
Time (minutes after commencement of test)
End point above start point due to rising tide


Slug Test Hydrograph - BH12 Shallow
Water level (metres relative to standing water level)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
10
20
30
40
50
60
70
80
90
Time (minutes after commencement of test)
Data impacted by rising tide

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

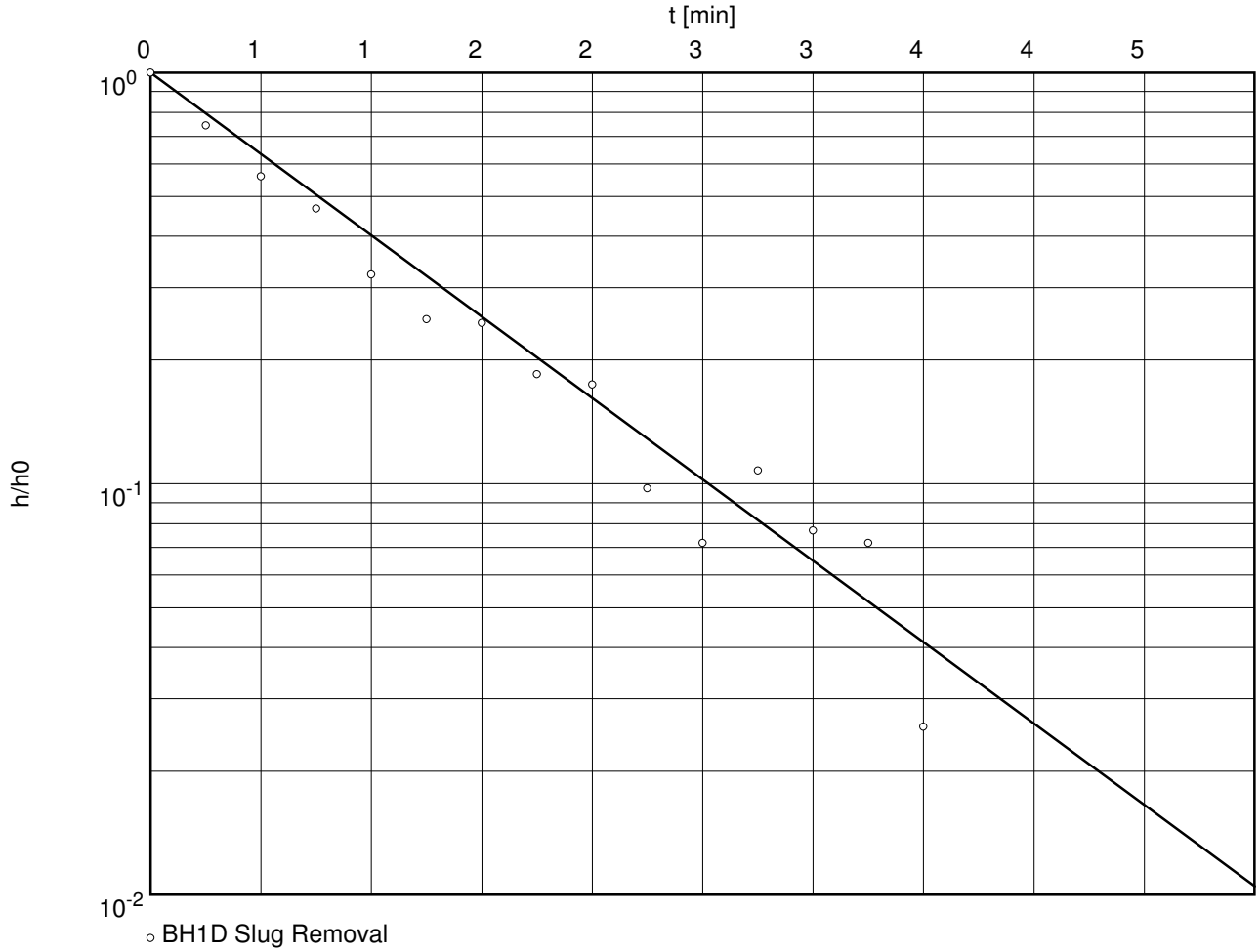
Slug Test No. 1 - Slug Insertion	Test conducted on: 25 Feb 15
BH1 Deep	



Hydraulic conductivity [m/min]: 6.22×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

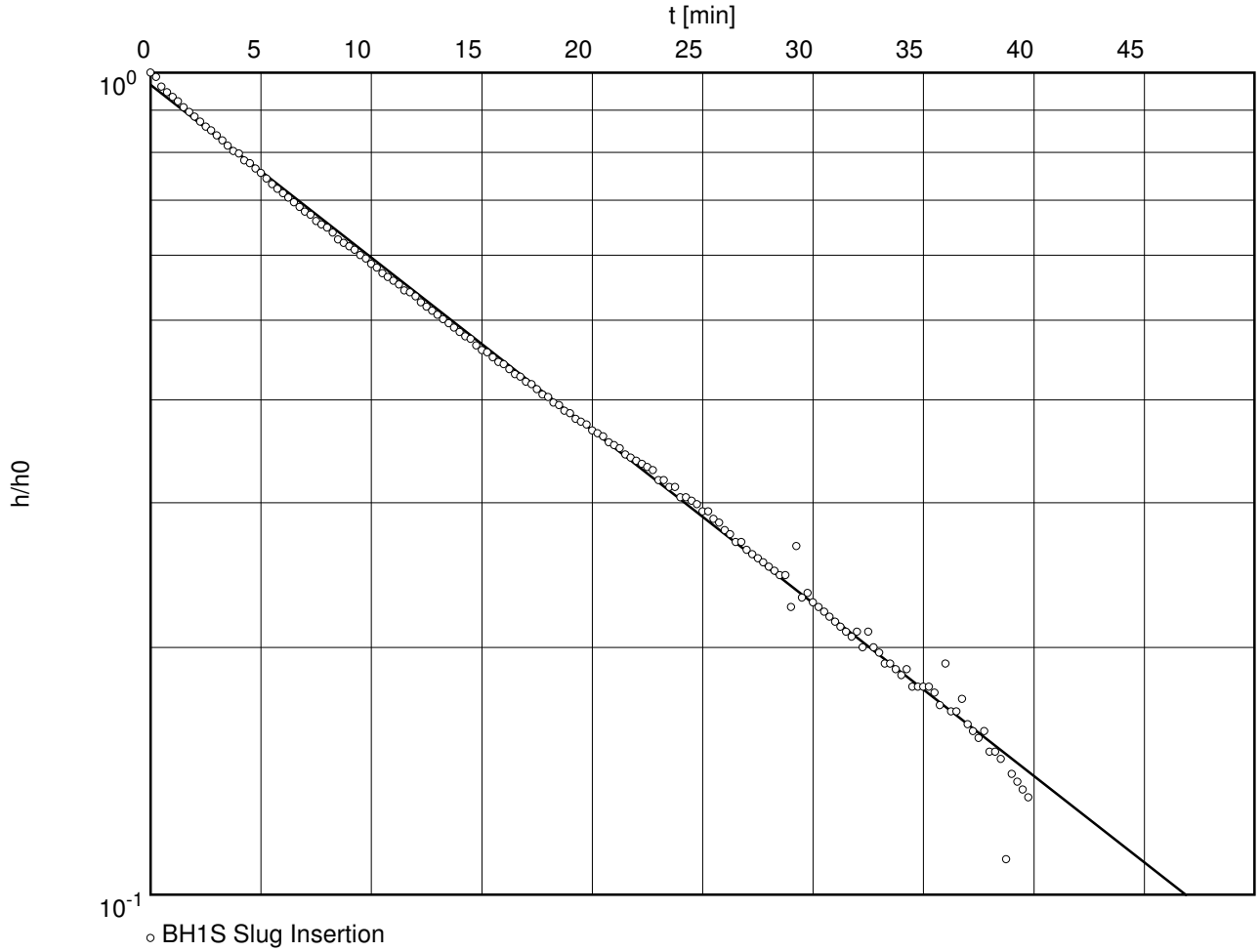
Slug Test No. 2 - Slug Removal (Bail)	Test conducted on: 25 Feb 15
BH1 Deep	



Hydraulic conductivity [m/min]: 1.49×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

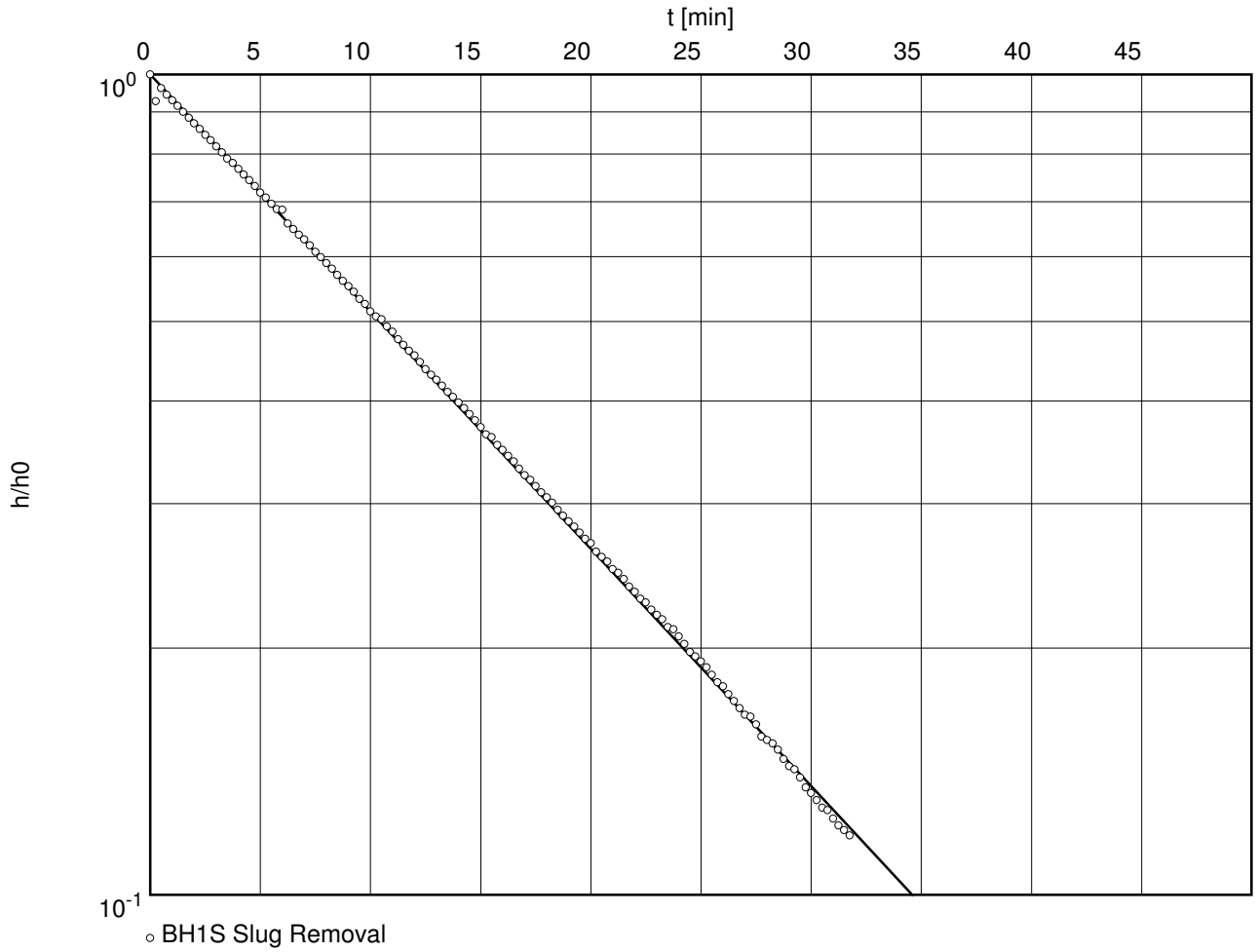
Slug Test No. 1 - Slug Insertion	Test conducted on: 25 Feb 15
BH1 Shallow	



Hydraulic conductivity [m/min]: 1.27×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

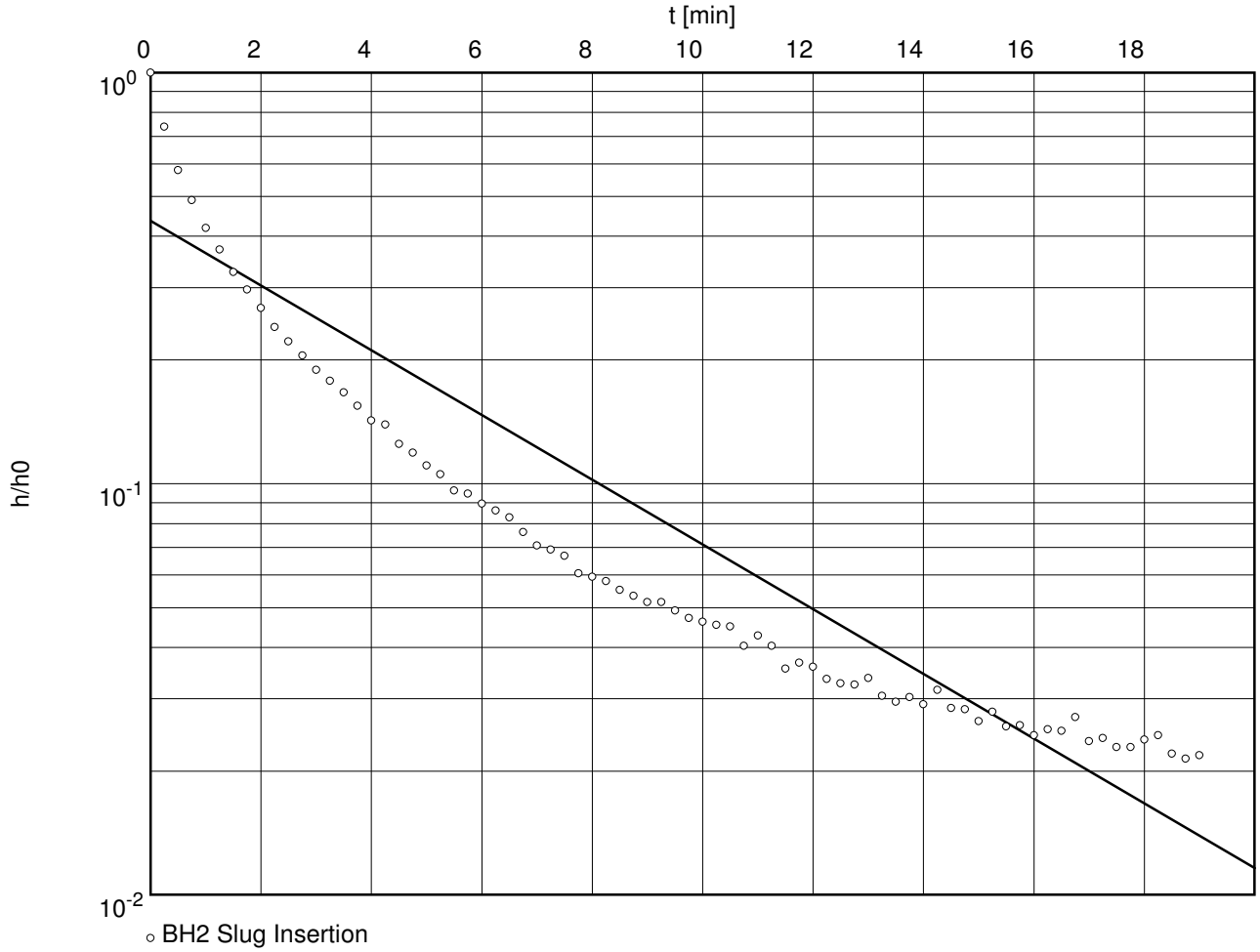
Slug Test No. 2 - Slug Removal (Bail)	Test conducted on: 25 Feb 15
BH1 Shallow	



Hydraulic conductivity [m/min]: 1.74×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

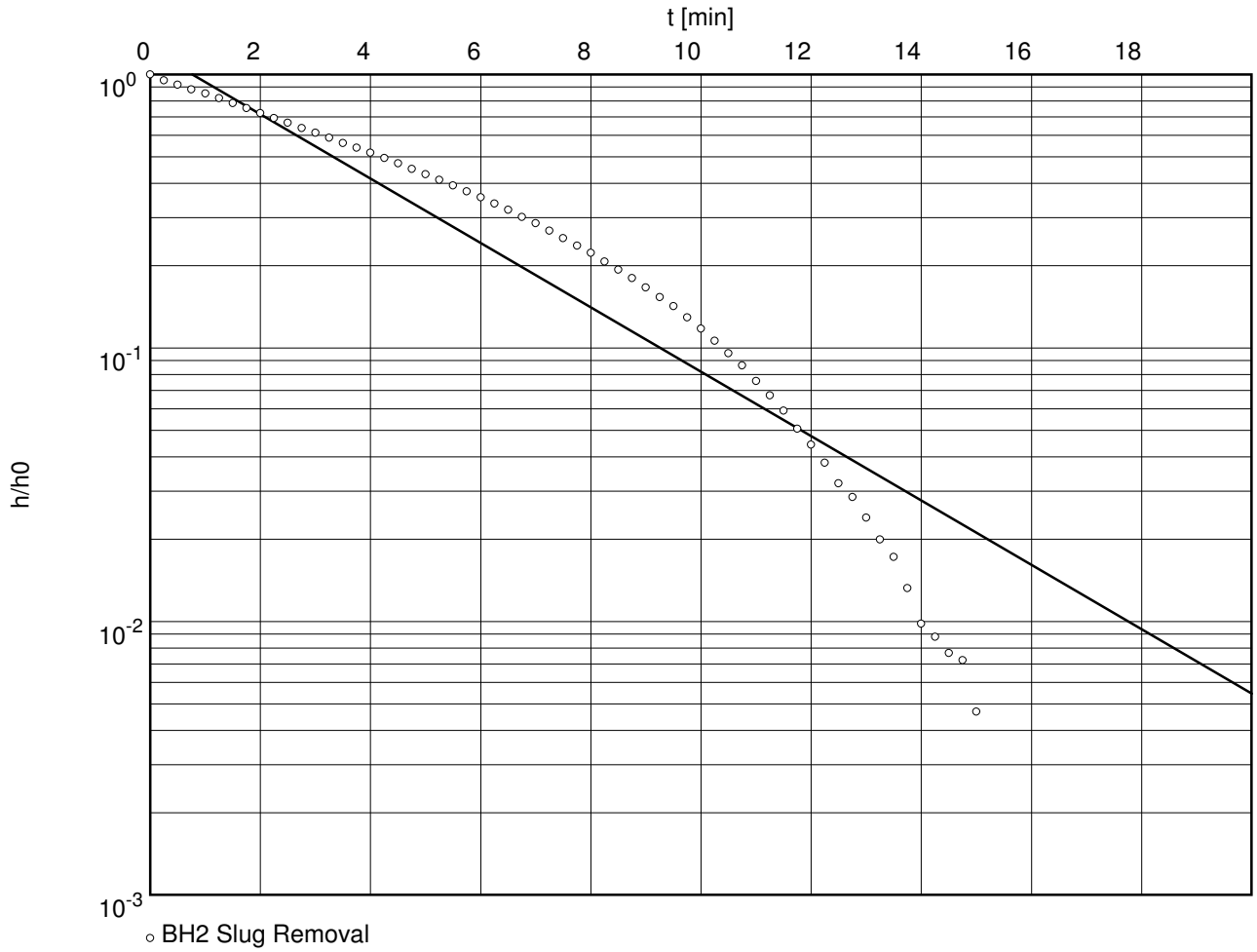
Slug Test No. 1 - Slug Insertion	Test conducted on: 25 Feb 15
BH2	



Hydraulic conductivity [m/min]: 5.96×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

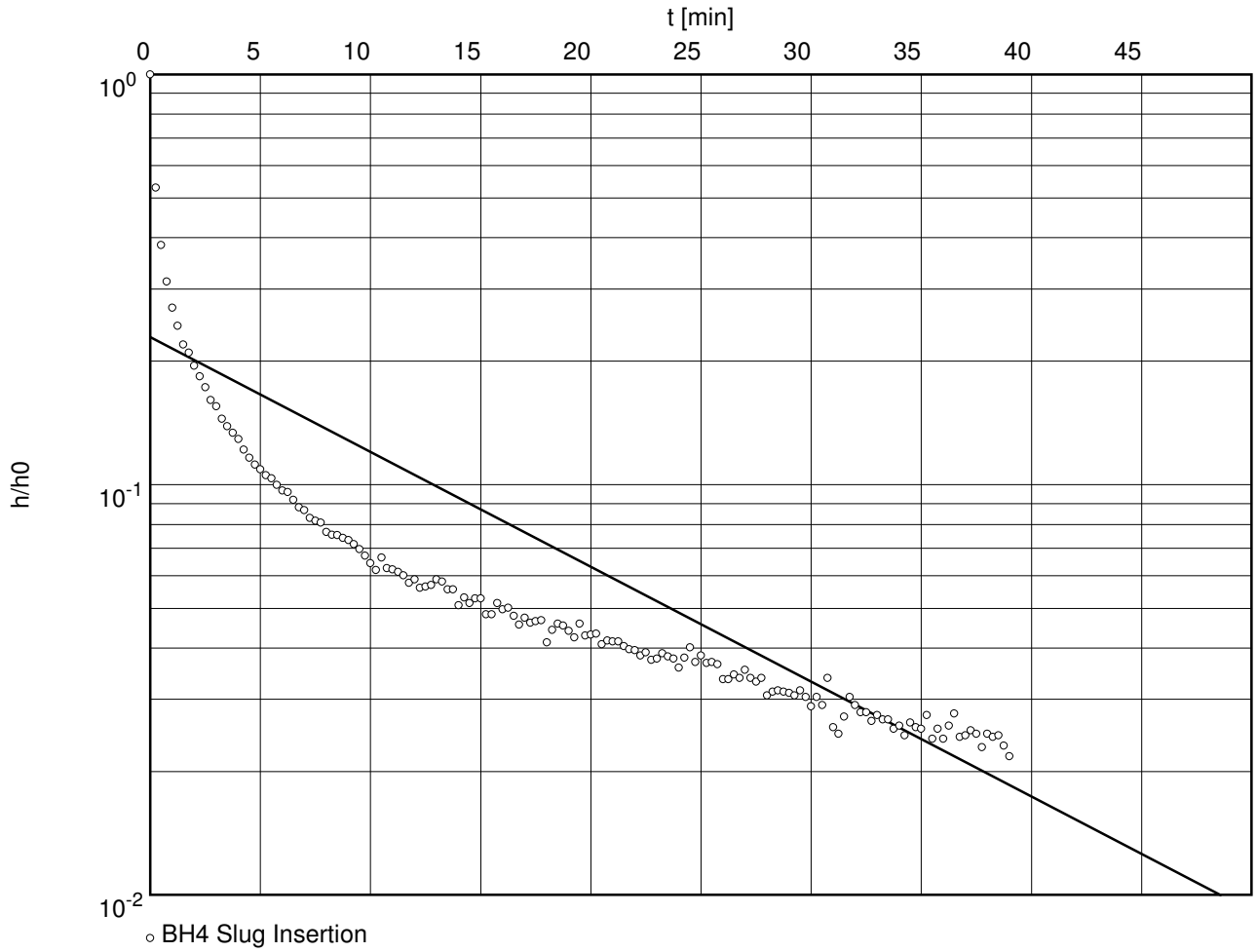
Slug Test No. 2 - Slug Removal (Bail)	Test conducted on: 25 Feb 15
BH2	



Hydraulic conductivity [m/min]: 8.92×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

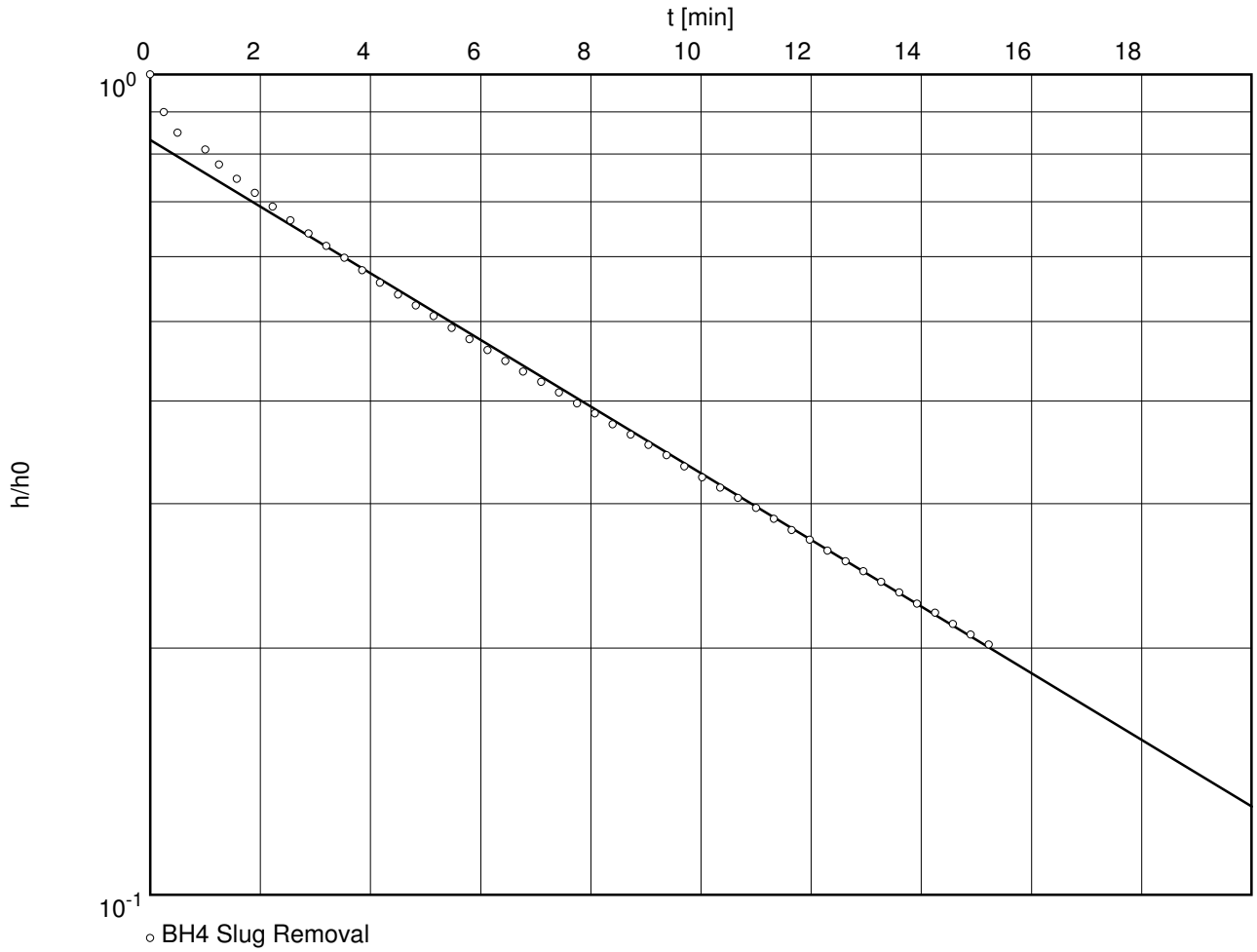
Slug Test No. 1 - Slug Insertion	Test conducted on: 25 Feb 15
BH4	



Hydraulic conductivity [m/min]: 1.45×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

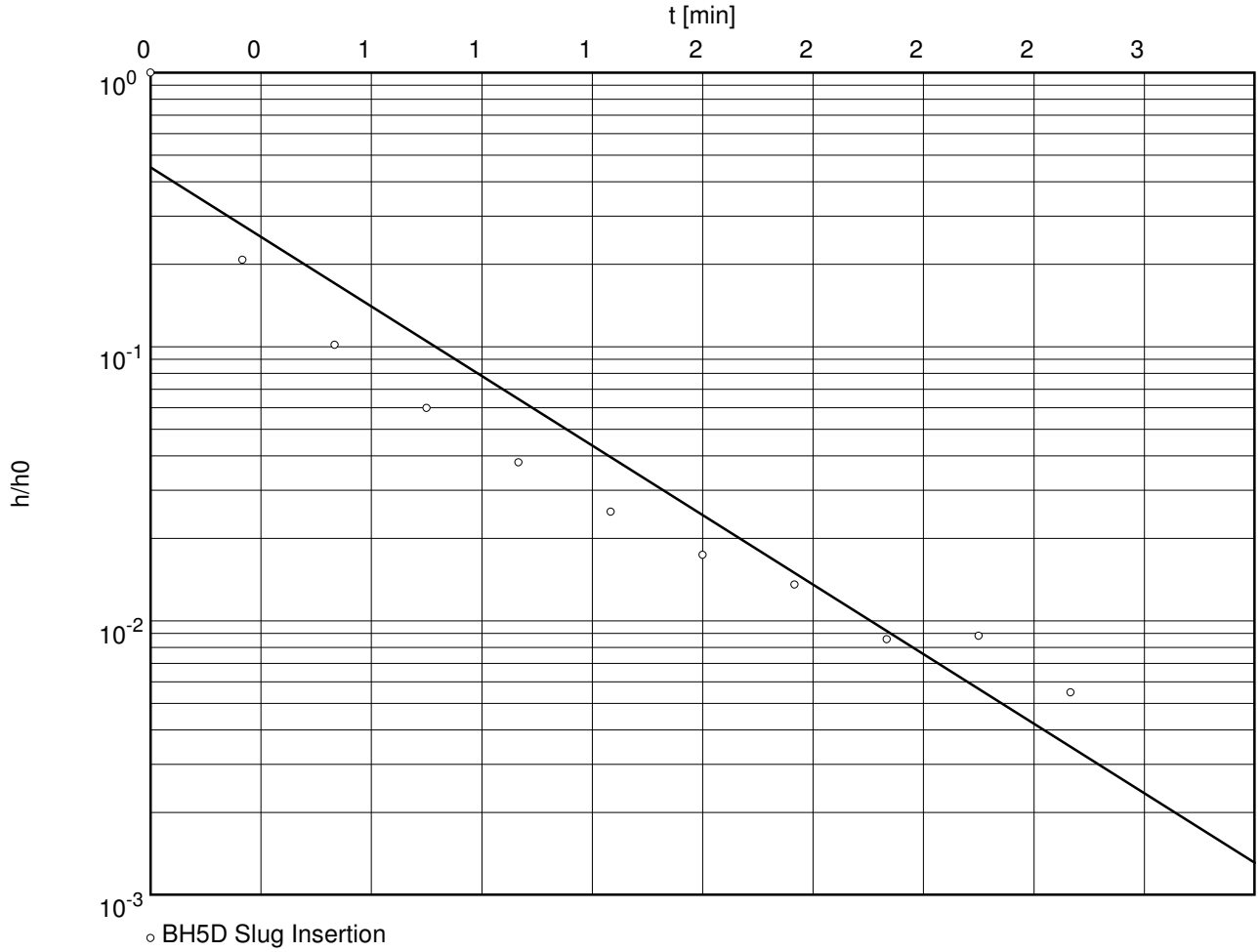
Slug Test No. 2 - Slug Removal (Bail)	Test conducted on: 25 Feb 15
BH4	



Hydraulic conductivity [m/min]: 2.10×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

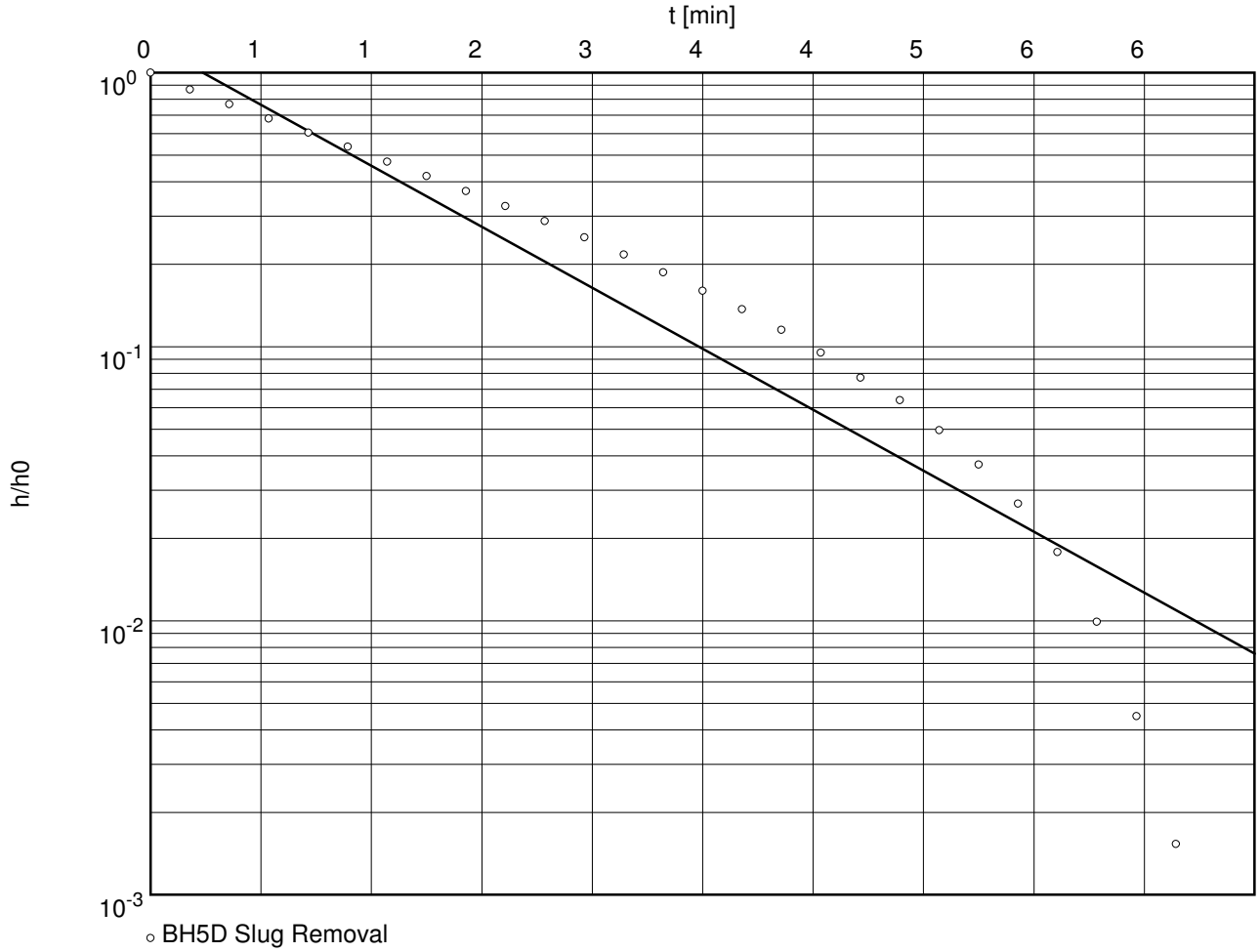
Slug Test No. 1 - Slug Insertion	Test conducted on: 3 Mar 15
BH5 Deep	



Hydraulic conductivity [m/min]: 4.13×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

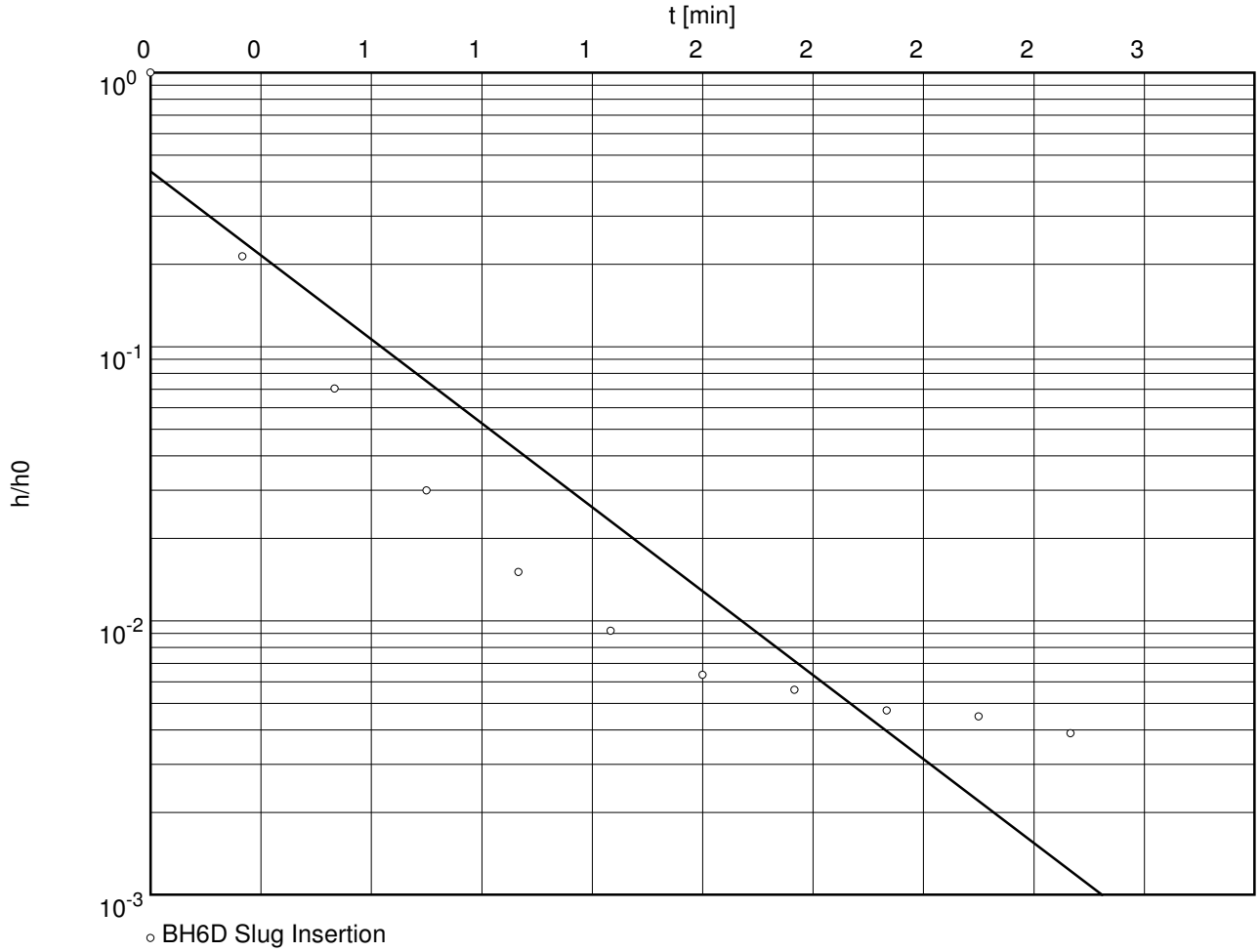
Slug Test No. 2 - Slug Removal	Test conducted on: 3 Mar 15
BH5 Deep	



Hydraulic conductivity [m/min]: 1.55×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

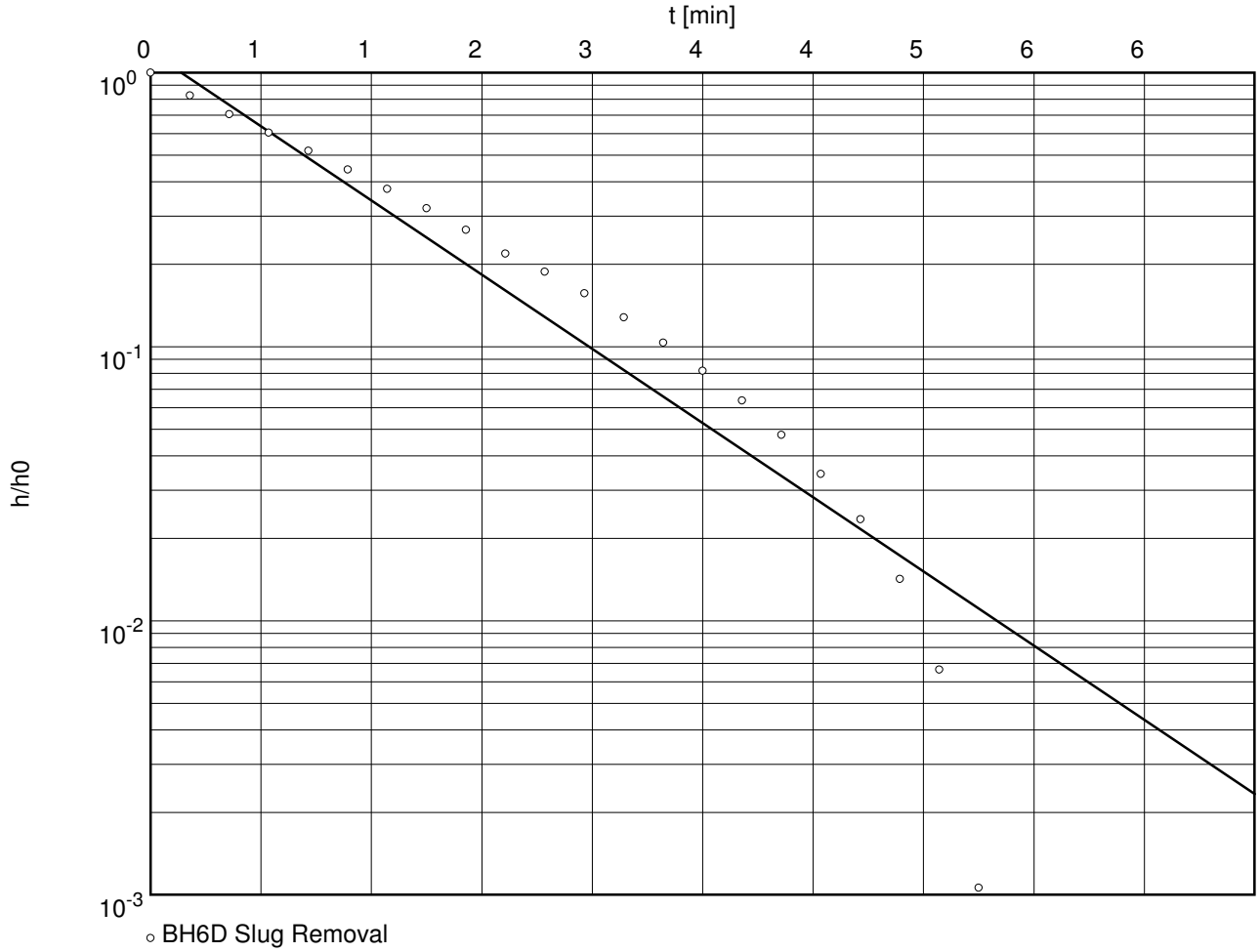
Slug Test No. 1 - Slug Insertion	Test conducted on: 27 Feb 15
BH6 Deep	



Hydraulic conductivity [m/min]: 6.67×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

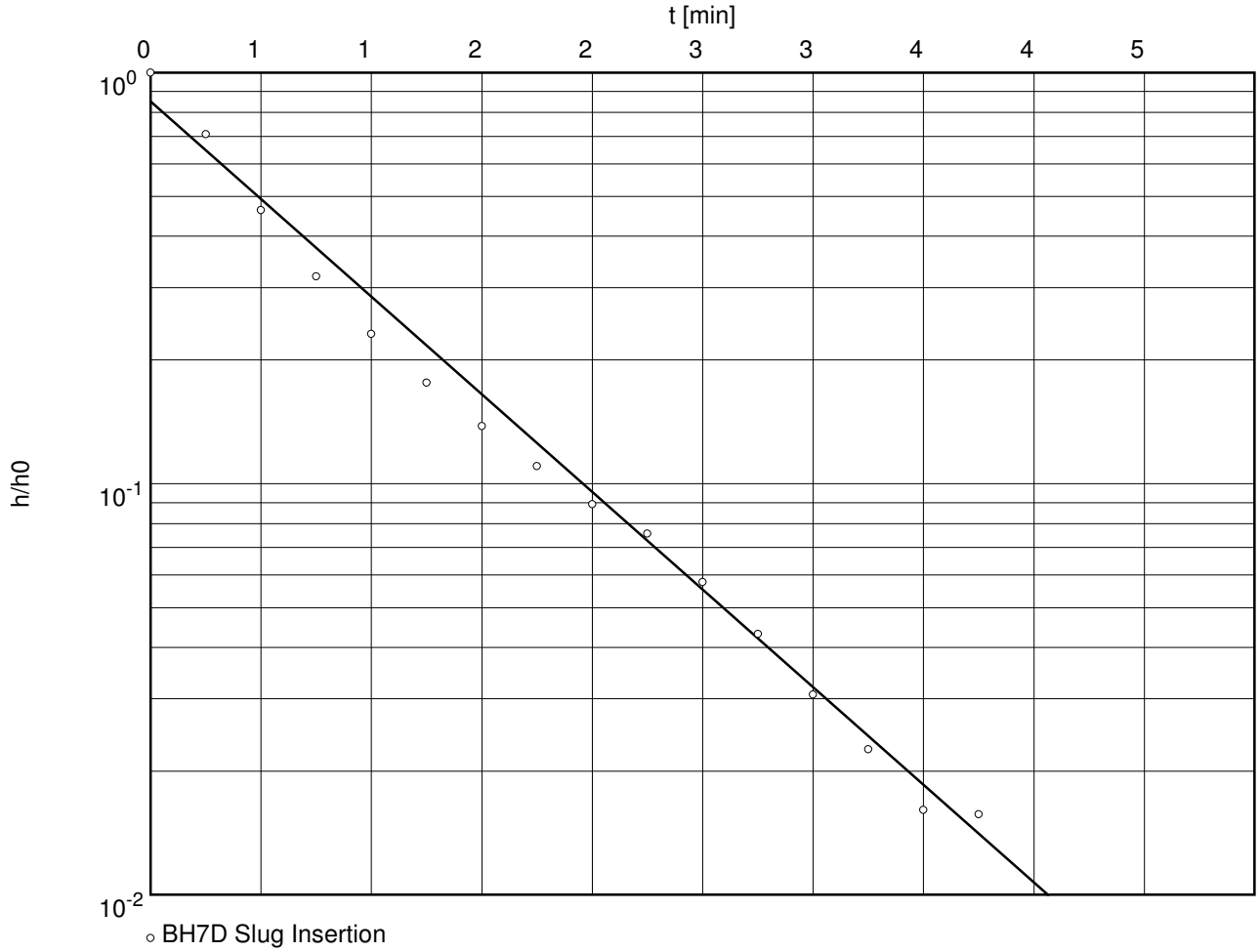
Slug Test No. 2 - Slug Removal	Test conducted on: 27 Feb 15
BH6 Deep	



Hydraulic conductivity [m/min]: 2.52×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

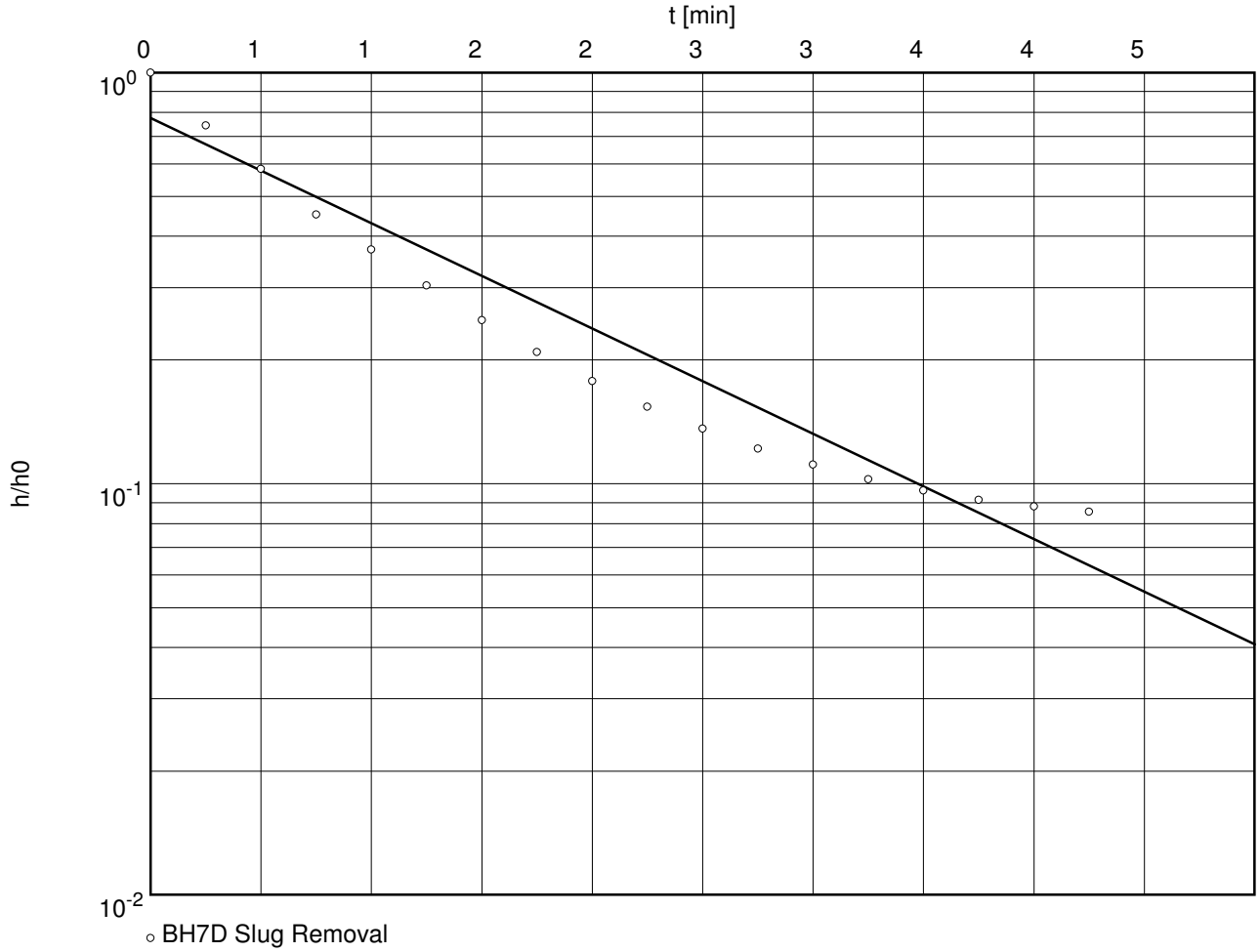
Slug Test No. 1 - Slug Insertion	Test conducted on: 27 Feb 15
BH7 Deep	



Hydraulic conductivity [m/min]: 2.25×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

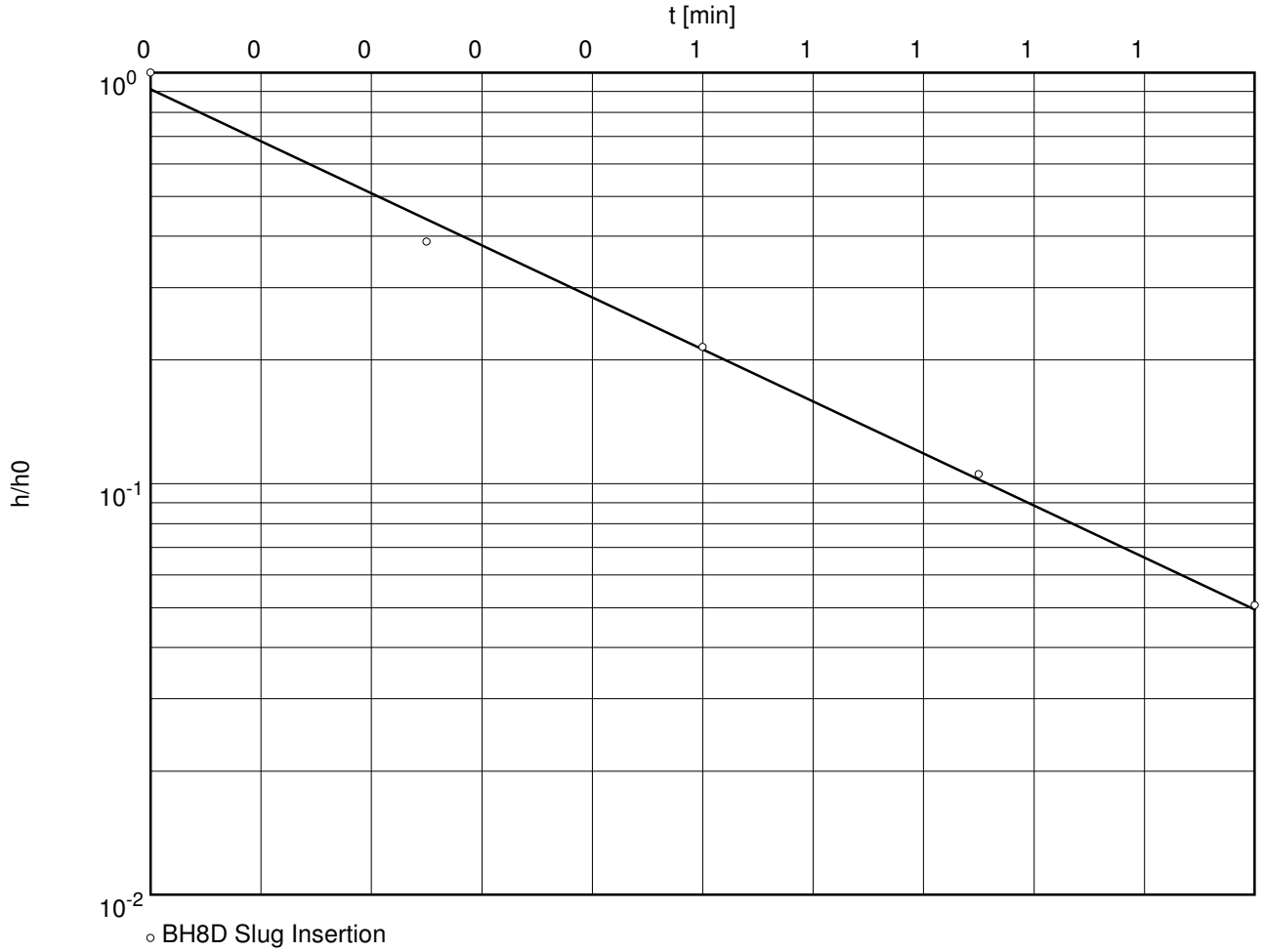
Slug Test No. 2 - Slug Removal	Test conducted on: 27 Feb 15
BH7 Deep	



Hydraulic conductivity [m/min]: 1.21×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

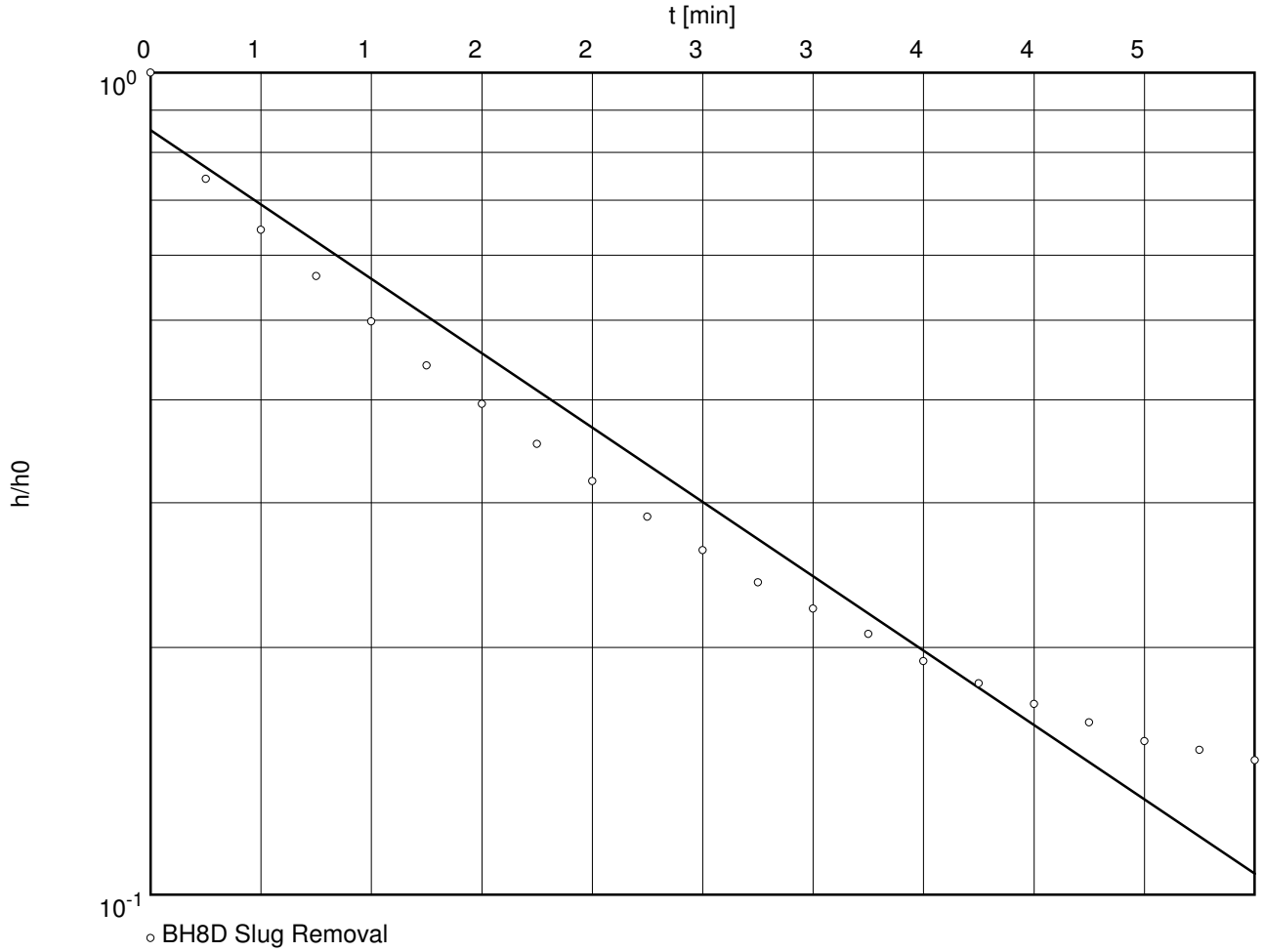
Slug Test No. 1 - Slug Insertion	Test conducted on: 3 Mar 15
BH8 Deep	



Hydraulic conductivity [m/min]: 6.26×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

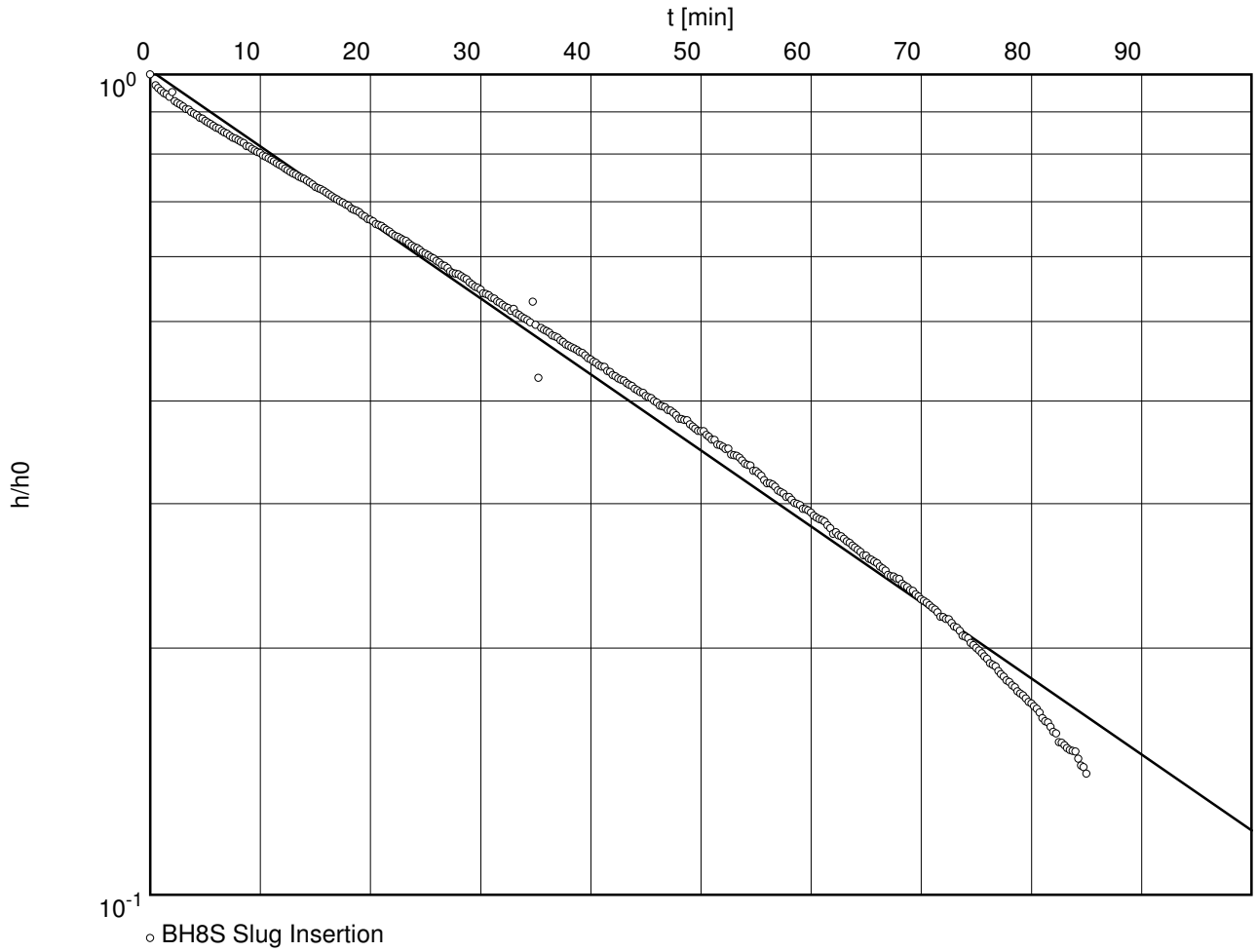
Slug Test No. 2 - Slug Removal	Test conducted on: 3 Mar 15
BH8 Deep	



Hydraulic conductivity [m/min]: 8.94×10^{-5}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

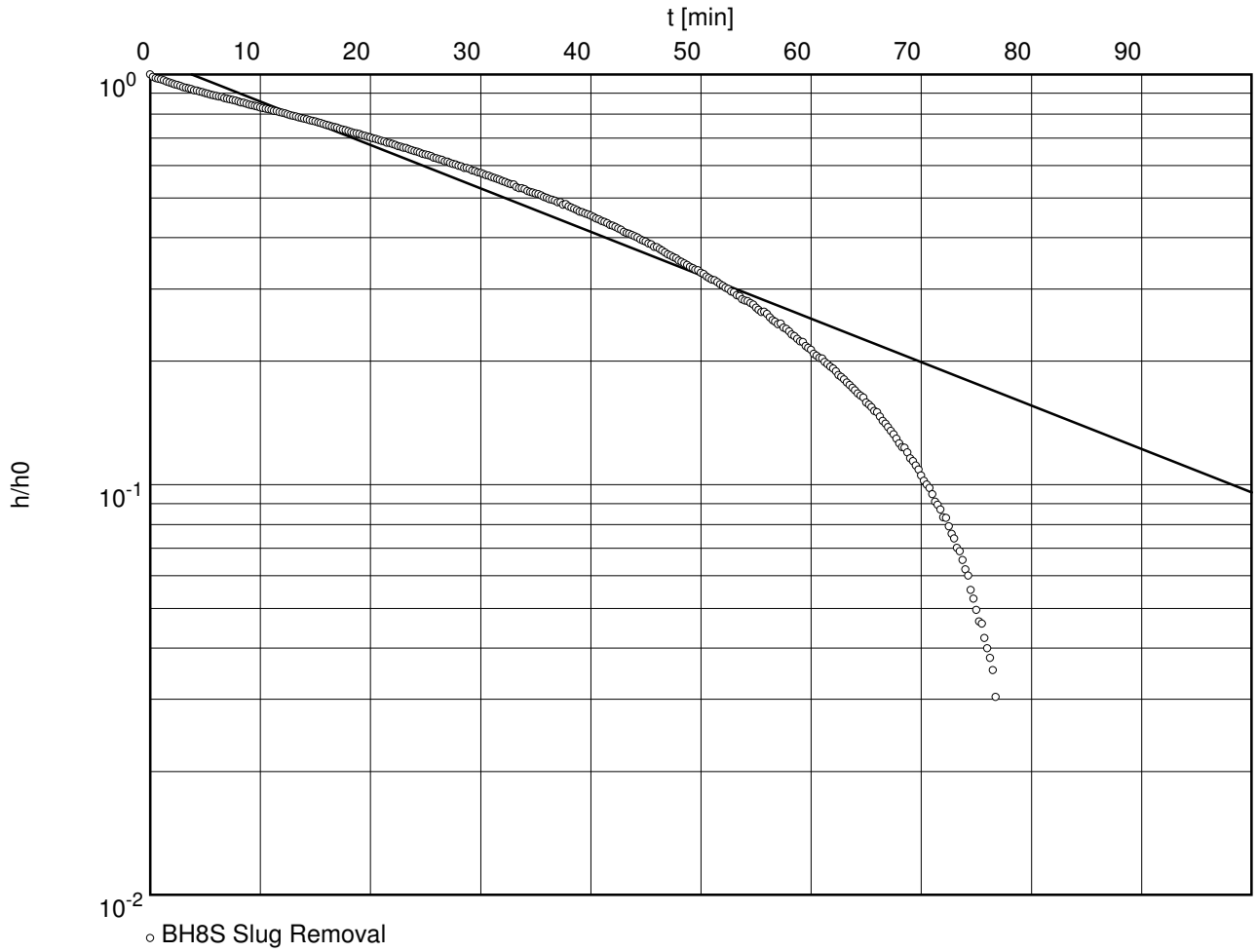
Slug Test No. 1 - Slug Insertion	Test conducted on: 26 Feb 15
BH8 Shallow	



Hydraulic conductivity [m/min]: 6.16×10^{-6}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

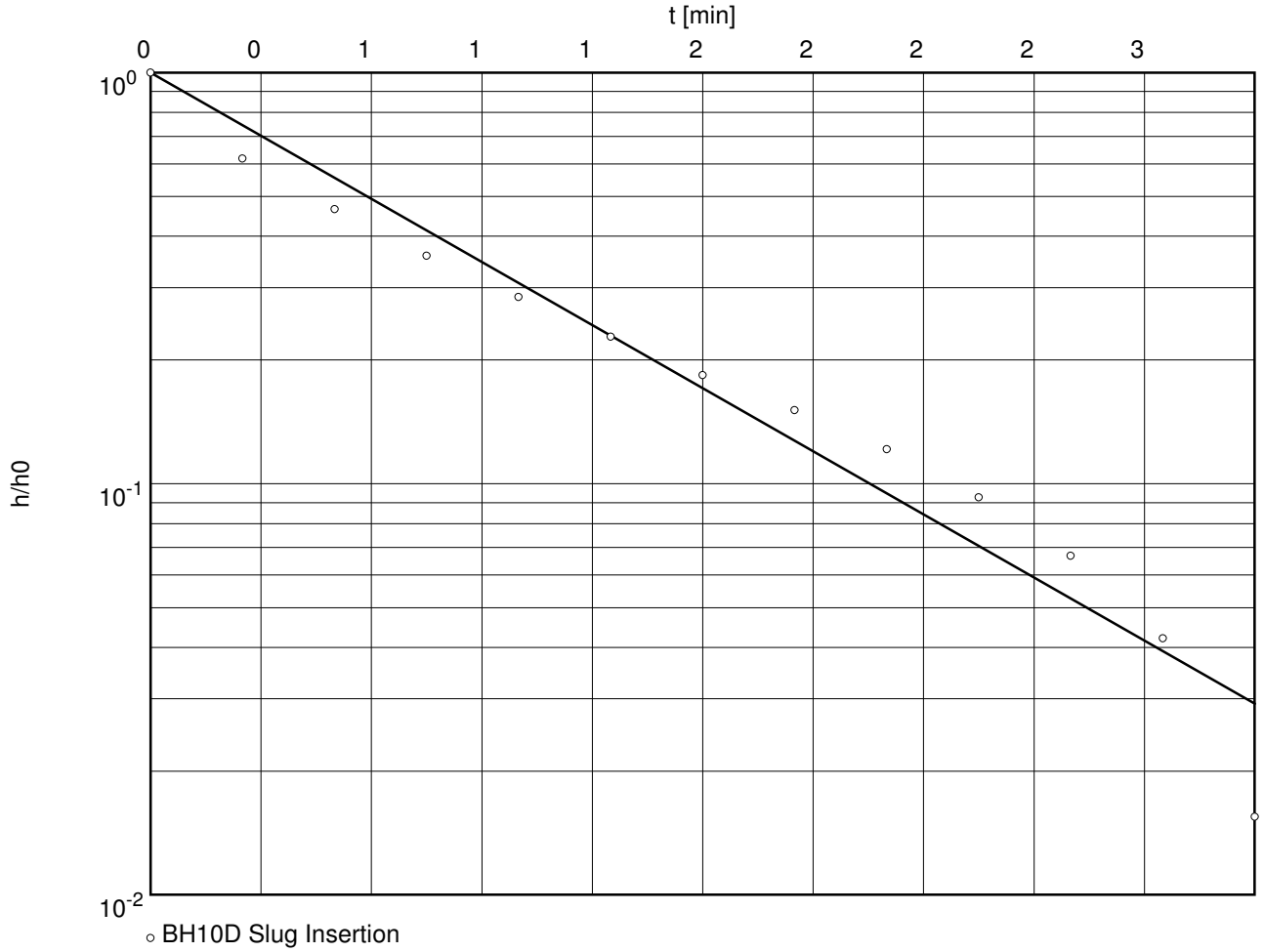
Slug Test No. 2 - Slug Removal	Test conducted on: 26 Feb 15
BH8 Shallow	



Hydraulic conductivity [m/min]: 7.05×10^{-6}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

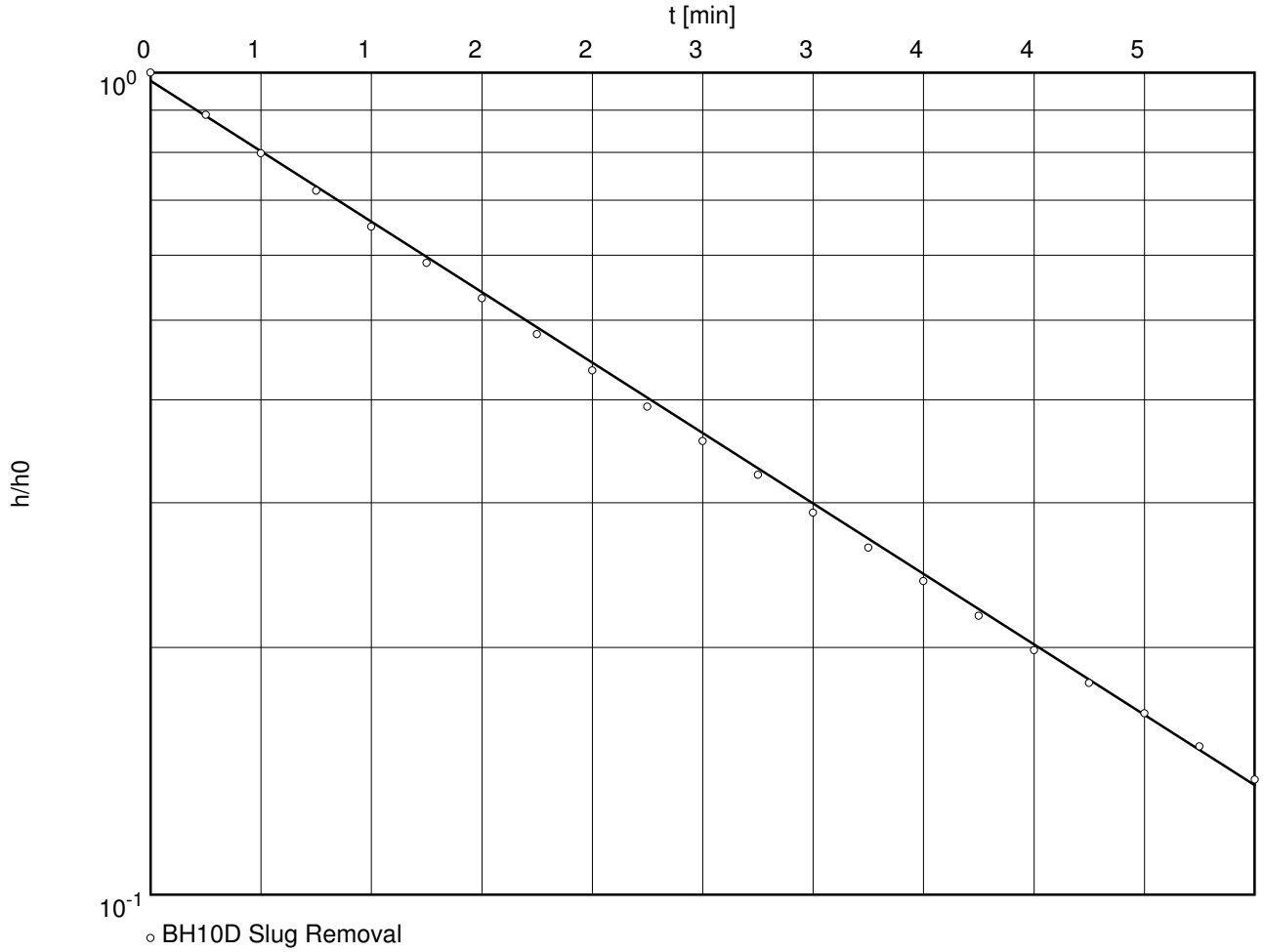
Slug Test No. 1 - Slug Insertion	Test conducted on: 26 Feb 15
BH10 Deep	



Hydraulic conductivity [m/min]: 1.08×10^{-3}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

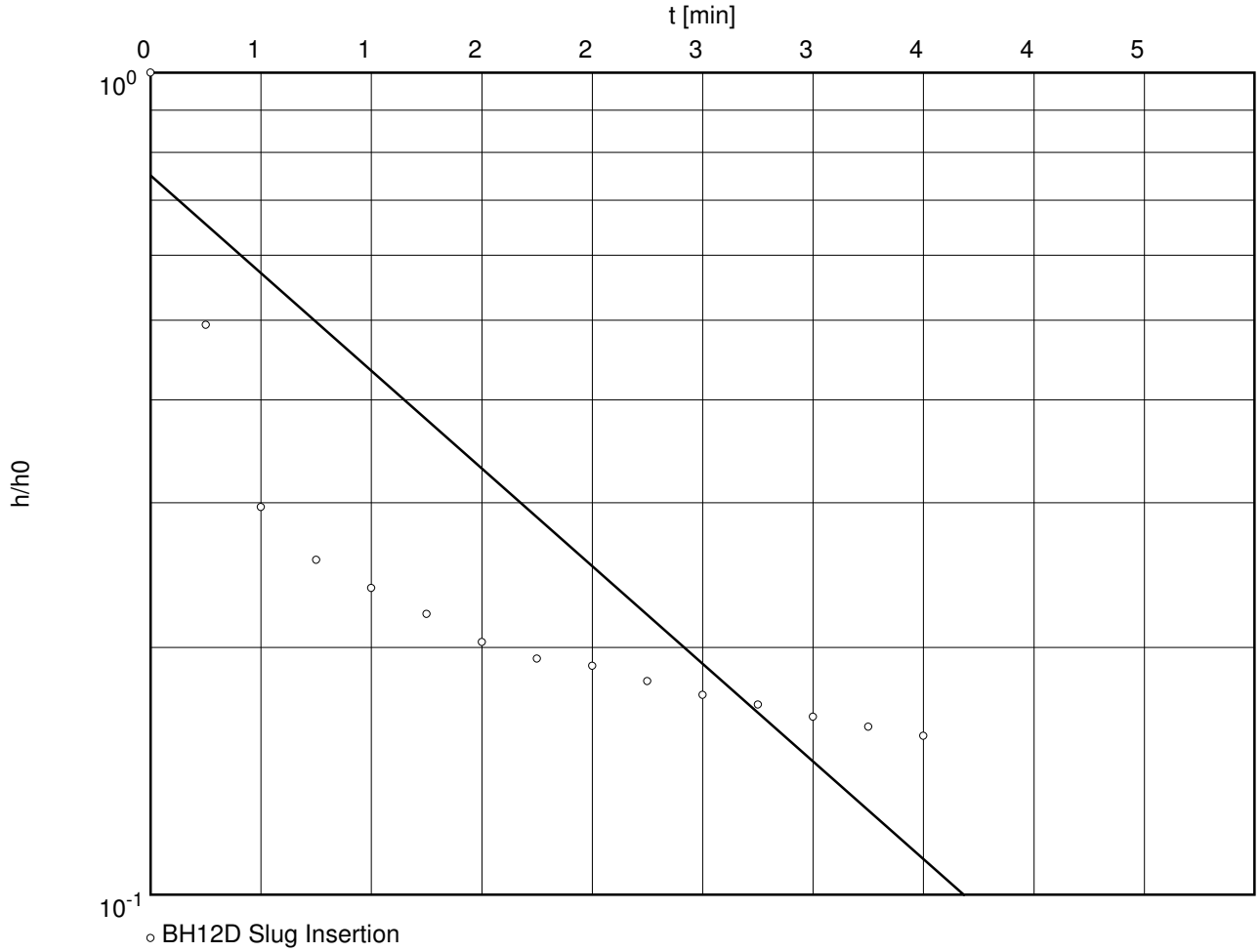
Slug Test No. 2 - Slug Removal	Test conducted on: 26 Feb 15
BH10 Deep	



Hydraulic conductivity [m/min]: 7.14×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

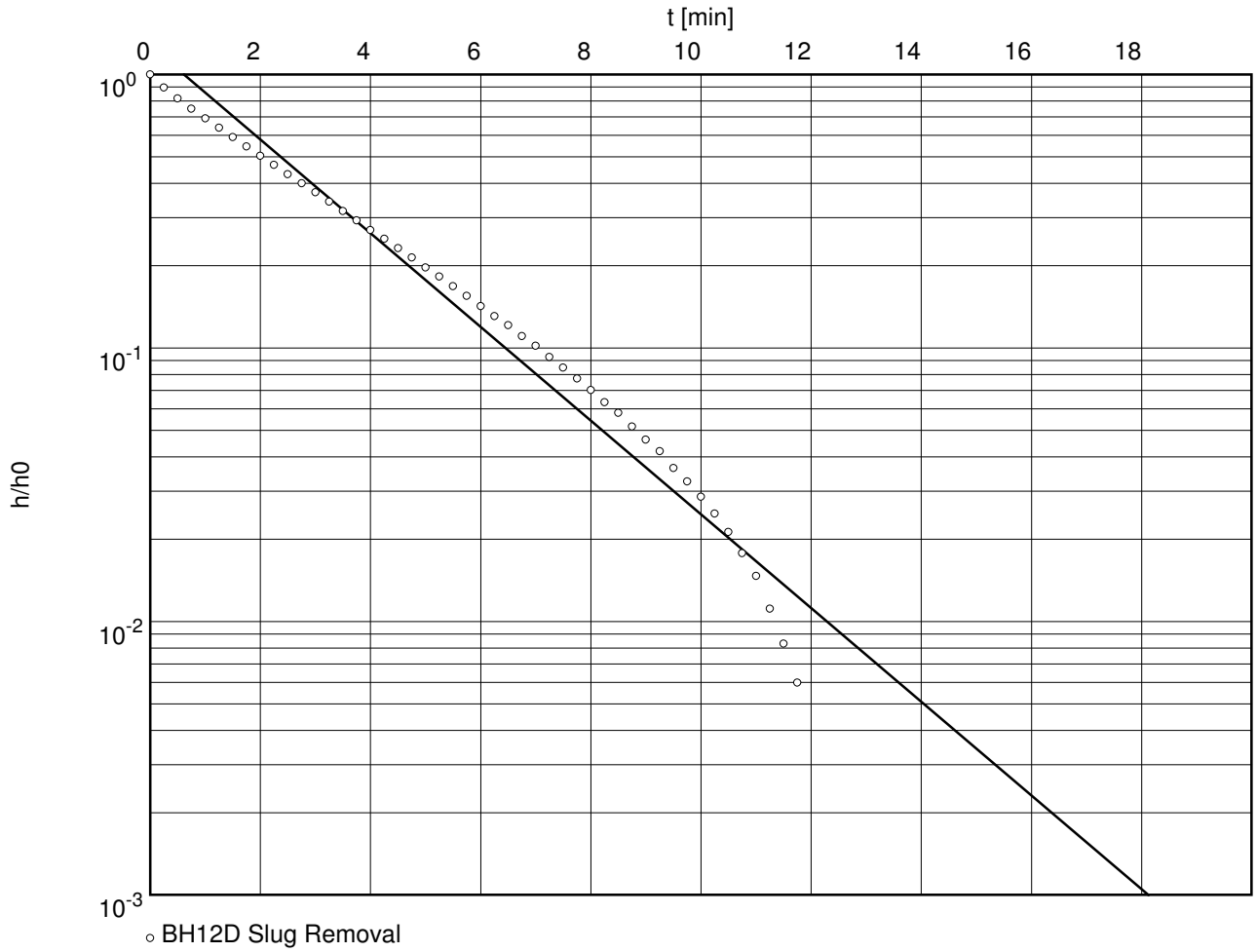
Slug Test No. 1 - Slug Insertion	Test conducted on: 25 Feb 15
BH12 Deep	



Hydraulic conductivity [m/min]: 2.04×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

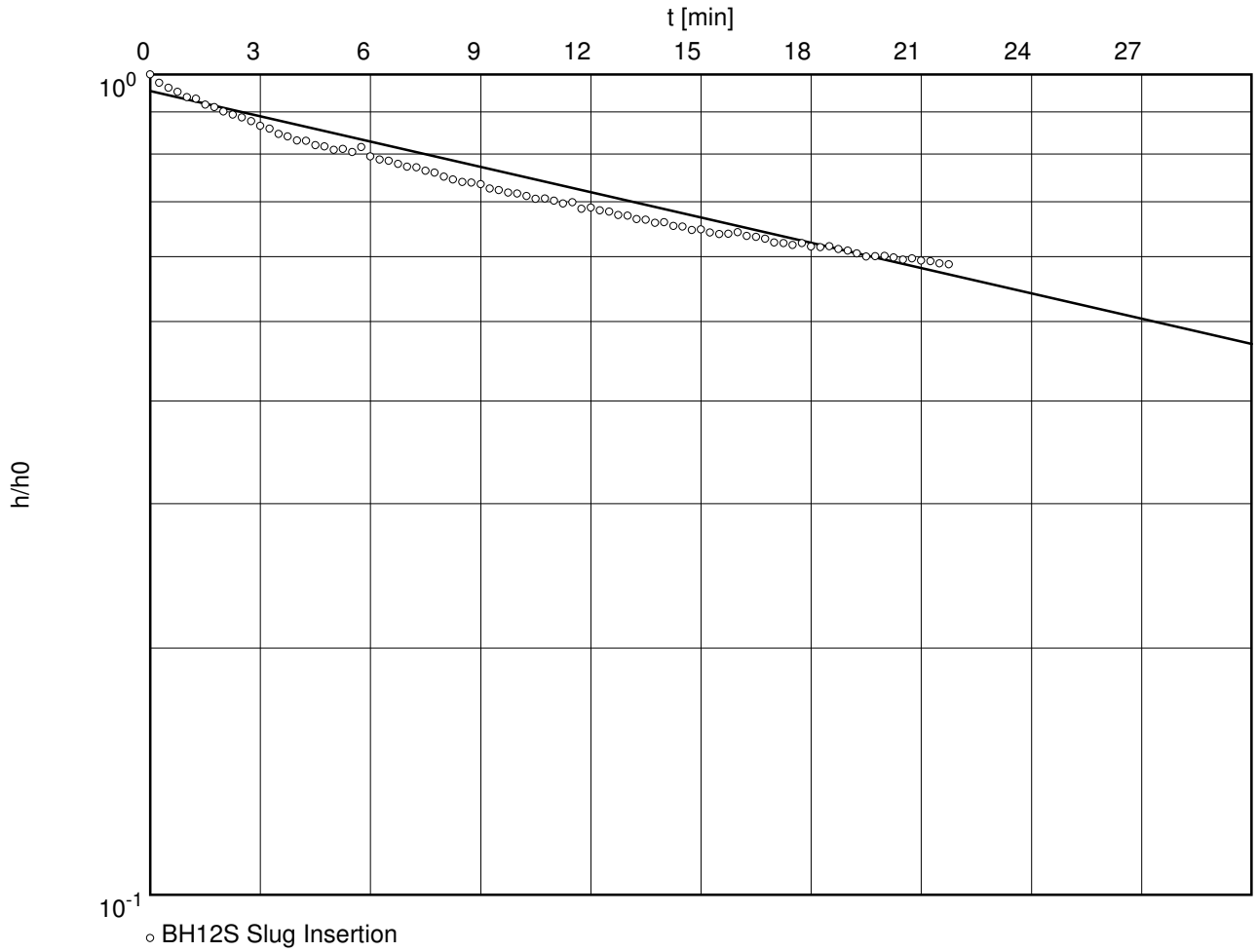
Slug Test No. 2 - Slug Removal	Test conducted on: 25 Feb 15
BH12 Deep	



Hydraulic conductivity [m/min]: 1.47×10^{-4}

Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

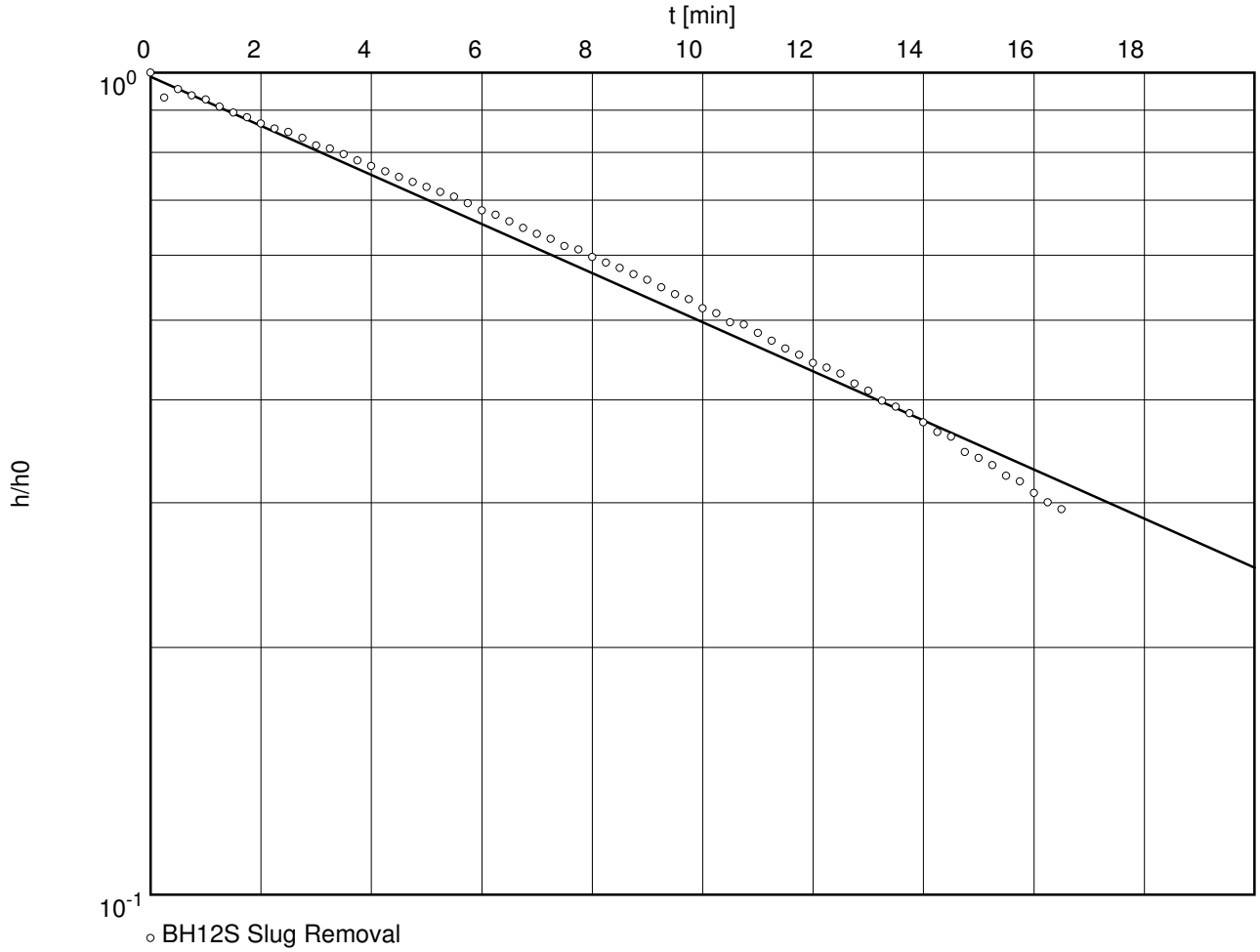
Slug Test No. 1 - Slug Insertion	Test conducted on: 26 Feb 15
BH12 Shallow	



Hydraulic conductivity [m/min]: 8.34×10^{-6}

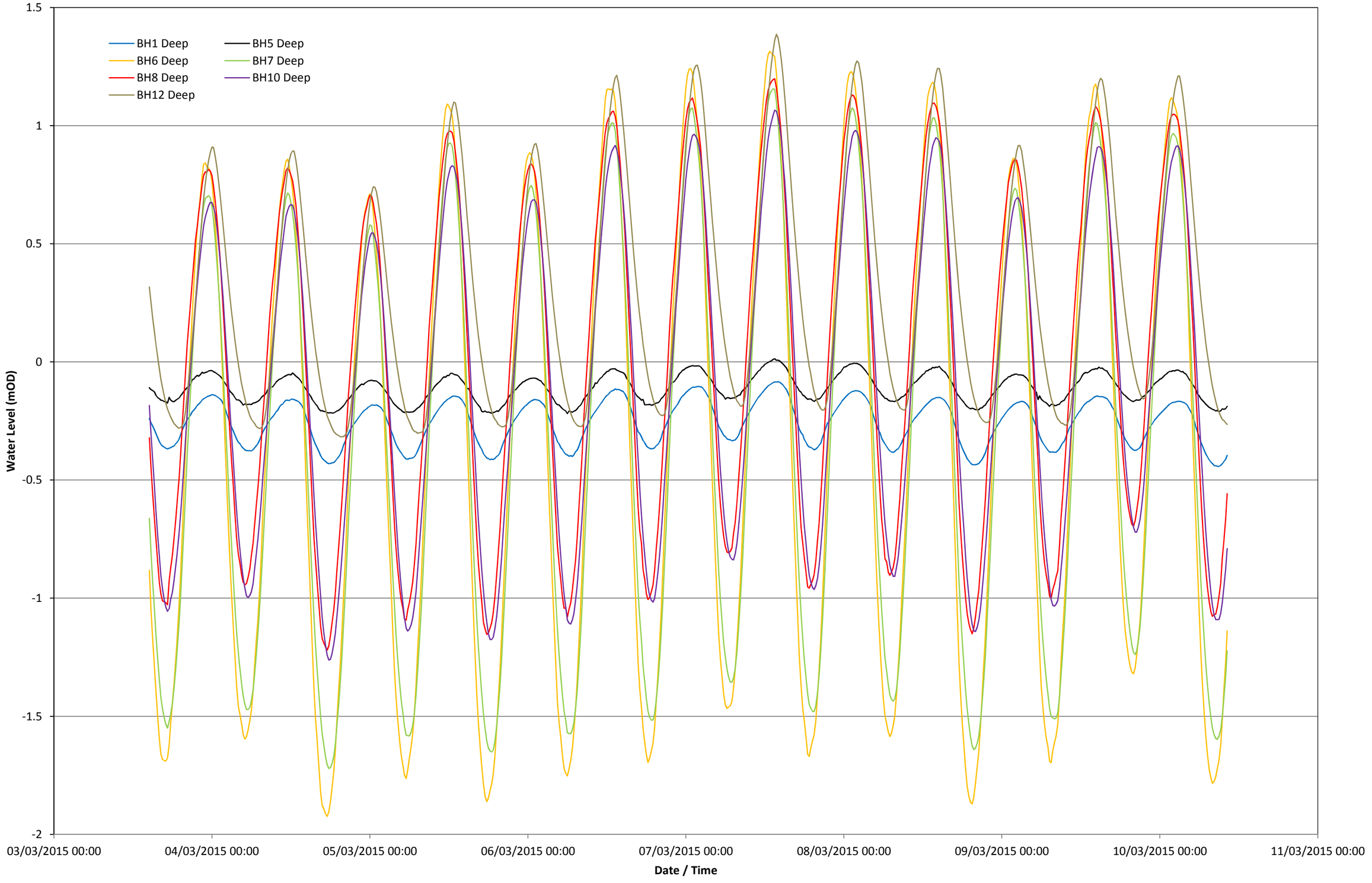
Pentland Macdonald Ltd Contaminated Land & Water Specialists The Courtyard, 16 Downshire Road Holywood, BT18 9LX	slug/bail test analysis HVORSLEV's method	Date: Mar 15	Page 1
		Project: Dublin Port	
		Evaluated by: TP	

Slug Test No. 2 - Slug Removal	Test conducted on: 26 Feb 15
BH12 Shallow	

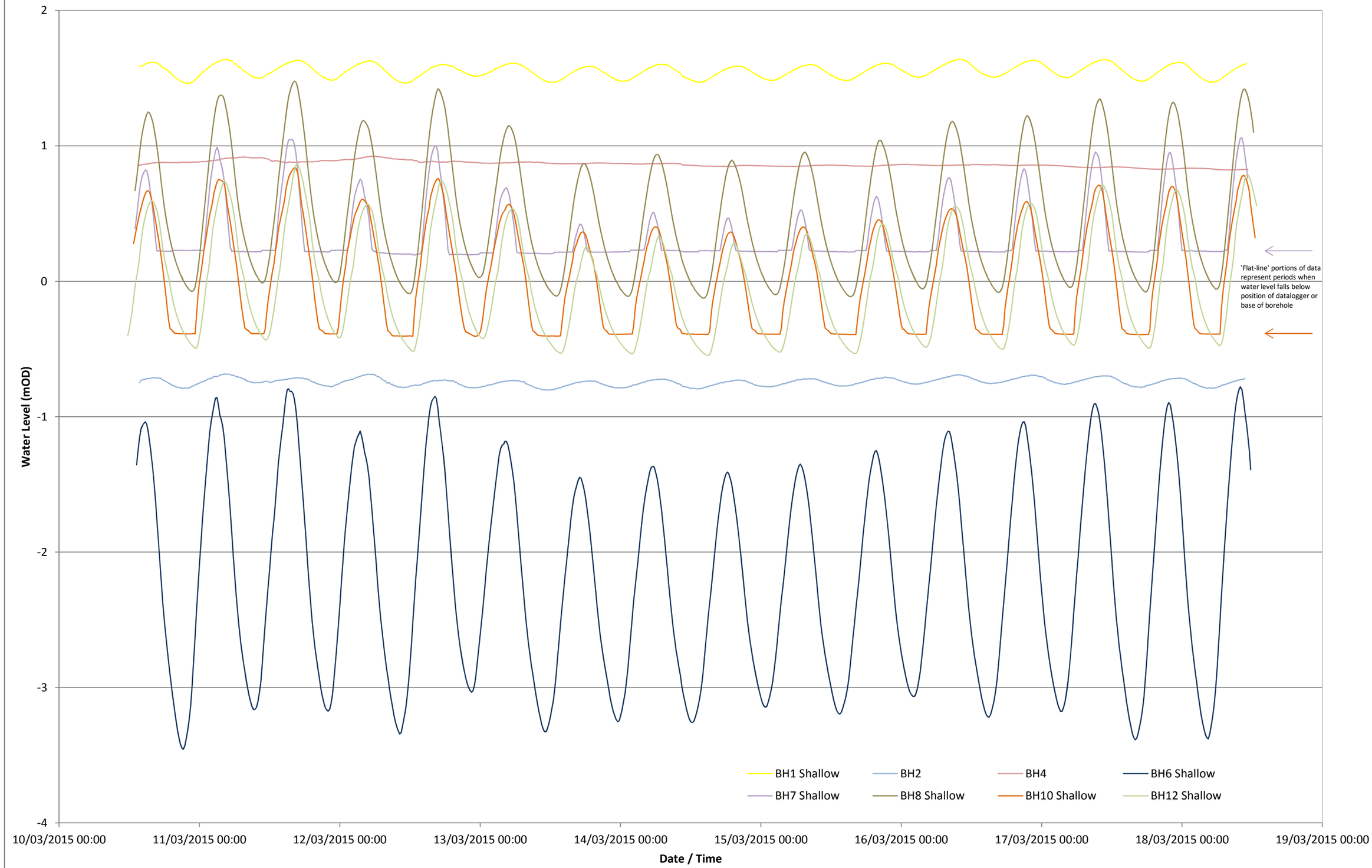


Hydraulic conductivity [m/min]: 2.42×10^{-5}

Dublin Port IED Application - Long Term Water Monitoring Hydrographs - Part 1



Dublin Port IED Application - Long Term Monitoring Hydrographs - Part 2



Appendix F

Geotechnical Results

GEOTECHNICAL AND ENVIRONMENTAL SERVICES

Laboratory Test Results

Site : Dublin Port IED Application, Alexandra Basin and Berths 52/53, Dublin Port, Dublin

Client : Dublin Port Company

Engineer : RPS

Job Number 01.RI15

Sheet 1 / 1

DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Level Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance (degrees)	Description
BH1	0.95	B1	9.6	2.09						MADE GROUND: Light brown silty gravelly fine to coarse SAND containing occasional pockets of brown sandy CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
BH1	12.00	B3	9.9	2.34						Dark brownish grey silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.
BH2	8.00	B3	36	1.86						Soft grey slightly sandy silty CLAY containing shells.
BH4	6.00	B3	24	1.88						Grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded.
BH5	6.00	B3	9.4	2.36						Grey and grey brown silty sandy fine to coarse GRAVEL with cobble and boulder content. Gravel is sub-angular to sub-rounded.
BH6	9.00	B3	39	1.71						Firm dark grey slightly sandy clayey thinly laminated organic SILT containing occasional thinly interbedded grey silty fine SAND layers.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

Remarks :

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Appendix G

Controlled Waters Models and RTCs

Area	Contaminant	Maximum leachable concentration (mg/l)	EU Assesment Criteria (mg/l)	Remedial Target Criteria (mg/l)
Graving Dock No. 2	Nickel	0.07	0.02	0.0276
	TBT	4.40E-06	2.00E-07	2.76E-07
Berth 52/53	Nickel	0.07	0.02	0.0211
	TBT	4.40E-06	2.00E-07	2.11E-07

Area	Contaminant	Maximum leachable concentration (mg/l)	Baseline surface water contamination level (mg/l)	Remedial Target Criteria (mg/l)
Graving Dock No. 2	TBT	4.40E-06	2.00E-06	2.76E-06
Berth 52/53	TBT	4.40E-06	2.00E-06	2.11E-06

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Environment Agency

Input Parameters

	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.02E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.07	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	2.90E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.23E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*McWorter and Sunada 1977*
Hydraulic gradient	i	4.23E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	1.73E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.95E+02	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.22E-02	m/d
Retardation factor	Rf	1.88E+03	fraction
Decay rate used	λ	3.69E-104	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	4.23E-02	fraction
Rate of contaminant flow due to retardation	u	1.18E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.43E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.35E+00**	**fraction**
Soil leachate concentration	Co	7.00E-02	

Remedial Targets

Level 3 Remedial Target		**2.76E-02**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		8.14E+00	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**7.43E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.95E+02	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.95E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

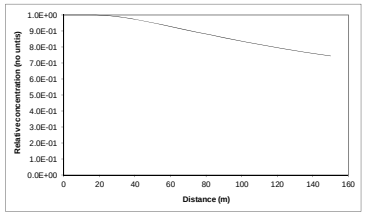
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	6.83E-02
7.5	1.00E+00	6.83E-02
15.0	1.00E+00	6.83E-02
22.5	9.97E-01	6.81E-02
30.0	9.89E-01	6.76E-02
37.5	9.77E-01	6.68E-02
45.0	9.62E-01	6.58E-02
52.5	9.45E-01	6.46E-02
60.0	9.28E-01	6.34E-02
67.5	9.10E-01	6.22E-02
75.0	8.92E-01	6.10E-02
82.5	8.75E-01	5.98E-02
90.0	8.58E-01	5.86E-02
97.5	8.41E-01	5.75E-02
105.0	8.26E-01	5.64E-02
112.5	8.10E-01	5.54E-02
120.0	7.96E-01	5.44E-02
127.5	7.82E-01	5.34E-02
135.0	7.68E-01	5.25E-02
142.5	7.55E-01	5.16E-02
150.0	7.43E-01	5.08E-02

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.02E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0091	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	2.90E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.23E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*McWorter and Sunada 1977*
Hydraulic gradient	i	4.23E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	1.73E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.95E+02	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.22E-02	m/d
Retardation factor	Rf	1.88E+03	fraction
Decay rate used	λ	3.69E-104	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	4.23E-02	fraction
Rate of contaminant flow due to retardation	u	1.18E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.43E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.35E+00**	**fraction**
Soil leachate concentration	Co	9.10E-03	

Remedial Targets

Level 3 Remedial Target		**2.76E-02**	**mg/l**
Domenico - Steady state		**or**	
		8.14E+00	**mg/kg**
Distance to compliance point		**150**	**m**
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**7.43E-01**	**fraction**

For comparison with measured pore water concentration.
This assumes Level 1 Remedial Target is based on Target Concentration.
For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.95E+02	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.95E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

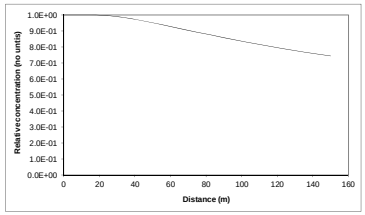
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	8.88E-03
7.5	1.00E+00	8.88E-03
15.0	1.00E+00	8.88E-03
22.5	9.97E-01	8.86E-03
30.0	9.89E-01	8.79E-03
37.5	9.77E-01	8.68E-03
45.0	9.62E-01	8.55E-03
52.5	9.45E-01	8.40E-03
60.0	9.28E-01	8.24E-03
67.5	9.10E-01	8.08E-03
75.0	8.92E-01	7.93E-03
82.5	8.75E-01	7.77E-03
90.0	8.58E-01	7.62E-03
97.5	8.41E-01	7.48E-03
105.0	8.26E-01	7.33E-03
112.5	8.10E-01	7.20E-03
120.0	7.96E-01	7.07E-03
127.5	7.82E-01	6.95E-03
135.0	7.68E-01	6.83E-03
142.5	7.55E-01	6.71E-03
150.0	7.43E-01	6.60E-03

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.0000002	mg/l	from Level 1
Dilution Factor	DF	1.02E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	2.90E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.23E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	4.23E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	1.73E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.22E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	4.23E-02	fraction
Rate of contaminant flow due to retardation	u	1.95E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.43E-01	fraction
Attenuation factor (C_o/C_{ED})	**AF**	**1.35E+00**	**fraction**
Soil leachate concentration	Co	0.00E+00	

Remedial Targets

Level 3 Remedial Target		**2.76E-07**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.78E-07	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**7.43E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

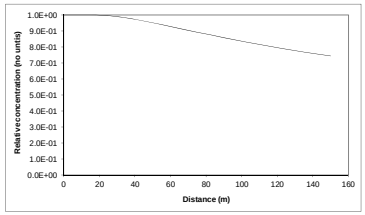
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = *ax*/10, *ay* = *ax*/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	0.00E+00
7.5	1.00E+00	0.00E+00
15.0	1.00E+00	0.00E+00
22.5	9.97E-01	0.00E+00
30.0	9.89E-01	0.00E+00
37.5	9.77E-01	0.00E+00
45.0	9.62E-01	0.00E+00
52.5	9.45E-01	0.00E+00
60.0	9.28E-01	0.00E+00
67.5	9.10E-01	0.00E+00
75.0	8.92E-01	0.00E+00
82.5	8.75E-01	0.00E+00
90.0	8.58E-01	0.00E+00
97.5	8.41E-01	0.00E+00
105.0	8.26E-01	0.00E+00
112.5	8.10E-01	0.00E+00
120.0	7.96E-01	0.00E+00
127.5	7.82E-01	0.00E+00
135.0	7.68E-01	0.00E+00
142.5	7.55E-01	0.00E+00
150.0	7.43E-01	0.00E+00

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Environment Agency

Input Parameters

	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.0000002	mg/l	from Level 1
Dilution Factor	DF	1.02E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0000044	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	2.90E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.23E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	4.23E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	1.73E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.22E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	4.23E-02	fraction
Rate of contaminant flow due to retardation	u	1.95E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.43E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.35E+00**	**fraction**
Soil leachate concentration	Co	4.40E-06	

Remedial Targets

Level 3 Remedial Target		**2.76E-07**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		4.78E-07	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**7.43E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

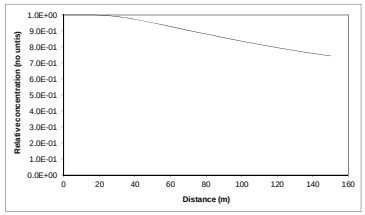
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = *ax*/10, *ay* = *ax*/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	4.30E-06
7.5	1.00E+00	4.30E-06
15.0	1.00E+00	4.29E-06
22.5	9.97E-01	4.28E-06
30.0	9.89E-01	4.25E-06
37.5	9.77E-01	4.20E-06
45.0	9.62E-01	4.13E-06
52.5	9.45E-01	4.06E-06
60.0	9.28E-01	3.99E-06
67.5	9.10E-01	3.91E-06
75.0	8.92E-01	3.83E-06
82.5	8.75E-01	3.76E-06
90.0	8.58E-01	3.68E-06
97.5	8.41E-01	3.61E-06
105.0	8.26E-01	3.55E-06
112.5	8.10E-01	3.48E-06
120.0	7.96E-01	3.42E-06
127.5	7.82E-01	3.36E-06
135.0	7.68E-01	3.30E-06
142.5	7.55E-01	3.24E-06
150.0	7.43E-01	3.19E-06

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.000002	mg/l	from Level 1
Dilution Factor	DF	1.02E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0000044	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	2.90E+01	m	from Level 2
Plume thickness in aquifer at source	Sy	1.23E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	4.23E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	1.73E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.22E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	4.23E-02	fraction
Rate of contaminant flow due to retardation	u	1.95E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	7.43E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.35E+00**	**fraction**
Soil leachate concentration	Co	4.40E-06	

Remedial Targets

Level 3 Remedial Target	**2.76E-06**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state	**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
	4.78E-06	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point	**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration (C_{ED}/C_0)	**7.43E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

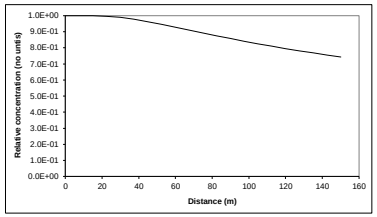
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+02	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	4.30E-06
7.5	1.00E+00	4.30E-06
15.0	1.00E+00	4.29E-06
22.5	9.97E-01	4.28E-06
30.0	9.89E-01	4.25E-06
37.5	9.77E-01	4.20E-06
45.0	9.62E-01	4.13E-06
52.5	9.45E-01	4.06E-06
60.0	9.28E-01	3.99E-06
67.5	9.10E-01	3.91E-06
75.0	8.92E-01	3.83E-06
82.5	8.75E-01	3.76E-06
90.0	8.58E-01	3.68E-06
97.5	8.41E-01	3.61E-06
105.0	8.26E-01	3.55E-06
112.5	8.10E-01	3.48E-06
120.0	7.96E-01	3.42E-06
127.5	7.82E-01	3.36E-06
135.0	7.68E-01	3.30E-06
142.5	7.55E-01	3.24E-06
150.0	7.43E-01	3.19E-06

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Environment Agency

Input Parameters	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.05E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.07	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.22E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	1.24E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*Mc Worter and Sunata 1977*
Hydraulic gradient	i	2.04E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	5.95E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.95E+02	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.68E-02	m/d
Retardation factor	Rf	1.88E+03	fraction
Decay rate used	λ	3.69E-104	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	2.04E-02	fraction
Rate of contaminant flow due to retardation	u	1.96E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.98E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Soil leachate concentration	Co	7.00E-02	

Remedial Targets

Level 3 Remedial Target		**2.11E-02**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		6.22E+00	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.98E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.95E+02	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.95E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

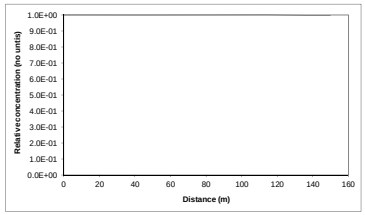
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Berth 52/53
Completed by:	Emily Morgan
Date:	########
Version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	6.66E-02
7.5	1.00E+00	6.66E-02
15.0	1.00E+00	6.66E-02
22.5	1.00E+00	6.66E-02
30.0	1.00E+00	6.66E-02
37.5	1.00E+00	6.66E-02
45.0	1.00E+00	6.66E-02
52.5	1.00E+00	6.66E-02
60.0	1.00E+00	6.66E-02
67.5	1.00E+00	6.66E-02
75.0	1.00E+00	6.66E-02
82.5	1.00E+00	6.66E-02
90.0	1.00E+00	6.66E-02
97.5	1.00E+00	6.66E-02
105.0	1.00E+00	6.66E-02
112.5	1.00E+00	6.65E-02
120.0	9.99E-01	6.65E-02
127.5	9.99E-01	6.65E-02
135.0	9.99E-01	6.65E-02
142.5	9.98E-01	6.65E-02
150.0	9.98E-01	6.64E-02

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	0.02	mg/l	from Level 1
Dilution Factor	DF	1.05E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0091	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.22E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	1.24E+01	m	from Level 2
Bulk density of aquifer materials	ρ	1.87E+00	g/cm^3	*Measured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*Mc Worter and Sunata 1977*
Hydraulic gradient	i	2.04E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	5.95E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.95E+02	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.68E-02	m/d
Retardation factor	Rf	1.67E+03	fraction
Decay rate used	λ	4.14E-104	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	2.04E-02	fraction
Rate of contaminant flow due to retardation	u	2.20E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.98E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Soil leachate concentration	Co	9.10E-03	

Remedial Targets

Level 3 Remedial Target		**2.11E-02**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		6.22E+00	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.98E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.95E+02	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.95E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

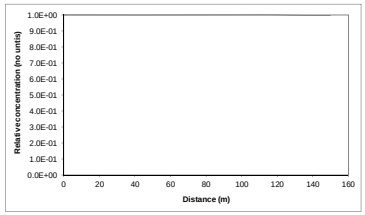
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = *ax*/10, *ay* = *ax*/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Berth 52/53
Completed by:	Emily Morgan
Date:	########
Version:	1.1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	8.65E-03
7.5	1.00E+00	8.65E-03
15.0	1.00E+00	8.65E-03
22.5	1.00E+00	8.65E-03
30.0	1.00E+00	8.65E-03
37.5	1.00E+00	8.65E-03
45.0	1.00E+00	8.65E-03
52.5	1.00E+00	8.65E-03
60.0	1.00E+00	8.65E-03
67.5	1.00E+00	8.65E-03
75.0	1.00E+00	8.65E-03
82.5	1.00E+00	8.65E-03
90.0	1.00E+00	8.65E-03
97.5	1.00E+00	8.65E-03
105.0	1.00E+00	8.65E-03
112.5	1.00E+00	8.65E-03
120.0	9.99E-01	8.65E-03
127.5	9.99E-01	8.65E-03
135.0	9.99E-01	8.64E-03
142.5	9.98E-01	8.64E-03
150.0	9.98E-01	8.64E-03

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.0000002	mg/l	from Level 1
Dilution Factor	DF	1.05E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.22E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	1.24E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Mesaured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	2.07E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	5.95E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.74E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	2.07E-02	fraction
Rate of contaminant flow due to retardation	u	3.29E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.98E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Soil leachate concentration	Co	0.00E+00	

Remedial Targets

Level 3 Remedial Target		**2.11E-07**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		3.65E-07	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.98E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

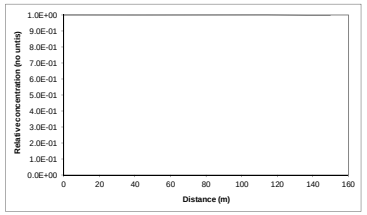
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = *ax*/10, *ay* = *ax*/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	0.00E+00
7.5	1.00E+00	0.00E+00
15.0	1.00E+00	0.00E+00
22.5	1.00E+00	0.00E+00
30.0	1.00E+00	0.00E+00
37.5	1.00E+00	0.00E+00
45.0	1.00E+00	0.00E+00
52.5	1.00E+00	0.00E+00
60.0	1.00E+00	0.00E+00
67.5	1.00E+00	0.00E+00
75.0	1.00E+00	0.00E+00
82.5	1.00E+00	0.00E+00
90.0	1.00E+00	0.00E+00
97.5	1.00E+00	0.00E+00
105.0	1.00E+00	0.00E+00
112.5	1.00E+00	0.00E+00
120.0	9.99E-01	0.00E+00
127.5	9.99E-01	0.00E+00
135.0	9.99E-01	0.00E+00
142.5	9.98E-01	0.00E+00
150.0	9.98E-01	0.00E+00

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.0000002	mg/l	from Level 1
Dilution Factor	DF	1.05E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to dissolved pollutants only**

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0000044	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.22E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	1.24E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Mesured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	2.07E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	5.95E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.74E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	2.07E-02	fraction
Rate of contaminant flow due to retardation	u	3.29E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.98E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Soil leachate concentration	Co	4.40E-06	

Remedial Targets

Level 3 Remedial Target		**2.11E-07**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		3.65E-07	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.98E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

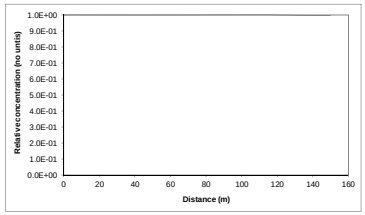
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration (No units)	Concentration mg/l
0	1.0E+00	4.19E-06
7.5	1.00E+00	4.19E-06
15.0	1.00E+00	4.19E-06
22.5	1.00E+00	4.19E-06
30.0	1.00E+00	4.19E-06
37.5	1.00E+00	4.19E-06
45.0	1.00E+00	4.19E-06
52.5	1.00E+00	4.19E-06
60.0	1.00E+00	4.19E-06
67.5	1.00E+00	4.19E-06
75.0	1.00E+00	4.19E-06
82.5	1.00E+00	4.19E-06
90.0	1.00E+00	4.19E-06
97.5	1.00E+00	4.19E-06
105.0	1.00E+00	4.19E-06
112.5	1.00E+00	4.19E-06
120.0	9.99E-01	4.19E-06
127.5	9.99E-01	4.18E-06
135.0	9.99E-01	4.18E-06
142.5	9.98E-01	4.18E-06
150.0	9.98E-01	4.18E-06

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters

	Variable	Value	Unit	Source
Contaminant		Tributyl Tin		from Level 1
Target Concentration	C_T	0.000002	mg/l	from Level 1
Dilution Factor	DF	1.05E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Domenico - Steady state — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to dissolved pollutants only

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil leachate concentration as mg/l		
Enter soil leachate concentration		0.0000044	mg/l	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+100	days	
Calculated decay rate	λ	6.93E-101	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	1.22E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	1.24E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.10E+00	g/cm^3	*Mesured value*
Effective porosity of aquifer	n	3.30E-01	fraction	*conservative estimate*
Hydraulic gradient	i	2.07E-02	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	5.95E-01	m/d	from Level 2
Distance to compliance point	x	1.50E+02	m	*150m arbitary compliance point*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.63E+00	l/kg	*see options*
Longitudinal dispersivity	ax	5.423	m	*see options*
Transverse dispersivity	az	0.542	m	*see options*
Vertical dispersivity	ay	0.054	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	3.74E-02	m/d
Retardation factor	Rf	1.14E+01	fraction
Decay rate used	λ	6.10E-102	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	2.07E-02	fraction
Rate of contaminant flow due to retardation	u	3.29E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.98E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Soil leachate concentration	Co	4.40E-06	

Remedial Targets

Level 3 Remedial Target	**2.11E-06**	**mg/l**	For comparison with measured pore water concentration.
Domenico - Steady state	**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
	3.65E-06	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point	**150**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration (C_{ED}/C_0)	**9.98E-01**	**fraction**	Domenico - Steady state

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	5.20E-01	fraction
Organic carbon partition coefficient	Koc	3.13E+00	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.63E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

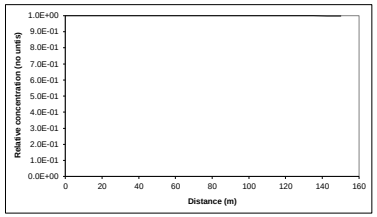
Dispersivity based on Xu & Eckstein (1995)

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+02	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Graving Dock 2
Completed by:	Emily Morgan
Date:	########
Version:	Version 1

Calculated (relative) concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Relative concentration	Concentration
	(No units)	mg/l
0	1.0E+00	4.19E-06
7.5	1.00E+00	4.19E-06
15.0	1.00E+00	4.19E-06
22.5	1.00E+00	4.19E-06
30.0	1.00E+00	4.19E-06
37.5	1.00E+00	4.19E-06
45.0	1.00E+00	4.19E-06
52.5	1.00E+00	4.19E-06
60.0	1.00E+00	4.19E-06
67.5	1.00E+00	4.19E-06
75.0	1.00E+00	4.19E-06
82.5	1.00E+00	4.19E-06
90.0	1.00E+00	4.19E-06
97.5	1.00E+00	4.19E-06
105.0	1.00E+00	4.19E-06
112.5	1.00E+00	4.19E-06
120.0	9.99E-01	4.19E-06
127.5	9.99E-01	4.18E-06
135.0	9.99E-01	4.18E-06
142.5	9.98E-01	4.18E-06
150.0	9.98E-01	4.18E-06

Appendix H

Soil Guideline Values

Commercial GAC Values

		Commercial	
	Units	GAC	SSL
Metals			
Arsenic	mg/kg	635	
Cadmium	mg/kg	230	
Chromium	mg/kg	30400	
Hexavalent Chromium	mg/kg	34.2	
Copper	mg/kg	71700	
Lead	mg/kg	6220	
Mercury	mg/kg	3640	
Nickel	mg/kg	1790	
Selenium	mg/kg	13000	
Zinc	mg/kg	665000	
Inorganics			
pH	-	-	
Cyanide total	mg/kg	53	
Organic matter	%	-	
Sulphate Aqueous Extract as SO4	mg/l	-	
Sulphide	mg/kg	-	
Petroleum Hydrocarbons			
Aliphatic C5-C6	mg/kg	3390	304
Aliphatic C6-C8	mg/kg	8250	144
Aliphatic C8-C10	mg/kg	2130	77.7
Aliphatic C10-C12	mg/kg	10300	47.5
Aliphatic C12-C16	mg/kg	60800	23.7
Aliphatic C16-C21	mg/kg	1590000	
Aliphatic C21-C35	mg/kg	1590000	
Aliphatic C5-C35	mg/kg	-	
Aromatic C5-C7	mg/kg	27700	122
Aromatic C7-C8	mg/kg	59000	869
Aromatic C8-C10	mg/kg	3670	613
Aromatic C10-C12	mg/kg	10300	47.5
Aromatic C12-C16	mg/kg	36300	169
Aromatic C16-C21	mg/kg	28200	
Aromatic C21-C35	mg/kg	28200	
Aromatic C5-C35	mg/kg	-	
TPH Ali/Aro	mg/kg	-	
Benzene	mg/kg	28.1	
Ethylbenzene	mg/kg	16800	518
Toluene	mg/kg	59000	869
Xylene	mg/kg	6220	576
MTBE	mg/kg	7930	
PAHs			
Acenaphthene	mg/kg	84900	57
Acenaphthylene	mg/kg	84300	86.1
Anthracene	mg/kg	525000	
Benzo(a)anthracene	mg/kg	89.5	
Benzo(a)pyrene	mg/kg	14.1	
Benzo(b)fluoranthene	mg/kg	100	
Benzo(k)fluoranthene	mg/kg	654	
Benzo(g,h,i)perylene	mg/kg	141	
Chrysene	mg/kg	137	
Dibenzo(a,h)anthracene	mg/kg	12.7	
Fluoranthene	mg/kg	22600	
Fluorene	mg/kg	63500	30.9
Indeno(1,2,3-c,d)pyrene	mg/kg	60	
Naphthalene	mg/kg	204	76.4
Phenanthrene	mg/kg	21900	
Pyrene	mg/kg	54200	
PAH	mg/kg	-	
Phenols	mg/kg	1100000	
Phenol - Monohydric	mg/kg	-	

GAC Generic Assessment criteria
SSL Soil Saturation Limits
- means no GAC value

GAC values are substituted for the more conservative SSL where one exists

This licence was amended on 26 April 2019 under Section S96(1) of the Environmental Protection Agency Act 1992, as amended. The details of Amendment A must be read in conjunction with this licence. The amendment document is entitled "Clerical Amendment A".



Headquarters
P.O. Box 3000
Johnstown Castle Estate
County Wexford
Ireland

INDUSTRIAL EMISSIONS LICENCE

Licence Register Number:	**P1022-02**
Company Register Number:	**262367**
Licensee:	**Dublin Port Company**
Location of Installation:	**Port Centre Alexandra Road Dublin Port Dublin 1**

ENVIRONMENTAL PROTECTION AGENCY ACT 1992 AS AMENDED

INDUSTRIAL EMISSIONS LICENCE

Decision of Agency, under Section 90(2) of the EPA Act 1992 as amended in respect of licence

Reference number in Register of licences: P1022-02

Further to notice dated 17/12/18, the Agency in exercise of the powers conferred on it by the Environmental Protection Agency Act 1992 as amended, for the reasons hereinafter set out, hereby grants an Industrial Emissions review licence to Dublin Port Company, Port Centre, Alexandra Road, Dublin 1, CRO number 262367,

to carry on the following activities

Class 11.1

The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

Class 11.2

Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:

(b) physico-chemical treatment;
(c) blending or mixing prior to submission to any of the other activities listed in points 11.2 or 11.3.

Class 11.6

Temporary storage of hazardous waste, (other than waste referred to in paragraph 11.5) pending any of the activities referred to in paragraph 11.2, 11.3, 11.5 or 11.7 with a total capacity exceeding 50 tonnes, other than temporary storage, pending collection, on the site where the waste is generated.

At Dublin Port Company, Port Centre, Alexandra Road, Dublin, D01 H4C6 subject to the conditions as set out.

GIVEN under the Seal of the Agency on this the 14th day of February 2019.

PRESENT when the seal of the Agency was affixed hereto:

Tara Gillen

Tara Gillen Authorised Person

INTRODUCTION

This introduction is not part of the licence and does not purport to be a legal interpretation of the licence.

This licence is for the ex-situ treatment by stabilisation/solidification and recovery of contaminated dredge material at specific locations within Dublin Port as part of the Alexandra Basin Redevelopment Project at Port Centre, Alexandra Road, Dublin Port, Dublin 1. The waste to be treated will comprise contaminated dredged sediment taken from the Alexandra Basin, which is contaminated with heavy metals, TBT, DBT, hydrocarbons and, to a lesser extent, PAHs and PCBs.

The treated waste will be recovered by infilling at two locations within the Dublin Port area, at Graving Dock No. 2 and at Berths 52/53. A total of 1,262,800 tonnes of dredge sediment will be treated and recovered over the lifetime of the activity. The work is anticipated to last approximately 18 months from commencement.

For the purpose of the EU Industrial Emissions Directive (2010/75/EU), this installation falls within the scope of the following Annex I category:

Category 5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:

(a) biological treatment;
(b) physic-chemical treatment;
(c) blending or mixing prior to submission to any of the other activities listed in points 5.1 to 5.2;
(d) repackaging prior to submission to any of the other activities listed in points 5.1 to 5.2;
(e) solvent reclamation/regeneration;
(f) recycling/reclamation of inorganic materials other than the metals of metal compounds;
(g) regeneration of acids or bases;
(h) recovery of components used for pollution abatement;
(i) recovery of components from catalysts;
(j) oil-refining or other reuses of oil;
(k) surface impoundment.

Category 5.5 Temporary storage of hazardous waste not covered under point 5.4 pending any of the activities listed I points 5.1, 5.2, 5.4 and 5.6 with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated.

The licence sets out in detail the conditions under which Dublin Port Company will operate and manage this installation.

TG

Table of Contents

Page No

Glossary of Terms 1
Decision & Reasons for the Decision 7
Part I Schedule of Activities Licensed 9
Part II Schedule of Activities Refused 9
Part III Conditions 10
Condition 1. Scope 10
Condition 2. Management of the Installation 11
Condition 3. Infrastructure and Operation 13
Condition 4. Interpretation 18
Condition 5. Emissions 18
Condition 6. Control and Monitoring 19
Condition 7. Resource Use and Energy Efficiency 22
Condition 8. Materials Handling 22
Condition 9. Accident Prevention and Emergency Response 24
Condition 10. Closure, Restoration and Aftercare Management 25
Condition 11. Notification, Records and Reports 26
Condition 12. Financial Charges and Provisions 29
SCHEDULE A: Limitations 31
SCHEDULE B: Emission Limits 32
SCHEDULE C: Control & Monitoring 34
SCHEDULE D: Specified Engineering Works 39
SCHEDULE E: Annual Environmental Report 40

Glossary of Terms

All terms in this licence should be interpreted in accordance with the definitions in the Environmental Protection Agency Act 1992 as amended / Waste Management Act 1996 as amended, unless otherwise defined in the section.

Accident	For the purposes of this licence an accident means an unplanned event that may result in pollution.
Adequate lighting	20 lux measured at ground level.
AER	Annual Environmental Report.
Aerosol	A suspension of solid or liquid particles in a gaseous medium.
Agreement	Agreement in writing.
Annually	All or part of a period of twelve consecutive months.
Application	The application by the licensee for this licence.
Appropriate Facility	A waste management facility or installation, duly authorised under relevant law and technically suitable.
Attachment	Any reference to Attachments in this licence refers to attachments submitted as part of this licence application.
BAT	Best Available Techniques.
BAT conclusions	A document containing the parts of a BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures.
BAT reference document	A document drawn up by the Commission of the European Union in accordance with Article 13 of the Industrial Emissions Directive, resulting from the exchange of information in accordance with that Article of that Directive and describing, in particular, applied techniques, present emissions and consumption levels, techniques considered for the determination of best available techniques as well as BAT conclusions and any emerging techniques.
Biannually	At approximately six – monthly intervals.
Biennially	Once every two years.

BOD	5 day Biochemical Oxygen Demand (without nitrification suppression).
CEN	Comité Européen De Normalisation – European Committee for Standardisation.
COD	Chemical Oxygen Demand.
Compliance Point	The point (location, depth) at which a compliance value should be met. Generally it is represented by a borehole or monitoring well from which representative groundwater samples can be obtained.
Compliance Value	The concentration of a substance and associated compliance regime that, when not exceeded at the compliance point, will prevent pollution and/or achieve water quality objectives at the receptor.
Containment boom	A boom that can contain spillages and prevent them from entering drains or watercourses or from further contaminating watercourses.
CRO Number	Company Register Number.
Daily	During all days of plant operation and, in the case of emissions, when emissions are taking place; with at least one measurement on any one day.
Day	Any 24 hour period.
Daytime	0700 hrs to 1900 hrs.
dB(A)	Decibels (A weighted).
DO	Dissolved oxygen.
Documentation	Any report, record, results, data, drawing, proposal, interpretation or other document in written or electronic form which is required by this licence.
Drawing	Any reference to a drawing or drawing number means a drawing or drawing number contained in the application, unless otherwise specified in this licence.
Emission limits	Those limits, including concentration limits and deposition rates, established in *Schedule B: Emission Limits,* of this licence.
EMP	Environmental Management Programme.
Environmental damage	As defined in Directive 2004/35/EC.

EPA	Environmental Protection Agency.
Evening Time	1900hrs to 2300hrs
Facility	Any site or premises used for the purpose of the recovery or disposal of waste.
Fortnightly	A minimum of 24 times per year, at approximately two week intervals.
GC/MS	Gas chromatography/mass spectroscopy.
Groundwater	Has the meaning assigned to it by Regulation 3 of the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010).
ha	Hectare.
Hazardous Substances	Substances or mixtures as defined in Article 3 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures.
Heavy metals	This term is to be interpreted as set out in "Parameters of Water Quality, Interpretation and Standards" published by the Agency in 2001. ISBN 1-84095-015-3.
Hours of operation	The hours during which the installation is authorised to be operational.
Hours of waste acceptance	The hours during which the installation is authorised to accept waste.
IE	Industrial Emissions.
Incident	The following shall constitute as incident for the purposes of this licence: (i) an emergency; (ii) any emission which does not comply with the requirements of this licence; (iii) any malfunction or breakdown of key environmental abatement, control or monitoring equipment; (iv) any exceedance of the daily duty capacity of the waste handling equipment; (v) any trigger level specified in this licence which is attained or exceeded; (vi) any compliance value specified in this licence which is attained or exceeded; and, (vii) any indication that environmental pollution has, or may have, taken place.

Industrial Emissions Directive	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).
Installation	A stationary technical unit or plant where the activity concerned referred to in the First Schedule of EPA Act 1992 as amended is or will be carried on, and shall be deemed to include any directly associated activity, which has a technical connection with the activity and is carried out on the site of the activity.
Irish Water	Irish Water, Colvill House, 24/26 Talbot Street, Dublin 1.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound.
Licensee	Dublin Port Company, Port Centre, Alexandra Road, Dublin Port, Dublin 1, CRO Number 262367.
List I	As listed in the EC Directives 2006/11/EC and 80/68/EEC and amendments.
List II	As listed in the EC Directives 2006/11/EC and 80/68/EEC and amendments.
List of Waste (LoW)	A harmonised, non-exhaustive list of wastes drawn up by the European Commission and published as Commission Decision 2000/532/EC, as amended by Commission Decision 2014/955/EU and any subsequent amendment published in the Official Journal of the European Community.
Local Authority	Dublin City Council.
Maintain	Keep in a fit state, including such regular inspection, servicing, calibration and repair as may be necessary to perform its function adequately.
Mass flow limit	An emission limit value expressed as the maximum mass of a substance that can be emitted per unit time.
Mass flow threshold	A mass flow rate above which a concentration limit applies.
Monthly	A minimum of 12 times per year, at intervals of approximately one month.
Night-time	2300 hrs to 0700 hrs.

Noise-sensitive location (NSL)	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Oil separator	Device installed according to the International Standard I.S. EN 858-2:2003 (Separator system for light liquids, (e.g. oil and petrol) – Part 2: Selection of normal size, installation, operation and maintenance).
PRTR	Pollutant Release and Transfer Register.
Quarterly	All or part of a period of three consecutive months beginning on the first day of January, April, July or October.
Relevant Hazardous Substances	Those substances or mixtures defined within Article 3 of Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation) which, as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the installation.
Residual Waste	The fraction of collected waste remaining after a treatment or diversion step, which generally requires further treatment or disposal, including mixed municipal waste.
SAC	Special Area of Conservation designated under the *Habitats Directive,* Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Sample(s)	Unless the context of this licence indicates to the contrary, the term samples shall include measurements taken by electronic instruments.
Sanitary effluent	Wastewater from installation toilet, washroom and canteen facilities.
Soil	The top layer of the Earth's crust situated between the bedrock and the surface. The soil is composed of mineral particles, organic matter, water, air and living organisms.
SOP	Standard operating procedure.
SPA	Special Protection Area designated under the Birds Directive, Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
Specified emissions	Those emissions listed in *Schedule B: Emission Limits,* of this licence.

Standard method	A National, European or internationally recognised procedure (e.g. I.S. EN, ISO, CEN, BS or equivalent); or an in-house documented procedure based on the above references; a procedure as detailed in the current edition of "Standard Methods for the Examination of Water and Wastewater" (prepared and published jointly by A.P.H.A., A.W.W.A. & W.E.F.), American Public Health Association, 1015 Fifteenth Street, N.W., Washington DC 20005, USA; or an alternative method as may be agreed by the Agency.
Storage	Includes holding of waste.
Storm water	Rain water run-off from roof and non-process areas.
The Agency	Environmental Protection Agency.
TOC	Total organic carbon.
Trade effluent	Trade effluent has the meaning given in the Water Services Act, 2007.
Trigger level	A parameter value, the achievement or exceedance of which requires certain actions to be taken by the licensee.
Waste	Any substance or object which the holder discards or intends or is required to discard.
Water Services Authority	Dublin City Council.
Weekly	During all weeks of plant operation and, in the case of emissions, when emissions are taking place; with at least one measurement in any one week.
WWTP	Waste water treatment plant.

Decision & Reasons for the Decision

The Environmental Protection Agency is satisfied, on the basis of the information available, that subject to compliance with the conditions of this licence, any emissions from the activity will comply with and will not contravene any of the requirements of Section 83(5) of the Environmental Protection Agency Act 1992 as amended.

The Agency also considers that the activities will not adversely affect the integrity of any European Site, and has decided to impose conditions for the purposes of ensuring they do not do so. It has determined that the activity, if managed, operated and controlled in accordance with the licence, will not have any adverse effect on the integrity of any of those sites.

The Agency has accordingly decided to grant a revised licence to Dublin Port Company, to carry on the activities listed in *Part I, Schedule of Activities Licensed*, subject to the conditions set out in *Part III, Conditions*; such licence to take effect in lieu of Licence Register Number: P1022-01.

No objection having been received to the proposed determination, the licence is granted in accordance with the terms of the proposed determination.

In reaching this decision the Agency has considered the documentation relating to the existing licence, Register Number: P1022-01; the review application, Register Number: P1022-02 and the supporting documentation received from the applicant; the Inspector's Report dated 11 December 2018; and has carried out an Environmental Impact Assessment (EIA) Screening and an Appropriate Assessment of the likely significant effects of the activities on European Sites.

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the activities, individually or in combination with other plans or projects are likely to have a significant effect on any European Site. In this context, particular attention was paid to the European Sites at South Dublin Bay and River Tolka Estuary SPA (Site code: 004024), South Dublin Bay SAC (Site code: 000210), North Dublin Bay SAC (Site code: 000206), North Bull Island SPA (Site code: 004006) and Rockabill to Dalkey Island SAC (Site code: 003000); Howth Head Coast SPA (Site Code: 004113); Baldoyle Bay SPA (Site Code: 004016); Ireland's Eye SPA (Site Code: 004117); Malahide Estuary SPA (Site Code: 004025); Lambay Island SPA (Site Code: 004069); Rogerstown Estuary SPA (Site Code: 004015); Dalkey Islands SPA (Site Code: 004172); Wicklow Mountains SPA (Site Code: 004040); Baldoyle Bay SAC (Site Code: 000199); Howth Head SAC (Site Code: 000202); Malahide Estuary SAC (Site Code: 000205); Lambay Island SAC (Site Code: 000204); Rogerstown Estuary SAC (Site Code: 000208); Wicklow Mountains SAC (Site Code: 002122); Bray Head SAC (Site Code: 000714); Ballyman Glen SAC (Site Code: 000713); Knocksink Wood SAC (Site Code: 000725); Ireland's Eye SAC (Site Code: 002193); Glenasmole Valley SAC (Site Code: 001209).

The activities are not directly connected with or necessary to the management of any European Site and the Agency considered, for the reasons set out below, that it cannot be excluded, on the basis of objective information, that the activities, individually or in combination with other plans or projects, will have a significant effect on any European Site and accordingly determined that an Appropriate Assessment of the activities was required.

- The proposed activities are located in close proximity to five European Sites and a further 24 European Sites lie within 19km of the installation.
- The proposed activities may result in adverse effects on water quality and disturbance impacts on qualifying interests at the European Sites.

The Agency notes that a Natura Impact Statement was submitted as part of the licence application documentation for P1022-02.

The Agency has completed the Appropriate Assessment of potential impacts on these sites and has made certain, based on best scientific knowledge in the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats

Directive, that the activities, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site, in particular South Dublin Bay and River Tolka Estuary SPA (Site code: 004024), South Dublin Bay SAC (Site code: 000210), North Dublin Bay SAC (Site code: 000206), North Bull Island SPA (Site code: 004006) and Rockabill to Dalkey Island SAC (Site code: 003000), having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with this licence and the conditions attached hereto for the following reasons:

- The licence specifies emission limit values in *Schedule B.2: Emissions to Water*, of this licence for relevant parameters in the waste water discharge, which are set to ensure compliance with the requirements of the European Communities Environmental Objectives (Surface Water) Regulations 2009, as amended.
- The results of coastal process modelling presented in the NIS conclude that there will be no impact on the intertidal habitats that support the species designated as qualifying interests.
- The results of modelling presented in the NIS of waste water and storm water discharges from the treatment area conclude that there will be no measurable impact on the environment.
- The drainage system on site will maintain a separation between the clean storm water and runoff which has the potential to be contaminated, which will be treated onsite before discharge.
- *Schedule C: Control & Monitoring* of this licence of the licence provides for control and monitoring of storm water emissions and emissions to surface water from the installation.
- Conditions in the licence require that all drainage from bunded and waste storage areas be treated as contaminated, (Condition 3.7.3), while visual inspections and proper maintenance are also provided for (Condition 6.11 & 6.12).
- A Marine Mammal Observer will be engaged during licensed activities and activities associated with licensed activities at the installation that may cause disturbance impacts on the Harbour Porpoise, which is highly mobile within its habitat (Condition 6.16.3).
- Noise-producing activities will only take place during daylight hours where visibility provides for effective monitoring. (Condition 6.16.4).

The Agency is satisfied that no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of those European Sites South Dublin Bay and River Tolka Estuary SPA (Site code: 004024), South Dublin Bay SAC (Site code: 000210), North Dublin Bay SAC (Site code: 000206), North Bull Island SPA (Site code: 004006) and Rockabill to Dalkey Island SAC (Site code: 003000).

Part I Schedule of Activities Licensed

In pursuance of the powers conferred on it by the Environmental Protection Agency Act 1992 as amended, the Agency hereby grants this revised Industrial Emissions licence to:

Dublin Port Company, Port Centre, Alexandra Road, Dublin Port, Dublin 1, and CRO Number 262367

under Section 90(2) of the said Act to carry on the following activities:

Class 11.1

The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

Class 11.2

Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:

(b) physico-chemical treatment;
(c) blending or mixing prior to submission to any of the other activities listed in points 11.2 or 11.3.

Class 11.6

Temporary storage of hazardous waste, (other than waste referred to in paragraph 11.5) pending any of the activities referred to in paragraph 11.2, 11.3, 11.5 or 11.7 with a total capacity exceeding 50 tonnes, other than temporary storage, pending collection, on the site where the waste is generated.

at Port Centre, Alexandra Road, Dublin, D01 H4C6 subject to the following twelve Conditions, with the reasons therefor and associated schedules attached thereto.

Part II Schedule of Activities Refused

None of the proposed activities as set out in the licence application have been refused.

Part III Conditions

Condition 1. Scope

1.1 Industrial Emissions Directive activities at this installation shall be restricted to those listed and described in *Part I Schedule of Activities Licensed*, and shall be as set out in the licence application or as modified under Condition 1.4 of this licence and subject to the conditions of this licence.

1.2 The licensee shall carry on the licensed activities in accordance with the limitations set out in *Schedule A: Limitations,* of this licence.

1.3 For the purposes of this licence, the installation authorised by this licence is the area of land outlined in red on Drawing No. IBR0668/121 of the application. Any reference in this licence to "installation" shall mean the area thus outlined in red. The licensed activities shall be carried on only within the area outlined.

1.4 No alteration to, or reconstruction in respect of, the activity, or any part thereof, that would, or is likely to, result in

(i) a material change or increase in:

- the nature or quantity of any emission;
- the abatement/treatment or recovery systems;
- the range of processes to be carried out;
- the fuels, raw materials, intermediates, products or wastes generated, or

(ii) any changes in:

- site management, infrastructure or control with adverse environmental significance;

shall be carried out or commenced without prior notice to, and without the approval of, the Agency.

1.5 The installation shall be controlled, operated and maintained, and emissions shall take place as set out in the licence. All programmes required to be carried out under the terms of this licence become part of this licence.

1.6 This licence is for the purpose of IE licensing under the EPA Act 1992 as amended only and nothing in this licence shall be construed as negating the licensee's statutory obligations or requirements under any other enactments or regulations.

1.7 This licence shall have effect in lieu of the licence granted on the 29th of November 2016 (Register No P1022-01).

1.8 Waste Acceptance Hours and Hours of Operation

Unless otherwise agreed by the Agency,

- the installation shall be operated only between the hours of 0800 and 1800 Monday to Friday inclusive and 0800 and 1300 on Saturdays; and
- no waste shall be accepted on Sundays or Bank holidays.

Reason: ***To clarify the scope of this licence.***

Condition 2. Management of the Installation

2.1 Installation Management

2.1.1 The licensee shall employ a suitably qualified and experienced installation manager who shall be designated as the person in charge. The installation manager or a nominated, suitably qualified and experienced deputy shall be present on the installation at all times during its operation or as otherwise required by the Agency.

2.1.2 The licensee shall ensure that personnel performing specifically assigned tasks shall be qualified on the basis of appropriate education, training and experience as required and shall be aware of the requirements of this licence.

2.2 Environmental Management System (EMS)

2.2.1 The licensee shall maintain and implement an Environmental Management System (EMS), which shall incorporate energy efficiency management, within six months of the date of grant of this licence. The EMS shall be reviewed by senior management for suitability, adequacy and effectiveness and updated on an annual basis.

2.2.2 The EMS shall include, as a minimum, the following elements:

2.2.2.1 Commitment of the management, including senior management.

2.2.2.2 An environmental policy defined for the installation that includes the continuous improvement for the installation by the management.

2.2.2.3 Management and Reporting Structure and responsibility.

2.2.2.4 The necessary procedures, objectives and targets, in conjunction with financial planning and investment.

2.2.2.5 Procedures that ensure employee involvement in ensuring compliance with environmental legislation.

2.2.2.6 A procedure for checking performance by sectoral benchmarking on a regular basis including energy efficiency.

2.2.2.7 Schedule of Environmental Objectives and Targets.

The licensee shall maintain a Schedule of Environmental Objectives and Targets. The Schedule shall, as a minimum, provide for a review of all operations and processes, including an evaluation of practicable options, for energy and resource efficiency, the use of cleaner technology, cleaner production and the prevention, reduction and minimisation of waste. The Schedule shall include waste reduction targets. The Schedule shall include time frames for the achievement of set targets and shall address a five-year period as a minimum. The Schedule shall be reviewed annually.

2.2.2.8 Environmental Management Programme (EMP)

The licensee shall maintain and implement an EMP, including a time schedule, for achieving the Environmental Objectives and Targets prepared under Condition 2.2.2.7. The EMP shall include:

- designation of responsibility for targets;
- the means by which they may be achieved;
- the time within which they may be achieved.

The EMP shall also include:

- Closure, Restoration and Aftercare Management Plan (CRAMP)
- Construction Environmental Management Programme (CEMP) which shall include:
    - Odour Management Plan

- Monitoring and auditing programme (for construction works and post-construction)
- Waste Management Plan
- Waste Treatment Procedures
- Waste Deposition/Fill Procedures
- Waste Monitoring Procedures
- Water Quality Management Plan
- Noise and Vibration Management Plan
- Dust Management Plan
- Contamination Strategy
- Traffic Management Plan
- Marine Mammal Observation Plan
- Marine Archaeology Management Plan
- Industrial Heritage Conservation Plan
- Lines of Communication, Reporting and Actions.

The EMP shall be reviewed annually.

A report on the programme, including the success in meeting agreed targets, shall be prepared and submitted to the Agency as part of the AER. Such reports shall be retained on-site for a period of not less than seven years and shall be available for inspection by authorised persons of the Agency.

2.2.2.9 Documentation

(i) The licensee shall maintain and implement an environmental management documentation system.

(ii) The licensee shall issue a copy of this licence to all relevant personnel whose duties relate to any condition of this licence.

2.2.2.10 Corrective and Preventative Action

(i) The licensee shall establish maintain and implement procedures to ensure that corrective and preventative action is taken should the specified requirements of this licence not be fulfilled. The responsibility and authority for persons initiating further investigation and corrective and preventative action in the event of a reported non-conformity with this licence shall be defined.

(ii) Where a breach of one or more of the conditions of this licence occurs, the licensee shall without delay take measures to restore compliance with the conditions of this licence in the shortest possible time and initiate any feasible preventative actions to prevent recurrence of the breach.

(iii) All corrective and preventative actions shall be documented.

2.2.2.11 Internal Audits

The licensee shall maintain and implement a programme for independent internal audits of the EMS. Such audits shall be carried out at least once every three years. The audit programme shall determine whether or not the EMS is being implemented and maintained properly, and in accordance with the requirements of the licence. Audit reports and records of the resultant corrective and preventative actions shall be maintained as part of the EMS in accordance with Condition 2.2.2.8.

2.2.2.12 Awareness, Training and Competence

The licensee shall maintain and implement procedures for identifying training needs, and for providing appropriate training, for all personnel whose work can have a significant effect upon the environment to ensure awareness and

competence in their work area. Appropriate records of training shall be maintained.

2.2.2.13 Communications Programme

The licensee shall maintain and implement a Public Awareness and Communications Programme to ensure that members of the public are informed, and can obtain information at the installation, at all reasonable times, concerning the environmental performance of the installation.

2.2.2.14 Maintenance Programme

The licensee shall maintain and implement programme for maintenance of all plant and equipment based on the instructions issued by the manufacturer/supplier or installer of the equipment. Appropriate record keeping and diagnostic testing shall support this maintenance programme. The licensee shall clearly allocate responsibility for the planning, management and execution of all aspects of this programme to appropriate personnel (see Condition 2.1 above). The maintenance programme shall use appropriate techniques and measures to ensure the optimisation of energy efficiency in plant and equipment.

2.2.2.15 Efficient Process Control

The licensee shall maintain and implement a programme to ensure there is adequate control of processes under all modes of operation. The programme shall identify the key indicator parameters for process control performance, as well as identifying methods for measuring and controlling these parameters. Abnormal process operating conditions shall be documented, and analysed to identify any necessary corrective action.

Reason: ***To make provision for management of the activity on a planned basis having regard to the desirability of ongoing assessment, recording and reporting of matters affecting the environment.***

Condition 3. Infrastructure and Operation

3.1 The licensee shall ensure, at all times after the grant of this licence, that all infrastructure and all equipment required under this licence has been and is:

(i) installed,

(ii) commissioned,

(iii) present on site, and

(iv) maintained in full working order.

3.2 Where any condition of this licence specifies any later deadline for installation of any piece of infrastructure or equipment, Condition 3.1 shall apply as and from the deadline specified.

3.3 The licensee shall establish and maintain, for each component of the installation, all infrastructure referred to in this licence in advance of the commencement of the licensed activities in that component, or as required by the conditions of this licence. Infrastructure specified in the application that relates to the environmental performance of the installation and is not specified in the licence, shall be installed in accordance with the schedule submitted in the application.

3.4 The licensee shall have regard to the following when choosing and/or designing any new plant/infrastructure:

(i) Energy efficiency, and

(ii) The environmental impact of eventual decommissioning.

3.5 Installation Notice Board

(i) The licensee shall, within one month of the date of grant of this licence, provide an Installation Notice Board on the installation so that it is legible to persons outside the main entrance to the installation. The minimum dimensions of the board shall be 1200 mm by 750 mm. The notice board shall be maintained thereafter.

(ii) The board shall clearly show:

(i) the name and telephone number of the installation;
(ii) the normal hours of operation;
(iii) the name of the licence holder;
(iv) an emergency out of hours contact telephone number;
(v) the licence reference number; and
(vi) where environmental information relating to the installation can be obtained.

(iii) A plan of the installation clearly identifying the location of each storage and treatment area shall be displayed as close as is possible to the entrance to the installation. The plan shall be displayed on a durable material such that is legible at all times. The plan shall be replaced as material changes to the installation are made.

3.6 The licensee shall install on all emission points such sampling points or equipment, including any data-logging or other electronic communication equipment, as may be required by the Agency. All such equipment shall be consistent with the safe operation of all sampling and monitoring systems.

3.7 In the case of composite sampling of aqueous emissions from the operation of the installation, a separate composite sample or homogeneous sub-sample (of sufficient volume as advised) shall be refrigerated immediately after collection and retained as required for EPA use.

3.8 The licensee shall clearly label and provide safe and permanent access to all on-site sampling and monitoring points and to off-site points as required by the Agency. The requirement with regard to off-site points is subject to the prior agreement of the landowner(s) concerned.

3.9 Tank, Container, Drum and Waste Storage Areas

3.9.1 All tank, container, drum and waste storage areas shall be rendered impervious to the materials stored therein. Bunds shall be designed having regard to Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (2004).

3.9.2 All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:

(i) 110% of the capacity of the largest tank or drum within the bunded area; or
(ii) 25% of the total volume of substance that could be stored within the bunded area.

3.9.3 All drainage from bunded and waste storage areas shall be treated as contaminated and shall be diverted for collection and safe disposal.

3.9.4 All inlets, outlets, vent pipes, valves and gauges must be within the bunded area.

3.9.5 All tanks, containers and drums shall be labelled to clearly indicate their contents.

3.9.6 All bunds shall be uniquely identified and labelled at the bund.

3.9.7 The licensee shall apply a leak detection system in accordance with BAT to all storage tanks, container and drum storage areas that contain liquid material other than water.

3.10 The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage at the installation. Once used, the absorbent material shall be disposed of at an appropriate facility.

3.11 Silt Traps and Oil Separators

The licensee shall, prior to commencement of waste activities, install and maintain silt traps and oil separators at the installation:

(i) Silt traps to ensure that all storm water discharges, other than from roofs, from the installation pass through a silt trap in advance of discharge;

(ii) An oil separator on the storm water discharge from yard areas. The separator shall be a Class I full retention separator.

The silt traps and separator shall be in accordance with I.S. EN-858-2: 2003 (separator systems for light liquids).

3.12 Fire-water Retention

3.12.1 The licensee shall carry out a risk assessment to determine if the activity should have a fire-water retention facility. The licensee shall submit a report to the Agency for approval on the findings and recommendations of the assessment within six months of the date of grant of this licence.

3.12.2 In the event that a significant risk exists for the release of contaminated fire-water, the licensee shall, based on the findings of the risk assessment, prepare and implement, with the agreement of the Agency, a suitable risk management programme. The risk management programme shall be fully implemented within three months of date of notification by the Agency.

3.12.3 In the event of a fire or a spillage to storm water, the site storm water shall be diverted for collection. The licensee shall examine, as part of the response programme in Condition 3.10.2 above, the provision of automatic diversion of storm water for collection. The licenses shall have regard to any guidelines issued by the Agency with regard to firewater retention.

3.12.4 The licensee shall have regard to the Environmental Protection Agency Draft Guidance Note to Industry on the Requirements for Fire-Water Retention Facilities when implementing Conditions 3.10.1 and 3.10.2 above.

3.13 All pump sumps, storage tanks, lagoons or other treatment plant chambers from which spillage of environmentally significant materials might occur in such quantities as are likely to breach local or remote containment or separators, shall be fitted with high liquid level alarms (or oil detectors as appropriate) from the date of grant of this licence.

3.14 The provision of a catchment system to collect any leaks from flanges and valves of all over-ground pipes used to transport material other than water shall be examined. This shall be incorporated into a Schedule of Environmental Objectives and Targets set out in Condition 2. of this licence for the reduction in fugitive emissions.

3.15 The licensee shall, prior to commencement of waste activities, install and maintain in a prominent location on the site a wind sock, or other wind direction indicator, which shall be visible from the public roadway outside the site.

3.16 Specified Engineering Works

3.16.1 The licensee shall submit proposals for all Specified Engineering Works, as defined in *Schedule D: Specified Engineering Works,* of this licence, to the Agency for its agreement at least two months in advance of the intended date of commencement of any such works. No such works shall be carried out without the prior agreement of the Agency.

3.16.2 All specified engineering works shall be supervised by a competent person(s) and that person, or persons, shall be present at all times during which relevant works are being undertaken.

3.16.3 Following the completion of all specified engineering works, the licensee shall complete a construction quality assurance validation report. The validation report shall be made available to the Agency on request. The report shall, as appropriate, include the following information:

(i) A description of the works;

(ii) As-built drawings of the works; and

(iii) Any other information requested in writing by the Agency.

3.17 Installation Security

3.17.1 Security fencing or walls and gates shall be maintained at an appropriate location to limit access to the installation. Subject to the implementation of the restoration and aftercare plan and to the agreement of the Agency, the requirement for such site security may be removed.

3.17.2 The licensee shall install a CCTV system which monitors the waste storage areas on a 24-hour basis. The CCTV system shall be operated at all times and copies of recordings kept on site and made available to the Agency on request.

3.17.3 Gates shall be locked shut when the installation is unsupervised.

3.17.4 The licensee shall remedy any defect in the gates, fencing and walls as follows:

(i) A temporary repair shall be made by the end of the working day; and

(ii) A repair to the standard of the original gates, fencing and walls shall be undertaken within three working days.

3.18 Installation Roads and Site Surfaces

3.18.1 Effective site roads shall be provided and maintained to ensure the safe and nuisance-free movement of vehicles within the installation.

3.18.2 The licensee shall maintain an impermeable concrete surface in all areas of the installation. The surfaces shall be concreted and constructed to British Standard 8110 or an alternative as agreed by the Agency. The licensee shall remedy any defect in concrete surfaces within five working days.

3.19 Installation Office

3.19.1 The licensee shall maintain an office at, or in close proximity to, the installation. The office shall be constructed and maintained in a manner suitable for the processing and storing of documentation.

3.19.2 The licensee shall maintain a working telephone and a method for electronic transfer of information at the installation

3.20 Operational Controls

3.20.1 The licensee shall provide and use adequate lighting during the operation of the installation in hours of darkness.

3.20.1 No smoking shall be allowed within the installation, except within a designated smoking area.

3.21 Weighing of waste and Wheel Cleaners

3.21.1 The licensee shall ensure that the weight of all waste treated and used as fill at the installation is calculated or measured and recorded.

3.21.2 The licensee shall provide and maintain wheel cleaners or wheel cleaning equipment at the installation.

3.21.3 The wheel cleaners shall be used by all vehicles leaving the installation as required to ensure that no trade effluent/storm water or waste is carried off-site. All water from the wheel cleaning area shall be collected for appropriate treatment, reuse or disposal.

3.21.4 The wheel-wash shall be inspected on a daily basis and drained as required. Silt, stones and other accumulated material shall be removed as required from the wheel-wash and treated or disposed of appropriately.

3.22 Waste handling, ventilation and processing plant

3.22.1 Items of plant deemed critical to the efficient and adequate processing of waste at the installation (including *inter alia* waste-loading vehicles) shall be provided on the following basis:

(i) 100% duty capacity;

(ii) 20% standby capacity available on a routine basis; and

(iii) Provision of contingency arrangements and/or backup and spares in the case of breakdown of critical equipment.

3.22.2 Prior to commencement of waste activities, the licensee shall maintain an inventory detailing the duty and standby capacity in tonnes per day of all waste handling equipment to be used at the installation. These capacities shall be based on the licensed waste intake, as per *Schedule A: Limitations* of this licence.

3.22.3 The quantity of waste to be accepted at the installation on a daily basis shall not exceed the duty capacity of the equipment at the installation. Any exceedance of this intake shall be treated as an incident.

3.23 Waste Inspection and Quarantine Areas

3.23.1 A Waste Inspection Area and a Waste Quarantine Area shall be provided and maintained at the installation.

3.23.2 These areas shall be constructed and maintained in a manner suitable, and be of a size appropriate, for the inspection of waste and subsequent quarantine if required. The waste inspection area and the waste quarantine area shall be clearly identified and segregated from each other

3.24 The licensee shall have regard to the following when choosing and/or designing any new plant/infrastructure: (i) energy efficiency; and, (ii) the environmental impact of eventual decommissioning.

3.25 Dust/Odour Control

The licensee shall install and provide adequate measures for the control of odours and dust emissions, including fugitive dust emissions, from the installation.

3.26 Groundwater wells

3.26.1 All groundwater monitoring boreholes, as shown on Drawing No. IBR0668/126, shall be adequately protected to prevent contamination or physical damage.

3.26.2 Groundwater wells shall be labelled in situ with their respective identification number and casing elevation in meters above ordinance datum Malin Head (mAOD Malin Head).

3.26.3 Any new groundwater monitoring wells shall be constructed having regard to the guidance given in the Guidance Note Landfill Manual – Guidance Note on Landfill Monitoring, which was published by the Agency.

Reason: ***To provide for appropriate operation of the installation to ensure protection of the environment.***

Condition 4. Interpretation

4.1 Emission limit values for emissions to waters in this licence shall be achieved without the introduction of aqueous dilution, and shall be interpreted in the following way:

4.1.1 Continuous Monitoring

(i) No flow value shall exceed the specific limit.

(ii) No pH value shall deviate from the specified range.

(iii) No temperature value shall exceed the limit value.

4.1.2 Composite Sampling

(i) No pH value shall deviate from the specified range.

(ii) For parameters other than pH and flow, eight out of ten consecutive composite results, based on flow proportional composite sampling, shall not exceed the emission limit value. No individual results similarly calculated shall exceed 1.2 times the emission limit value.

4.1.3 Discrete Sampling

For parameters other than pH and temperature, no grab sample value shall exceed 1.2 times the emission limit value.

4.2 Where the ability to measure a parameter is affected by mixing before emission, then, with agreement from the Agency, the parameter may be assessed before mixing takes place.

4.3 Noise

Noise from the installation shall not give rise to sound pressure levels ($L_{Aeq, T}$) measured at the NSLs of the installation which exceed the limit value(s).

4.4 Dust and Particulate Matter

Dust and particulate matters from the activity shall not give rise to deposition levels which exceed the limit values.

Reason: ***To clarify the interpretation of limit values fixed under the licence.***

Condition 5. Emissions

5.1 Emissions may be made from the specified emission points set out in *Schedule B: Emission Limits,* of this licence, subject to compliance with the Emission Limit Values specified in that Schedule.

5.1.1 Uncontaminated storm water may be discharged to surface water.

5.1.2 Uncontaminated storm water may be emitted to groundwater or to soil.

5.2 Notwithstanding the requirements of Condition 5.1, there shall be no other emissions from the installation.

5.3 No emissions, including odours, from the activities carried on at the site shall result in an impairment of, or an interference with amenities or the environment beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary.

5.4 No substance shall be discharged in a manner, or at a concentration, that, following initial dilution, causes tainting of fish or shellfish.

5.5 The exceedance of Environmental Quality Standards in marine water at monitoring points SW1, SW2 and SW3 shall be treated as an incident.

5.6 The licensee shall ensure that all or any of the following:

- Vermin
- Birds
- Flies
- Mud
- Dust
- Litter

associated with the activity do not result in an impairment of, or an interference with, amenities or the environment at the installation or beyond the installation boundary or any other legitimate uses of the environment beyond the installation boundary. Any method used by the licensee to control or prevent any such impairment/interference shall not cause environmental pollution.

5.7 No leachate or contaminated storm water shall be discharged to surface water courses.

5.8 There shall be no direct emissions to ground or groundwater.

Reason: ***To provide for the protection of the environment by way of control and limitation of emissions.***

Condition 6. Control and Monitoring

6.1 The licensee shall carry out such sampling, analyses, measurements, examinations, maintenance and calibrations as set out below and as in accordance with *Schedule C: Control & Monitoring,* of this licence.

6.1.1 Sampling and analysis shall be undertaken by competent staff in accordance with documented operating procedures.

6.1.2 Such procedures shall be assessed for their suitability for the test matrix and performance characteristics shall be determined.

6.1.3 Such procedures shall be subject to a programme of Analytical Quality Control using appropriate control standards with evaluation of test responses.

6.1.4 Where any analysis is sub-contracted it shall be outsourced to a competent laboratory.

6.2 The licensee shall ensure that:

(i) sampling and analysis for all parameters listed in the Schedules to this licence; and

(ii) any reference measurements for the calibration of automated measurement systems;

shall be carried out in accordance with CEN-standards. If CEN standards are not available, ISO, national or international standards that will ensure the provision of data of an equivalent scientific quality shall apply.

6.3 All automatic monitors and samplers shall be functioning at all times (except during maintenance and calibration) when the activity is being carried on unless alternative sampling or monitoring has been agreed in writing by the Agency for a limited period. In the event of the malfunction of any continuous monitor, the licensee shall contact the Agency as soon as practicable, and alternative sampling and monitoring facilities shall be put in place. The use of alternative equipment, other than in emergency situations, shall be as agreed by the Agency.

6.4 Monitoring and analysis equipment shall be installed, operated and maintained as necessary so that all monitoring accurately reflects the emission/discharge (or ambient conditions where that is the monitoring objective).

6.5 The licensee shall ensure that groundwater monitoring well sampling equipment is available or installed on-site at the installation and is fit for purpose at all times. The sampling equipment shall be to Agency specifications.

6.6 All treatment/abatement and emission control equipment shall be calibrated and maintained in accordance with the instructions issued by the manufacturer/supplier or installer.

6.7 The frequency, methods and scope of monitoring, sampling and analyses, as set out in this licence, may be amended as required or approved by the Agency following evaluation of test results.

6.8 The cellular coffer dam and the steel combi wall shall be properly maintained at all times and shall be inspected at a frequency to be specified in the EMP.

6.9 The fill areas at Graving Dock No. 2 and Berth 52/53 shall, upon completion, be capped and sealed to prevent the infiltration of rainwater.

6.10 The licensee shall prepare a programme, to the satisfaction of the Agency, for the identification and reduction of fugitive emissions using an appropriate combination of best available techniques. This programme shall be included in the Environmental Management Programme.

6.11 The integrity and water tightness of all tanks, bunding structures, containers and underground pipes and their resistance to penetration by water or other materials carried or stored therein shall be tested and demonstrated by the licensee prior to commencement of waste activities. This testing shall be carried out by the licensee at least once every three years thereafter and reported to the Agency on each occasion. This testing shall be carried out in accordance with any guidance published by the Agency. A written record of all integrity tests and any maintenance or remedial work arising from them shall be maintained by the licensee.

6.12 The stormwater drainage system (i.e., gullies, manholes, any visible drainage conduits and such other aspects as may be agreed) shall be visually inspected weekly, and desludged as necessary. Bunds, silt traps and oil separators shall be inspected weekly and desludged as necessary. All sludge and drainage from these operations shall be collected for safe disposal. The drainage system, bunds, silt traps and oil interceptors shall be properly maintained at all times. The licensee shall maintain a drainage map on site. The drainage map shall be reviewed annually and updated as necessary

6.13 Process Effluent

6.13.1 The acute toxicity of the undiluted final effluent to at least four aquatic species from different trophic levels shall be determined by standardised and internationally accepted procedures and carried out by a competent laboratory. The name of the laboratory and the scope of testing to be undertaken shall be submitted, in writing, to the Agency, prior to commencement of waste activities. Once the testing laboratory and the scope of testing have been agreed by the Agency, the Agency shall decide when this testing is to be carried out and copies of the complete reports shall be submitted by the licensee to the Agency within six weeks of completion of the testing.

6.13.2 Having identified the most sensitive species outlined in Condition 6.13.1, subsequent compliance toxicity monitoring shall be carried out on the two most sensitive species by the laboratory identified in Condition 6.13.1. The Agency shall decide when this testing is to be carried out and copies of the complete reports shall be submitted by the licensee to the Agency within six weeks of completion of the testing.

6.13.3 A representative sample of effluent shall be screened for the presence of organic compounds. Such screening shall be repeated at intervals as requested by the Agency thereafter.

6.14 An inspection system for the detection of leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be developed and maintained prior to the commencement of the activity.

6.15 Storm Water

6.15.1 A visual examination of the storm water discharges shall be carried out daily. A log of such inspections, shall be maintained.

6.15.2 The licensee shall, prior to commencement of the activity, establish suitable trigger levels for pH, TOC and suspended solids in storm water discharges, such that storm waters exceeding these levels will be diverted for retention and suitable disposal. The licensee shall have regard to the Environmental Protection Agency "Guidance on the setting of trigger values for storm water discharges to off-site surface waters at EPA IPPC and Waste licensed facilities" when establishing the suitable trigger levels

6.16 Noise

6.16.1 The licensee shall carry out a noise survey of the site operations as required by the Agency, at monitoring locations N1 to N6.

6.16.2 The survey programme shall be undertaken in accordance with the methodology specified in the 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' as published by the Agency.

6.16.3 A suitably qualified Marine Mammal Observer shall be engaged to carry out monitoring during noise-producing activities.

6.16.4 Noise-producing activities shall only take place during daylight hours where visibility provides for effective monitoring.

6.16.5 Noise-producing activities shall be ceased or reduced where required in order to protect the harbour porpoise. The licensee shall implement any recommendations of the Marine Mammal Observer in that regard.

6.17 Dust/Odour Control

6.17.1 In dry weather, site roads and any other areas used by vehicles shall be sprayed with water as and when required to minimise airborne dust nuisance.

6.17.2 The road network in the vicinity of the installation, and between the areas of the installation at Berth 52/53 and Graving Dock No. 2, shall be kept free from any debris caused by vehicles entering or leaving the installation. Any such debris or deposited materials shall be removed without delay.

6.17.3 The licensee shall undertake, as required by the Agency, an odour assessment which shall include as a minimum the identification and quantification of all significant odour sources and an assessment of the suitability and adequacy of the odour abatement systems to deal with these emissions. Any recommendations arising from such an odour assessment shall be implemented.

6.18 Pollutant Release and Transfer Register (PRTR)

The licensee shall prepare and report a PRTR for the site. The substance and/or wastes to be included in the PRTR shall be determined by reference to EC Regulations No. 166/2006 concerning the establishment of the European Pollutant Release and Transfer Register. The PRTR shall be prepared in accordance with any relevant guidelines issued by the Agency and shall be submitted electronically in specified format and as part of the AER.

6.19 The licensee shall, prior to commencement of waste activities, develop and establish a Data Management System for collation, archiving, assessing and graphically presenting the monitoring data generated as a result of this licence.

6.20 There shall be no unauthorised public access to the installation.

6.21 Monitoring Locations

Prior to commencement of waste activities, the licensee shall submit to the Agency an appropriately scaled drawing or drawings showing all the monitoring locations that are stipulated in this licence. The drawing shall include the eight-digit national grid reference of each monitoring point.

6.22 The licensee shall, on a daily basis, inspect the installation and its immediate surrounds for any nuisances caused by litter, vermin, birds, flies, mud, dust and odours. The licensee shall maintain a record of these inspections.

6.23. Groundwater Monitoring

The licensee shall carry out monitoring for relevant hazardous substances in groundwater at the site of the installation. The substances for monitoring shall be identified by the licensee by undertaking a risk based assessment. The risk assessment, sampling and monitoring shall be carried out in accordance with any guidance published by the Agency. The licensee shall have regard to the '*Classification of Hazardous and Non-Hazardous Substances in Groundwater*' as published by the Agency.

6.23.1 Monitoring shall be carried out in accordance with *Schedule C.7 Groundwater Monitoring*, of this licence.

Reason: ***To provide for the protection of the environment by way of treatment and monitoring of emissions.***

Condition 7. Resource Use and Energy Efficiency

7.1 The licensee shall carry out an audit of the energy efficiency of the site within four months of commencement of waste activities. The audit shall be carried out in accordance with the guidance published by the Agency, "Guidance Note on Energy Efficiency Auditing". The energy efficiency audit shall be repeated at intervals as required by the Agency.

7.2 The audit shall identify all practicable opportunities for energy use reduction and efficiency and the recommendations of the audit will be incorporated into the Schedule of Environmental Objectives and Targets under Condition 2 above.

7.3 The licensee shall identify opportunities for reduction in the quantity of water used on site including recycling and reuse initiatives, wherever possible. Reductions in water usage shall be incorporated into Schedule of Environmental Objectives and Targets.

7.4 The licensee shall undertake an assessment of the efficiency of use of raw materials in all processes, having particular regard to the reduction in waste generated. The assessment should take account of best international practice for this type of activity. Where improvements are identified, these shall be incorporated into the Schedule of Environmental Objectives and Targets.

Reason: ***To provide for the efficient use of resources and energy in all site operations.***

Condition 8. Materials Handling

8.1 Leachate from treated waste shall not exceed the limit values specified in *Schedule B.6 Leachate Limits in leachate from treated dredge sediment,* of this licence.

8.2 Where leachate from treated waste exceeds the limit values specified in *Schedule B.6 Leachate Limits in leachate from treated dredge sediment,* of this licence in three consecutive samples, the treated waste shall be deemed unsuitable for fill and shall be excavated for re-treatment or removed off site for appropriate disposal.

8.3 The licensee shall ensure that waste generated in the carrying on of the activity shall be prepared for re-use, recycling or recovery or, where that is not technically or economically possible, disposed of in a manner which will prevent or minimise any impact on the environment.

8.4 Disposal or recovery of waste on-site shall only take place in accordance with the conditions of this licence and in accordance with the appropriate National and European legislation and protocols.

8.5 Waste sent off-site for recovery or disposal

8.5.1 Waste sent off-site for recovery or disposal shall be transported only by an authorised waste contractor. The waste shall be transported from the site of the activity to the site of recovery/disposal only in a manner that will not adversely affect the environment and in accordance with the appropriate National and European legislation and protocols.

8.5.2 Waste sent off-site for recovery or disposal shall be transferred only to an appropriate facility.

8.6 The licensee shall ensure that, in advance of transfer to another person, waste shall be classified, packaged and labelled in accordance with National, European and any other standards which are in force in relation to such labelling.

8.7 The loading and unloading of materials shall be carried out in designated areas protected against spillage and leachate run-off.

8.8 Waste and materials shall be stored in designated areas, protected as may be appropriate against spillage and leachate run-off. The waste and materials shall be clearly labelled and appropriately segregated.

8.9 No waste classified as green list waste in accordance with the EU Shipment of Waste Regulations (Council Regulation EEC No. 1013/2006, as may be amended) shall be consigned for recovery without the agreement of the Agency.

8.10 Waste for disposal/recovery off-site shall be analysed in accordance with *Schedule C: Control & Monitoring,* of this licence.

8.11 Unless approved in writing, in advance, by the Agency the licensee is prohibited from mixing a hazardous waste of one category with a hazardous waste of another category or with any other non-hazardous waste.

8.12 The licensee shall neither import waste into the State nor export waste out of the State except in accordance with the relevant provisions of Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14th June 2006 on shipments of waste and associated national regulations.

8.13 Waste Acceptance Criteria for Treatment and Infill

8.13.1 No waste shall be accepted at the installation other than:

- sediment which has been dredged from the Alexandra Basin; and
- pulverised fuel ash and granulated ground blast furnace slag in such quantities and to the engineering specification required for use in waste treatment.

8.13.2 Recovery of waste by infill at Graving Dock No. 2 and Berth 52/53 shall be limited to treated dredge material that has been treated at the installation.

8.13.3 The licensee shall carry out sampling and testing of the treated dredge material, in accordance with *Schedule C.4: Waste Monitoring*, of this licence, to ensure its acceptability for infill at Graving Dock No. 2 and Berth 52/53.

8.13.4 The treatment of dredge material for the purposes of recovery and use as fill shall take place according to:

- waste treatment procedures to be established in accordance with Condition 2.2.2.8 of this licence; and
- treatment objectives to render the waste suitable for fill.

8.13.5 Any waste deemed unsuitable for treatment or recovery at the installation and/or in contravention of this licence shall be immediately separated and removed from the installation at the earliest possible time. Temporary storage of such wastes shall be in a designated Waste Quarantine Area. Waste shall be stored under appropriate conditions in the quarantine area to avoid putrefaction, odour generation, the attraction of vermin and any other nuisance or objectionable condition.

8.14 Waste and Materials Storage Plan

8.14.1 The licensee shall, prior to commencement of waste activities, establish, maintain and implement a Waste and Materials Storage Plan for all waste stored and held at the installation.

8.14.2 The Waste and Materials Storage Plan shall be reviewed and updated prior to each phase of the treatment activity commencing.

8.14.3 The Waste and Materials Storage Plan shall be adequate to ensure compliance with all conditions of this licence.

8.14.4 The Waste and Materials Storage Plan shall be to the satisfaction of the Agency at all times.

8.14.5 The Waste and Materials Storage Plan shall incorporate:

- a limit on the volume of waste to be stored or held in designated storage areas;
- maximum stockpile sizes in designated storage areas or vessels including maximum volume, height, length, width and area, and minimum separation distances;
- a limit on the maximum storage or holding period for each type of waste in designated storage areas or vessels;
- a drawing or plan of the location of each waste type and the means of storage for each waste type; and
- details of the drainage system super-imposed on the above drawing or plan.

8.14.6 Waste storage and holding practices at the installation shall comply at all times with the Waste Storage Plan.

8.14.7 Waste accepted or generated at the installation shall be stored or held only in designated areas that have been identified in the Waste and Materials Storage Plan.

8.14.8 All designated areas for storage or holding of waste shall be:

- clearly labelled;
- appropriately segregated; and,
- visibly or physically delineated by walls, dividers, painted lines or marks on the ground or other methods acceptable to the Agency.

8.14.9 The Emergency Response Procedure as required under Condition 9 of this licence shall include an up-to-date copy of the Waste and Materials Storage Plan.

Reason: ***To provide for the appropriate handling of material and the protection of the environment.***

Condition 9. Accident Prevention and Emergency Response

9.1 The licensee shall, in advance of the commencement of the activity, ensure that a documented Accident Prevention Procedure is in place that addresses the hazards on-site, particularly in relation to the prevention of accidents with a possible impact on the environment. This procedure shall be reviewed annually and updated as necessary.

9.2 The licensee shall, in advance of the date of commencement of the activity, ensure that a documented Emergency Response Procedure is in place, that addresses any emergency situation which may originate on-site. This procedure shall include provision for minimising the effects of any emergency on the environment. This procedure shall be reviewed annually and updated as necessary.

9.3 Incidents

9.3.1 In the event of an incident the licensee shall immediately:

(i) carry out an investigation to identify the nature, source and cause of the incident and any emission arising therefrom;

(ii) isolate the source of any such emission;

(iii) evaluate the environmental pollution, if any, caused by the incident;

(iv) identify and execute measures to minimise the emissions/malfunction and the effects thereof;

(v) identify the date, time and place of the incident;

(vi) notify the Agency as required by Condition 11.5 of this licence.

9.3.2 Where an incident or accident that significantly affects the environment occurs, the licensee shall, without delay take measures to limit the environmental consequences of the incident or accident and to prevent further incident or accident.

9.4 Emergencies

9.4.1 In the event of a breakdown of equipment or any other occurrence which results in the indefinite closure of the installation, any waste at the installation shall be transferred directly to appropriate landfill sites or any other appropriate facility. Such an event shall be treated as an emergency and rectified as soon as possible.

9.4.2 All significant spillages occurring at the installation shall be treated as an emergency and immediately cleaned up and dealt with so as to alleviate their effects.

9.4.3 No waste shall be burnt within the boundaries of the installation. A fire at the installation shall be treated as an emergency and immediate action shall be taken to extinguish it and notify the appropriate authorities.

9.4.4 In the event that monitoring of local wells indicates that the installation is having a significant adverse effect on the quantity and/or quality of the water supply this shall be treated as an emergency and the licensee shall provide an alternative supply of water to those affected.

Reason: ***To provide for the protection of the environment.***

Condition 10. Closure, Restoration and Aftercare Management

10.1 Following termination, or planned cessation for a period greater than six months, of use or involvement of all or part of the site in the licensed activity, the licensee shall, to the satisfaction of the Agency, decommission, render safe or remove for disposal/recovery any soil, subsoil, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution. A final validation report to include a certificate of completion to demonstrate there is no continuing risk to the environment shall be submitted to the Agency within three months of termination or planned cessation of the activity.

10.2 Closure, Restoration and Aftercare Management Plan (CRAMP)

10.2.1 The licensee shall submit a revised CRAMP for agreement by the Agency prior to commencement of waste activities. The licensee shall maintain a fully detailed and costed plan for the closure, restoration and long-term aftercare of the site or part thereof.

10.2.2 The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the agreement of the Agency.

10.2.3 The licensee shall have regard to the Environmental Protection Agency's Guidance on Assessing and Costing Environmental Liabilities (2014) and, as appropriate, Guidance on Financial Provision (2015), and the baseline report, when implementing Condition 10.2.1 and 10.2.2 above.

10.3 The Closure, Restoration and Aftercare Management Plan (CRAMP) shall include, as a minimum, the following:

(i) a scope statement for the plan;

(ii) the criteria that define the successful closure and restoration and aftercare of the activity or part thereof, which ensures minimum impact on the environment;

(iii) a programme to achieve the stated criteria;

(iv) where relevant, a test programme to demonstrate the successful implementation of the plan;

(v) details of the long term supervision, monitoring, control, maintenance and reporting requirements for the restored facility; and

(vi) details of the costings for the plan and the financial provisions to underwrite those costs.

Reason: ***To make provision for the proper closure of the activity ensuring protection of the environment.***

Condition 11. Notification, Records and Reports

11.1 The licensee shall submit the reports, proposals and submissions required by this licence by the deadlines specified. The licensee shall not be in compliance with the requirements of this condition unless and until it has submitted every report, proposal and submission, the deadline for which has passed.

11.2 The licensee shall carry out every action required by the Agency, and arising out of such reports, proposals or submission, by such deadline as the Agency may specify. The licensee shall not be in compliance with the requirements of this condition unless and until it has carried out every such action.

11.3 The licensee shall notify the Agency, in a format as may be specified by the Agency, one month in advance of the intended date of commencement of the Scheduled Activity.

11.4 The licensee shall notify the Agency of the date when the Scheduled Activities were completed and the maintenance and aftercare phase commenced.

11.5 The licensee shall notify the Agency by both telephone and either email or webform, to the Agency's headquarters in Wexford, or to such other Agency office as may be specified by the Agency, as soon as practicable after the occurrence of any of the following:

(i) an incident or accident as defined by the Glossary;

(ii) any release of environmental significance to atmosphere from any potential emissions point including bypasses;

(iii) any breach of one or more of the conditions attached to this licence;

(iv) any malfunction or breakdown of key environmental abatement, control or monitoring equipment set out in *Schedule C: Control and Monitoring*, of this licence which is likely to lead to loss of control of the abatement system; and

(v) any incident or accident as defined in the glossary requiring an emergency response by the Local Authority.

The licensee shall include as part of the notification, date and time of the incident, summary details of the occurrence, and where available, the steps taken to minimise any emissions. All details required to be communicated must be in accordance with any Guidance provided by the Agency.

11.6 The following shall be notified, as soon as practicable after the occurrence of any incident which relates to a discharge to water:

(i) Department of Agriculture, Food and the Marine in the case of discharges to receiving waters.

(ii) The local authority, in the case of discharges to designated bathing waters

11.7 The licensee shall make a record of any notification made under Condition 11.3 and 11.4. This record shall include details of the nature, extent, and impact of, and circumstances giving rise to, the incident or accident. The record shall include all corrective actions taken to manage the incident or accident, minimise wastes generated and the effect on the environment, and avoid recurrence. In the case of a breach of a condition, the record shall include measures to restore compliance.

11.8 The licensee shall record all complaints of an environmental nature related to the operation of the activity. Each such record shall give details of the date and time of the complaint, the name of the complainant (if provided), and give details of the nature of the complaint. A record shall also be kept of the response made in the case of each complaint.

11.9 The licensee shall record all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence and all other such monitoring which relates to the environmental performance of the installation.

11.10 The licensee shall as a minimum ensure that the following documents are accessible at the site:

(i) the licences relating to the installation;

(ii) the current EMS for the installation including all associated procedures, reports, records and other documents;

(iii) the previous year's AER for the installation;

(iv) records of all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence and all other such monitoring which relates to the environmental performance of the installation;

(v) relevant correspondence with the Agency;

(vi) up-to-date site drawings/plans showing the location of key process and environmental infrastructure, including monitoring locations and emission points;

(vii) up-to-date Standard Operational Procedures for all processes, plant and equipment necessary to give effect to this licence or otherwise to ensure that standard operation of such processes, plant or equipment does not result in unauthorised emissions to the environment;

(viii) any elements of the licence application or EIS documentation referenced in this licence.

(ix) corrective and preventive actions undertaken; and,

(x) all records of audits.

This documentation shall be available to the Agency for inspection at all reasonable times.

11.11 The licensee shall submit to the Agency, by the 31st March of each year, an AER covering the previous calendar year. This report, which shall be to the satisfaction of the Agency, shall include as a minimum the information specified in *Schedule D: Annual Environmental Report,* of this licence and shall be prepared in accordance with any relevant guidelines issued by the Agency.

11.12 A full record, which shall be open to inspection by authorised persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall be maintained on a monthly basis and shall as a minimum contain details of the following:

(i) the tonnages and LoW Code for the waste materials imported and/or sent off-site for disposal/recovery;

(ii) the names of the agent and carrier of the waste, and their waste collection permit details, if required (to include issuing authority and vehicle registration number);

(iii) details of the ultimate disposal/recovery destination facility for the waste and its appropriateness to accept the consigned waste stream, to include its permit/licence details and issuing authority, if required;

(iv) written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site;

(v) details of all waste consigned abroad for Recovery and classified as 'Green' in accordance with the EU Shipment of Waste Regulations (Council Regulation EEC No. 1013/2006, as may be amended). The rationale for the classification must form part of the record;

(vi) details of any rejected consignments;

(vii) details of any approved waste mixing;

(viii) the results of any waste analyses required under *Schedule C: Control & Monitoring*, of this licence; and

(ix) the tonnage and LoW Code for the waste materials recovered/disposed on-site.

11.13 The licensee shall submit report(s) as required by the conditions of this licence to the Agency's Headquarters in Wexford, or to such other Agency office as may be specified by the Agency.

11.14 All reports shall be certified accurate and representative by the installation manager or a nominated, suitably qualified and experienced deputy.

11.15 The licensee shall maintain a computer based record for each load of waste arriving at and departing from the installation. The licensee shall record the following:

(i) the date and time;

(ii) the name of the carrier (other than waste unloaded from a barge);

(iii) the waste collection permit number or transfrontier shipment notification and tracking/movement numbers (other than waste unloaded from a barge);

(iv) the vehicle registration number (other than waste unloaded from a barge);

(v) the trailer, skip or other container unique identification number (where relevant);

(vi) the name of the producer/collector of the waste as appropriate (other than waste unloaded from a barge);

(vii) the name of the facility from which the load originated (other than waste unloaded from a barge);

(viii) a description of the waste including the associated LoW Codes;

(ix) the quantity of the waste, recorded in tonnes;

(x) the name of the person checking the load;

(xi) where loads or wastes are removed or rejected, details of the date of occurrence, the types of waste and the facility to which they were removed including the waste licence and waste permit register number of these facilities; and

(xii) where applicable a consignment note number (including transfrontier shipment notification and movement/tracking form numbers, as appropriate).

11.16 The licensee shall maintain a computer based record of each consignment of trade effluent, leachate and contaminated storm water removed from the installation. The record shall include the following:

(i) the name of the carrier;

(ii) the date and time of removal of trade effluent, leachate and/or contaminated storm water from the installation;

(iii) the volume of trade effluent, leachate or contaminated storm water, in cubic metres, removed from the installation on each occasion;

(iv) the name and address of the wastewater treatment plant to which the trade effluent, leachate or contaminated storm water was transported; and

(v) any incidents or spillages of trade effluent, leachate or contaminated storm water during its removal or transportation.

11.17 A record shall be kept at the installation of the programme for the control and eradication of vermin and fly infestations at the installation. A report on the programme shall be prepared and submitted to the Agency as part of the AER.

Reason: ***To provide for the collection and reporting of adequate information on the activity.***

Condition 12. Financial Charges and Provisions

12.1 Agency Charges

12.1.1 The licensee shall pay to the Agency an annual contribution of €9,702, or such sum as the Agency from time to time determines, having regard to variations in the extent of reporting, auditing, inspection, sampling and analysis or other functions carried out by the Agency, towards the cost of monitoring the activity as the Agency considers necessary for the performance of its functions under the Environmental Protection Agency Act 1992 as amended. The first payment shall be a pro-rata amount for the period from the date of commencement of enforcement to the 31st day of December, and shall be paid to the Agency within one month from the date of grant of the licence. In subsequent years the licensee shall pay to the Agency such revised annual contribution as the Agency shall from time to time consider necessary to enable performance by the Agency of its relevant functions under the Environmental Protection Agency Act 1992 as amended, and all such payments shall be made within one month of the date upon which demanded by the Agency.

12.1.2 In the event that the frequency or extent of monitoring or other functions carried out by the Agency needs to be increased, the licensee shall contribute such sums as determined by the Agency to defray its costs in regard to items not covered by the said annual contribution.

12.2 Environmental Liabilities

12.2.1 The licensee shall as part of the AER, provide an annual statement as to the measures taken or adopted at the site in relation to the prevention of environmental damage, and the financial provisions in place, as appropriate in relation to the underwriting of costs for remedial actions following anticipated events (including closure) or accidents/incidents, as may be associated with the carrying on of the activity.

12.2.2 The licensee shall arrange for the revision, by an independent and appropriately qualified consultant, of the comprehensive and fully costed revised Environmental Liabilities Risk Assessment (ELRA) which addresses the liabilities from past and present activities. The assessment shall include those liabilities and costs identified in Condition 10 for execution of the CRAMP. A report on this assessment shall be submitted for approval and agreement by the Agency in advance of the commencement of the activity. The ELRA shall be reviewed as necessary to reflect any significant change on site, and in any case every three years following initial agreement. Review results are to be notified as part of the AER.

12.2.3 The licensee shall, prior to commencement of the activity and to the satisfaction of the Agency, make financial provision to cover any liabilities associated with the operation (including closure, restoration and aftercare). The amount of financial provision held shall be reviewed and revised as necessary, but at least annually. Proof of renewal or revision of such financial indemnity shall be included in the annual 'Statement of Measures' report identified in Condition 12.2.1.

12.2.4 The licensee shall revise the cost of closure, restoration and aftercare annually and any adjustments shall be reflected in the financial provision made under Condition 12.2.3.

12.2.5 The licensee shall have regard to the Environmental Protection Agency's Guidance on Assessing and Costing Environmental Liabilities (2014) and Guidance on Financial

TG

Provision (2015) and the baseline report when implementing Conditions 12.2.2, 12.2.3 and 12.2.4 above.

Reason:	***To provide for adequate financing for monitoring and financial provisions for measures to protect the environment***

SCHEDULE A: Limitations

A.1 Waste Processes

The following waste related processes are authorised:

- Storage of waste, including imported waste to be used in the waste treatment process
- Treatment of waste (contaminated dredge material)
- Recovery of treated waste by infill within the installation
- Treatment of contaminated process water

No additions to these processes are permitted unless agreed in advance by the Agency.

A.2 Waste Acceptance

Table A.2 Waste Categories and Quantities

LoW Codes	Waste Type	Maximum (Lifetime Recovery Objective)
17 05 05*	Dredging spoil containing hazardous substances	1,262,800 tonnes Note 1
17 05 06	Dredging spoil other than those mentioned in 17 05 05.	
-	Materials required for treatment of dredged materials including pulverised fuel ash and granulated ground blast furnace slag	As required for use in waste treatment

Note 1: Based on 574,000m^3 of infill after stabilisation (470,000m^3 of dredge spoil) and an approximate density of 2.2 tonnes per cubic metre conversion. The maximum may be exceeded, subject to the Agency's agreement if the licensee demonstrates through measurements that the density is greater than 2.2 or if additional quantities of stabilisation materials are needed.

SCHEDULE B: Emission Limits

B.1 Emissions to Air

There shall be no emissions to air of environmental significance.

B.2 Emissions to Water

Emission Point Reference No: WW1 (Phase 1, Phase 2 and Phase 3)
WW2

Name of Receiving Waters: Liffey Estuary Lower

Location: WW1 Phase 1 – E320547; N234320
WW1 Phase 2 – E320489; N234621
WW1 Phase 3 – E320460; N234305
WW2 – E318401; N234634

Volume to be emitted: Maximum Total Combined from WW1 & WW2 in any one day: 6.9 litres/second

Parameter	Emission Limit Value (mg/l)
Suspended Solids	35
Metals	
TBT	0.000014
Nickel	0.318
Mercury	0.00065
Arsenic	0.17
Cadmium	0.004
Chromium VI	0.299
Copper	0.047
Lead	0.131
Zinc	0.374

B.3 Emissions to Sewer

There shall be no process effluent emissions to sewer.

B.4 Noise Emissions

Daytime dB $L_{A1,T}$ (30 minutes)	Evening time dB $L_{A1,T}$ (30 minutes)	Night-time dB $L_{Aeq,T}$ (15-30 minutes)
55	50	45[Note 1]

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise-sensitive location.

B.5 Dust Deposition Limits

Level ($mg/m^2/day$)[Note 1]
350

Note 1: 30 day composite sample with the results expressed as $mg/m^2/day$.

B.6 Leachate Limits in leachate from treated dredge sediment

Parameter	Leachate Limit (mg/l)
Tributyltin	1.42×10^{-4}
Nickel	6.09

SCHEDULE C: Control & Monitoring

C.1.1. Control of Emissions to Air

There shall be no emissions to air of environmental significance.

C.1.2. Monitoring of Emissions to Air

There shall be no emissions to air of environmental significance.

C.2.1. Control of Emissions to Water

Emission Point Reference No:	WW1 & WW2
Description of Treatment:	Settlement, separation and filtration

C.2.2. Monitoring of Emissions to Water

Emission Point Reference No: WW1 & WW2

Control Parameter	Monitoring Frequency [Note 2]	Key Equipment/Technique
Flow	Continuous/Daily [Note 1]	On-line flow meter with recorder
Temperature	Continuous	On-line temperature probe with recorder
pH	Continuous	pH electrode/meter with recorder
TOC	Continuous	On-line TOC meter with recorder
Suspended Solids	Daily	Standard Method
Total Dissolved Solids	Daily	Standard Method
Ammonia (as N)	Daily	Standard Method
Total Phosphorus (as P)	Weekly	Standard Method
Phenols	Monthly	Standard Method
Metals [Note 3]	Weekly for first month after commencement and monthly thereafter	Standard Method
PAHs	Monthly	Standard Method
PCBs	Monthly	Standard Method
Petroleum hydrocarbons	Monthly	Standard Method
Organic Compounds [Note 4]	Monthly	Standard Method
Toxicity [Note 5]	As may be required by the Agency	As may be agreed by the Agency
Other [Note 6]	As may be required by the Agency	As may be agreed by the Agency

Note 1: Total effluent discharged over the 24 hour period in which the composite sample is collected shall be recorded.
Note 2: All samples shall be collected on a 24 hour flow proportional composite sampling basis.
Note 3: Arsenic, Cadmium, Chromium VI, Copper, Lead, Mercury, Nickel, Zinc, Tributyl tin.
Note 4: Screening for priority pollutant list substances (such as US EPA volatile and/or semi-volatile compounds). This analysis shall include those organic solvents in use in the process, which are likely through normal process operators to be diverted to the wastewater streams.
Note 5: The number of toxic units (Tu) = 100/x hour EC/LC_{50} in percentage vol/vol so that higher Tu values reflect greater levels of toxicity. For test regimes where species death is not easily detected, immobilisation is considered equivalent to death.
Note 6: Any parameters as may be required by the Agency.

C.2.3. Marine Water Monitoring in the Liffey Estuary

Monitoring Locations:

SW1	E318004; N234301
SW2	E320683; N233872
SW3	E321313; N234225

As per Drawing No. IBR0668/126 of the application

Control Parameter	Monitoring Frequency	Key Equipment/Technique
Suspended Solids	Continuous	Standard Methods
Turbidity	Continuous	Standard Methods
Temperature	Continuous	Standard Methods
Dissolved Oxygen	Daily	Standard Methods
Metals **Arsenic** **Cadmium** **Chromium** **Copper** **Lead** **Mercury** **Nickel** **Zinc** **Tributyl tin** **Polyaromatic hydrocarbons (PAHs)** **Polychlorinated biphenyls (PCBs)** **Petroleum hydrocarbons** [Note 1]	During construction works: • Daily After construction works: • Weekly for first month after completion • Monthly for subsequent 12 months • Annually thereafter	Standard Methods

Note 1: During construction works only.

C.2.4. Monitoring of Storm Water Emissions

Emission Point Reference No: SWO1 and SWO2

Location: SWO1 at Graving Dock No. 2
SWO2 at Berth 52/53

Parameter	Monitoring Frequency	Analysis Method/Technique
Visual Inspection	Daily	Sample and examine for colour and odour
pH	Weekly	Standard method
TOC	Weekly	Standard method
Temperature	Weekly	Standard method
Suspended Solids	Weekly	Standard method
Metals [Note 1] **PAHs** **PCBs** **Petroleum hydrocarbons** [Note 2]	During construction works: • Weekly After construction works: • Monthly for subsequent 12 months • Annually thereafter [Note 4]	Standard method
Other [Note 3]	As may be required by the Agency	As may be agreed by the Agency

Note 1: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Tributyl tin.
Note 2: During construction works only.
Note 3: Any parameters as may be required by the Agency.
Note 4: Unless otherwise agreed by the Agency.

C.3.1. Control of Emissions to Sewer

There shall be no process effluent emissions to sewer.

C.3.2. Monitoring of Emissions to Sewer

There shall be no process effluent emissions to Sewer.

C.4 Waste Monitoring

Waste Class	Frequency	Parameters	Method
Treated dredge sediment (leachate test)	• After each change to the recipe for the treatment mix and • In any case every 1,000 m^3 Leachate samples will be tested at 1, 2, 4 and 9 days.	Nickel Tributyl tin	Standard Method
Other [Note 1]			

Note 1: Analytical requirements to be determined on a case by case basis.

C.5 Noise Monitoring

Location:

N1	E318616; N234021
N2	E317971; N234596
N4	E319074; N233924
N5	E318936; N233122
N6	E318622; N234060

Period	Minimum Survey Duration
Daytime	A minimum of 3 sampling periods at each noise monitoring location [Note 2]
Evening-time	A minimum of 1 sampling period at each noise monitoring location.
Night-time [Note 1]	A minimum of 2 sampling periods at each noise monitoring location.

Note 1: Night-time measurements should be made between 2300hrs and 0400hrs, Sunday to Thursday, with 2300hrs being the preferred start time.

Note 2: Sampling period is to be the time period T stated as per *Schedule B.4 Noise Emissions,* of this licence. This applies to day, evening and night time periods.

C.6 Ambient Monitoring

C.6.1 Dust Deposition

Location:

DS1	E318375; N234856
DS2	E318516; N234644
DS3	E320308; N234567
DS4	E320665; N234304

Parameter	Monitoring Frequency	Analysis Method/Technique
Dust deposition	Monthly during construction works	Bergerhoff Method

C.7 Groundwater Monitoring

Location:	GW1	E318362; N234702
	GW2	E318362; N234813
	GW4	E318490; N234817
	GW5	E318475; N234671
	GW6	E320303; N234299
	GW7	E320344; N234481
	GW8	E320351; N234618
	GW10	E320564; N234584
	GW12	E320569; N234375

Parameter	Monitoring Frequency	Analysis Method/Techniques
PH	During construction works: • Monthly After construction works: • Annually for first five years after completion • Every five years thereafter	pH electrode/meter
COD		Standard Method
Nitrate		Standard Method
Total Ammonia		Standard Method
Total Nitrogen		Standard Method
Conductivity		Standard Method
Chloride		Standard Method
Fluoride		Standard Method
Relevant Hazardous Substances Note1		Standard Method

Note 1: Groundwater monitoring for relevant hazardous substances shall be in accordance with Condition 6.23.

SCHEDULE D: Specified Engineering Works

Specified Engineering Works
Installation of waste handling and processing infrastructure.
Installation of waste water treatment plant.
Relocation of plant and equipment as the phases of the licensable activity progress.
Capping of infill areas.
Any other works notified in writing by the Agency.

SCHEDULE E: Annual Environmental Report

Annual Environmental Report Content [Note 1]
Emissions from the installation.
Waste management record.
Resource consumption summary.
Complaints summary.
Schedule of Environmental Objectives and Targets.
Environmental management programme – report for previous year.
Environmental management programme – proposal for current year.
Pollutant Release and Transfer Register – report for previous year.
Pollutant Release and Transfer Register – proposal for current year.
Noise monitoring report summary.
Ambient monitoring summary.
Tank and pipeline assessment report.
Reported incidents summary.
Energy efficiency audit report summary.
Report on the assessment of the efficiency of use of raw materials in processes and the reduction in waste generated.
Report on progress made and proposals being developed to minimise water demand and the volume of trade effluent discharges.
Development/Infrastructural works summary (completed in previous year or prepared for current year).
Reports on financial provision made under this licence, management and staffing structure of the installation, and a programme for public information.
Review of Closure, Restoration & Aftercare Management Plan.
Statement of measures in relation to prevention of environmental damage and remedial actions (Environmental Liabilities).
Environmental Liabilities Risk Assessment Review (every three years or more frequently as dictated by relevant on-site change including financial provisions).
Any other items specified by the Agency.

Note 1: Content may be revised subject to the approval of the Agency.

Sealed by the seal of the Agency on this the 14th day of February 2019.

PRESENT when the seal of the Agency
Was affixed hereto:

Tara Gillen

Tara Gillen Authorised Person

TG

Results

2019
2020
2021
2022
2023
2024

9 boreholes were installed around two areas for infilling

EPA licence (P-1022-02) provides for the permission to treat by stabilisation/solidification (S/S) and recovery of contaminated dredge sediments as part of the Alexandra Basin Redevelopment Project. The waste being treated comprises contaminated sediment dredged from the Alexandra Basin. The treated waste is being recovered by infilling at two locations within the Dublin Port area; at Graving Dock No. 2 and at Berths 52/53. A total of 1,262,800 tonnes of dredge sediment will be treated and recovered over the lifetime of the activity. The current phase of works (treatment of contaminated dredge sediments) commenced in September 2019 and ceased in December 2021. To date infilling of treated sediments has been undertaken at Graving Dock No.2 and some shallow in filling at Berth 52/53. A temporary bund was constructed at Berth 52/53 with 50,811 m^3 of treated dredge sediment being stored. This bund was capped with HDPE liner. In order to close Berth 52/53 the quay wall is being extended. This required the relocation of the temporary bund and treated stored material northwards. This work was undertaken in 2023. The remaining treatment and works will be completed at a later date.


GW2A&B
Ds1
GW4-C
GW
GW1A&B
GW
GW5C-S
GW5C-D
GW
Ds2
WWC
SWD 1
N2
SW1


GW8A&B
GW10A&B
GW7A&B
GW12C-S
GW12C-D
GW6A&B
GW
WW1 Ph 2
WW1 Ph 3
WW1 Ph 1
SWO 2A
DS3
DS5
DS4

Table 4. Results of Heavy Metal and Tributyl Tin Laboratory Analysis on Samples taken from Groundwater Monitoring Wells at Graving Dock 2 and Berth 52/53 in Dublin Port (31.07.19).

		METALS														ORGANOTINS	
Parameter		**Cadmium (Cd)**		**Chromium (Cr)**		**Chromium (Cr) Hexavalent**		**Copper (Cu)**	**Lead (Pb)**		**Nickel (Ni)**		**Mercury (Hg)**		**Zinc (Zn)**		**Tributyl tin (Low Level)**	
Lab name		7440-43-9		7440-47-3		18540-29-9		7440-50-8	7439-92-1		7440-02-0		7439-97-6		7440-66-6		**5225**	
Units		ug/l		ug/l		ug/l		ug/l	ug/l		ug/l		ug/l		ug/l		ng/l	
Limits		**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**
S.I. No. 122 of 2014 European Union (Drinking Water) Regulations 2014		5	#N/A	50	#N/A	#N/A	#N/A	2000	10	#N/A	20	#N/A	1	#N/A	#N/A	#N/A	#N/A	#N/A
EPA Guideline Values - From Interim Report on 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland'.		5	#N/A	30	#N/A	#N/A	#N/A	30	10	#N/A	20	#N/A	1	#N/A	100	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) 2010		#N/A	#N/A	37.5	#N/A	#N/A	#N/A	#N/A	18.75	#N/A	15	#N/A	0.75	#N/A	#N/A	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) Statutory Instrument No. 9, 2016.		#N/A	#N/A	37.5	#N/A	7.5	#N/A	1500	7.5	#N/A	#N/A	#N/A	0.75	#N/A	75	#N/A	#N/A	#N/A
LocationDetails.Loc	**Date**	*5*	*#N/A*	*30*	*#N/A*	*#N/A*	*#N/A*	*30*	*10*	*#N/A*	*20*	*#N/A*	*1*	*#N/A*	*100*	*#N/A*	*#N/A*	*#N/A*
GW10-01 Deep	31/07/2019	0.41		200		< 0.10		140	< 1.0		1.9		< 0.010		40		0.078	
GW10-01 Shallow	31/07/2019	0.57		200		< 0.10		130	< 1.0		2.6		< 0.010		41		0.1	
GW1-01 Deep	31/07/2019	0.58		180		< 0.10		110	< 1.0		3.9		< 0.010		52		0.16	
GW1-01 Shallow	31/07/2019	0.52		34		< 0.10		20	< 1.0		8.5		< 0.010		28		0.19	
GW12-01 Deep	31/07/2019	0.52		190		< 0.10		120	< 1.0		6.0		< 0.010		43		0.089	
GW12-01 Shallow	31/07/2019	0.31		190		< 0.10		140	< 1.0		< 1.0		< 0.010		54		17	
GW2-01 Deep	31/07/2019	< 0.080		11		< 0.10		4.9	< 1.0		1.8		< 0.010		14		0.21	
GW4	31/07/2019	0.090		19		0.16		12	< 1.0		3.2		< 0.010		12		0.26	
GW6-01 Deep	31/07/2019	0.20		200		< 0.10		140	1.1		3.6		< 0.010		57		0.16	
GW6-01 Shallow	31/07/2019	0.26		190		< 0.10		130	1.9		5.1		< 0.010		53		0.17	
GW7-01 Deep	31/07/2019	0.15		160		< 0.10		98	1.4		2.2		< 0.010		57		0.097	
GW7-01 Shallow	31/07/2019	0.43		210		< 0.10		140	4.2		< 1.0		< 0.010		62		0.16	
GW8-01 Deep	31/07/2019	0.080		150		< 0.10		88	< 1.0		4.5		< 0.010		23		0.13	
GW1-01 Shallow	27/08/2019	0.81		56		<1.0		21	<1.0		8.4		<0.010		19		0.0008	

Table A1.6 Results of VOCs Laboratory Analysis on Samples taken from Groundwater Monitoring Wells at Graving Dock 2 and Berth 52/53 in Dublin Port (11.12.19). Part 4

Parameter			VOCs																			
			1,3-Dichlorobenzene		1,4-Dichlorobenzene		sec-Butylbenzene		tert-Butylbenzene		1,2-Dichlorobenzene		n-Butylbenzene		1,2-Dibromo-3-chloropropane		1,2,4-Trichlorobenzene		1,2,3-Trichlorobenzene		Hexachlorobutadiene		Chloroethane	
Lab name			541-73-1		106-46-7		135-98-8		98-06-6		95-50-1		104-51-8		96-12-8		120-82-1		87-61-6		87-68-3		75-00-3	
Units			ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
Limits			Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
S.I. No. 122 of 2014 European Union (Drinking Water) Regulations 2014	*Parametric Values*		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
EPA Guideline Values - From Interim Report on 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland'.	*Parametric & Indicator Values*		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3	#N/A	#N/A	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) 2010			#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) Statutory Instrument No. 9, 2016.	*Threshold Values*		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LocationDetails.Locatio	Date	Type	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*3*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*
GW1-01 Shallow	11/12/2019	EW	< 1.0		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	
GW1-01 Deep	11/12/2019	EW	< 0.50		< 1.0		< 1.0		< 1.0		< 0.50		< 1.0		< 50		< 0.50		< 2.0		< 0.50		< 2.0	
GW2-01 Deep	11/12/2019	EW	< 1.0		< 0.50		< 1.0		< 1.0		< 0.50		< 1.0		< 50		< 0.50		< 2.0		< 1.0		< 2.0	
GW4	11/12/2019	EW	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	
GW5-01 Deep	11/12/2019	EW	< 1.0		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 0.50		< 2.0		< 1.0		< 2.0	
GW6-01 Shallow	11/12/2019	EW	< 0.50		< 0.50		< 1.0		< 1.0		< 0.50		< 1.0		< 50		< 0.50		< 2.0		< 1.0		< 2.0	
GW6-01 Deep	11/12/2019	EW	< 0.50		< 0.50		< 1.0		< 1.0		< 0.50		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	
GW7-01 Deep	11/12/2019	EW	< 1.0		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	
GW8-01 Shallow	11/12/2019	EW	< 0.50		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 0.50		< 2.0		< 0.50		< 2.0	
GW8-01 Deep	11/12/2019	EW	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 0.50		< 2.0		< 1.0		< 2.0	
GW10-01 Deep	11/12/2019	EW	< 0.50		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	
GW12-01 Shallow	11/12/2019	EW	< 0.50		< 0.50		< 1.0		< 1.0		< 1.0		< 1.0		< 50		< 1.0		< 2.0		< 1.0		< 2.0	
GW12-01 Deep	11/12/2019	EW	< 0.50		< 1.0		< 1.0		< 1.0		< 0.50		< 1.0		< 50		< 1.0		< 2.0		< 0.50		< 2.0	

450

Pink Highlight indicates where EC Environmental Objectives (Groundwater Regulations) 2010 and Statutory Instrument No. 9, 2016. values were exceeded

< **= Less than**

#N/A **Not Applicable**

Table A2.4 Results of sVOCs Laboratory Analysis on Samples taken from Groundwater Monitoring Wells at Graving Dock 2 and Berth 52/53 in Dublin Port (31.05.21).

Parameter	VOCs
Unit	
LOD/LOR	
Accreditation	
S.I. No. 9 of 2010 Groundwater Regulations (Threshold Values)	
S.I. No. 272 of 2009 - European Communities Environmental Objectives (Surface Water) Regulations	
S.I. No. 272 of 2009 - European Communities Environmental Objectives (Groundwater) Regulations	
Interim Guidelines for Bathing Water Quality 2008	

Table A3.5 Results of sVOC Laboratory Analysis on Samples taken from Groundwater Monitoring Wells at Graving Dock 2 and Berth 52/53 in Dublin Port (28.02.22)

Parameter				3-Nitroaniline		4-Nitroaniline		N-Nitrosodimethylamine		2,4-Dinitrotoluene		2,6-Dinitrotoluene		Bis(2-chloroethyl)ether		Bis(2-Chloroisopropyl)Ether		4-Bromophenylphenylether		4-Chlorophenylphenylether		Hexachloroethane		Hexachlorobutadiene		Hexchlorocyclopentadiene		Bis(2-chloroethoxy)methane		N-nitrosodi-n-propylamine	
Lab name				99-09-2		100-01-6		P1451		121-14-2		606-20-2		111-44-4		39638-32-9		101-55-3		7005-72-3		67-72-1		87-68-3		77-47-4		111-91-1		621-67-7	
Units				ug/l		ug/l		#N/A		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		#N/A	
Limits				Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
S.I. No. 122 of 2014 European Union (Drinking Water) Regulations 2014			*Parametric Values*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
EPA Guideline Values - From Interim Report on 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland'.			*Parametric & Indicator Values*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) 2010				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
EC Environmental Objectives (Groundwater Regulations) Statutory Instrument No. 9, 2016.			*Threshold Values*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LocationDetails.	**DateTimeSample**	**Date**	Type	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*	*#N/A*
GW10-01 Deep	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW1-01 Shallow	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW2-01 Deep	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW4	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW5	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW6-01 Deep	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW6-01 Shallow	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW7-01 Deep	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW8-01 Deep	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW8-01 Shallow	31/01/2022 12:00	31/01/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW1-01 Deep	04/02/2022 12:00	04/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW12-01 Deep	04/02/2022 12:00	04/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW10-01 Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW1-01 Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW1-01 Shallow	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW12-01 Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW2-01-Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW4	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW5	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW6-01 Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW6-01 Shallow	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	
GW7-01-Deep	28/02/2022 12:00	28/02/2022	EW	<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50		<0.50	

450 **Pink Highlight indicates where EC Environmental Objectives (Groundwater Regulations) 2010 and Statutory Instrument No. 9, 2016. values were exceeded**

< **= Less than**

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650353	1650354	1650355	1650356	1650357	1650358	1650359	1650360
			Client Sample ID.:		GW1A	GW1B	GW2A	GW6A	GW6B	GW7B	GW8A	GW8B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	U	1010		N/A	7.9	7.4	7.8	7.2	7.3	7.5	7.7	7.5
Electrical Conductivity	U	1020	µS/cm	1.0	1600	43000	1600	42000	44000	41000	38000	33000
Chemical Oxygen Demand	U	1100	mg O2/l	10	[B] 13	[B] 130	[B] 32	[B] 130	[B] 130	[B] 120	[B] 100	[B] 86
Chloride	U	1220	mg/l	1.0	290	19000	310	19000	20000	18000	17000	14000
Fluoride	U	1220	mg/l	0.050	0.67	0.91	0.80	0.81	1.0	0.74	0.66	1.0
Ammonia (Free)	N	1220	mg/l	0.050	< 0.050	< 0.050	0.39	< 0.050	0.079	0.10	< 0.050	0.072
Nitrate as NO3	U	1220	mg/l	0.50	32	< 0.50	< 0.50	< 0.50	< 0.50	1.3	< 0.50	< 0.50
Nitrogen (Total)	N	1340	mg/l	5.0	8.4	< 5.0	15	< 5.0	10	14	< 5.0	5.5
Arsenic (Dissolved)	U	1455	µg/l	0.20	1.1	5.0	6.1	4.6	12	1.5	2.7	8.3
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	0.25	< 0.11	0.32	< 0.11	0.19	0.35	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	2.3	1.1	0.85	3.4	0.78	0.58	0.52	0.62
Copper (Dissolved)	U	1455	µg/l	0.50	2.1	1.5	1.3	2.0	< 0.50	1.5	1.5	< 0.50
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	1.6	3.6	1.8	0.89	1.5	1.3	2.3	5.4
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.78	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	< 2.5	6.3	6.1	14	20	9.5	36	28
Low-Level Chromium (Hexavalent)	U	1495	µg/l	0.10	[B] 0.52	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650353	1650354	1650355	1650356	1650357	1650358	1650359	1650360
			Client Sample ID.:		GW1A	GW1B	GW2A	GW6A	GW6B	GW7B	GW8A	GW8B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650353	1650354	1650355	1650356	1650357	1650358	1650359	1650360
			Client Sample ID.:		GW1A	GW1B	GW2A	GW6A	GW6B	GW7B	GW8A	GW8B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650353	1650354	1650355	1650356	1650357	1650358	1650359	1650360
			Client Sample ID.:		GW1A	GW1B	GW2A	GW6A	GW6B	GW7B	GW8A	GW8B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650353	1650354	1650355	1650356	1650357	1650358	1650359	1650360
			Client Sample ID.:		GW1A	GW1B	GW2A	GW6A	GW6B	GW7B	GW8A	GW8B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
PCB 90+101	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 congeners)	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Organotins suite waters	SN		µg/l	1.000	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650361	1650362	1650363
			Client Sample ID.:		GW10A	GW10B	GW12B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		11:25	11:25	12:00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
pH	U	1010		N/A	7.5	7.7	7.6
Electrical Conductivity	U	1020	µS/cm	1.0	44000	41000	45000
Chemical Oxygen Demand	U	1100	mg O2/l	10	[B] 98	[B] 110	[B] 100
Chloride	U	1220	mg/l	1.0	19000	18000	20000
Fluoride	U	1220	mg/l	0.050	0.89	0.86	0.94
Ammonia (Free)	N	1220	mg/l	0.050	< 0.050	0.38	< 0.050
Nitrate as NO3	U	1220	mg/l	0.50	< 0.50	< 0.50	< 0.50
Nitrogen (Total)	N	1340	mg/l	5.0	< 5.0	12	< 5.0
Arsenic (Dissolved)	U	1455	µg/l	0.20	4.6	24	7.5
Cadmium (Dissolved)	U	1455	µg/l	0.11	0.30	1.6	0.13
Chromium (Dissolved)	U	1455	µg/l	0.50	0.94	0.78	1.7
Copper (Dissolved)	U	1455	µg/l	0.50	1.1	7.0	1.3
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	1.5	12	1.4
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	29	11	6.6
Low-Level Chromium (Hexavalent)	U	1495	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650361	1650362	1650363
			Client Sample ID.:		GW10A	GW10B	GW12B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		11:25	11:25	12:00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650361	1650362	1650363
			Client Sample ID.:		GW10A	GW10B	GW12B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		11:25	11:25	12:00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650361	1650362	1650363
			Client Sample ID.:		GW10A	GW10B	GW12B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		11:25	11:25	12:00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0
PCB 28	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
PCB 52	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010

Results - Water

Project: IBR1448 Dublin Port

Client: RPS			**Chemtest Job No.:**		23-18694	23-18694	23-18694
Quotation No.: Q23-30015			**Chemtest Sample ID.:**		1650361	1650362	1650363
			Client Sample ID.:		GW10A	GW10B	GW12B
			Sample Location:		Dublin Port	Dublin Port	Dublin Port
			Sample Type:		WATER	WATER	WATER
			Date Sampled:		30-May-2023	30-May-2023	30-May-2023
			Time Sampled:		11:25	11:25	12:00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
PCB 90+101	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
PCB 118	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
PCB 153	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
PCB 138	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
PCB 180	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 congeners)	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010
Organotins suite waters	SN		µg/l	1.000	See Attached	See Attached	See Attached

Results Summary

Report No.: 23-04030-1

Customer Reference: Not Supplied

Customer Order No: 24843

Customer Sample No	**1650353**	**1650354**	**1650355**	**1650356**	**1650357**	**1650358**	**1650359**	**1650360**	**1650361**	**1650362**	**1650363**
RPS Sample No	24329	24330	24331	24332	24333	24334	24335	24336	24337	24338	24339
Sample Type	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Matrix	W	W	W	W	W	W	W	W	W	W	W
Sampling Date	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023	30/05/2023
Sampling Time	9:25	9:25	12:30	12:40	12:50	12:25	10:50	10:50	11:25	11:25	12:00

Determinand	CAS No	Codes	SOP	RL	Units											
tributyltin (TBT)	36643-28-4	SN	in house	0.06	ng/L	< 0.20	< 0.20	8.60	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.90
dibutyltin (DBT)	1002-53-5	SN	in house	0.2	ng/L	< 0.2	0.3	1.1	< 0.2	< 0.2	< 0.2	0.2	< 0.2	< 0.2	< 0.2	0.5

Results - Water

Project: IBR1345 Dublin Port

Client: RPS		Chemtest Job No.:	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	Min	Max
Quotation No.: Q24-34655		Chemtest Sample ID.:	1910446	1910447	1910448	1910449	1910450	1910451	1910452	1910453	1910454	1910455	1910456	1910457	1910458	1910459	1910460		
		Client Sample ID.:	GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D		
		Sample Location:	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port		
		Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER		
		Sample Sub Type:																	
		Date Sampled:	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**														
pH at 20C		U	1010		4.0	8.4	7.9	7.9	8.7	7.7	7.9	8.0	7.9	8.0	8.3	8.3	8.1	8.4	8.1	8.0	7.70	8.70
Electrical Conductivity at 25C		U	1020	µS/cm	1.0	1200	3100	200	2000	1500	39000	41000	42000	33000	17000	32000	39000	30000	42000	42000	200.00	42000.00
Chemical Oxygen Demand		U	1100	mg O2/l	10	< 10	90	26	22	110	28	140	150	120	100	70	200	140	95	88	< 10	200.00
Chloride		U	1220	mg/l	1.0	130	13000	170	360	47	610	17000	17000	16000	14000	6500	16000	12000	19000	19000	47.00	19000.00
Fluoride		U	1220	mg/l	0.050	0.78	0.86	0.76	0.83	0.72	1.0	0.80	1.0	0.77	0.68	0.84	0.87	0.85	0.86	0.83	0.68	1.00
Ammonia (Free)		N	1220	mg/l	0.050	0.27	0.11	0.48	0.95	0.060	< 0.050	< 0.050	0.75	0.35	0.16	0.43	0.078	1.7	0.082	0.16	< 0.050	1.70
Nitrate as NO3		U	1220	mg/l	0.50	20	< 0.50	< 0.50	2.7	< 0.50	23	< 0.50	1.5	< 0.50	< 0.50	7.9	< 0.50	0.61	< 0.50	< 0.50	0.61	23.00
Nitrogen (Total)		N	1340	mg/l	5.0	8.5	< 5.0	15	9.9	< 5.0	7.3	< 5.0	11	5.2	< 5.0	14	< 5.0	11	< 5.0	< 5.0	< 5.0	15.00
Arsenic (Dissolved)		U	1455	µg/l	0.20	0.74	7.2	1.6	0.41	6.5	2.6	9.8	9.3	3.5	6.0	5.8	6.0	36	13	3.2	0.41	36.00
Cadmium (Dissolved)		U	1455	µg/l	0.11	< 0.11	0.45	< 0.11	< 0.11	< 0.11	< 0.11	0.47	< 0.11	< 0.11	< 0.11	< 0.11	0.30	< 0.11	0.38	< 0.11	< 0.11	0.47
Chromium (Dissolved)		U	1455	µg/l	0.50	< 0.50	23	< 0.50	< 0.50	< 0.50	< 0.50	25	25	25	23	25	25	25	25	25	< 0.50	25.00
Copper (Dissolved)		U	1455	µg/l	0.50	1.7	2.8	< 0.50	1.3	< 0.50	2.1	3.9	1.9	1.3	1.8	10	2.5	3.6	3.4	1.9	< 0.50	10.00
Mercury (Dissolved)		U	1455	µg/l	0.05	< 0.05	0.10	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.09	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10
Nickel (Dissolved)		U	1455	µg/l	0.50	1.0	18	0.92	1.5	0.84	0.96	15	16	15	16	20	13	14	13	12	0.84	20.00
Lead (Dissolved)		U	1455	µg/l	0.50	< 0.50	0.99	0.53	< 0.50	< 0.50	< 0.50	0.71	0.65	0.69	1.7	1.9	0.72	0.59	0.82	0.94	< 0.50	1.90
Zinc (Dissolved)		U	1455	µg/l	2.5	7.4	11	4.9	17	9.8	25	32	26	10	35	36	22	6.2	27	22	4.90	36.00
Chromium (Hexavalent)		U	1490	µg/l	20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	< 20	< 20
Total TPH >C6-C40	EH_1D_Total	U	1670	µg/l	10	< 10	< 10	< 10	< 10	42000	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	42000
Dichlorodifluoromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Water

Project: IBR1345 Dublin Port

Client: RPS		Chemtest Job No.:	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	Min	Max
Quotation No.: Q24-34655		Chemtest Sample ID.:	1910446	1910447	1910448	1910449	1910450	1910451	1910452	1910453	1910454	1910455	1910456	1910457	1910458	1910459	1910460		
		Client Sample ID.:	GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D		
		Sample Location:	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port		
		Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER		
		Sample Sub Type:																	
		Date Sampled:	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**														
1,2-Dichloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene		N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene		N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane		N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Water

Project: IBR1345 Dublin Port

Client: RPS		**Chemtest Job No.:**	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327
Quotation No.: Q24-34655		**Chemtest Sample ID.:**	1910446	1910447	1910448	1910449	1910450	1910451	1910452	1910453	1910454	1910455	1910456	1910457	1910458	1910459	1910460
		Client Sample ID.:	GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D
		Sample Location:	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port
		Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Sample Sub Type:															
		Date Sampled:	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024

Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**															**Min**	**Max**
1,2-Dibromo-3-Chloropropane		U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: IBR1345 Dublin Port

Client: RPS			**Chemtest Job No.:**	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	**Min**	**Max**
Quotation No.: Q24-34655			**Chemtest Sample ID.:**	1910446	1910447	1910448	1910449	1910450	1910451	1910452	1910453	1910454	1910455	1910456	1910457	1910458	1910459	1910460			
			Client Sample ID.:	GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D			
			Sample Location:	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port			
			Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER			
			Sample Sub Type:																		
			Date Sampled:	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024			
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**																
2,6-Dinitrotoluene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: IBR1345 Dublin Port

Client: RPS		Chemtest Job No.:	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	24-41327	Min	Max
Quotation No.: Q24-34655		Chemtest Sample ID.:	1910446	1910447	1910448	1910449	1910450	1910451	1910452	1910453	1910454	1910455	1910456	1910457	1910458	1910459	1910460		
		Client Sample ID.:	GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D		
		Sample Location:	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port	Dublin Port		
		Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER		
		Sample Sub Type:																	
		Date Sampled:	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024	12-Dec-2024		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**														
Phenanthrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	7.8	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	7.80
Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	7.8	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	7.80
Benzo[a]anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	[C] < 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	16	< 2.0	< 2.0	[C] < 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	16.00
PCB 28		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 52		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 101		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 153		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 138		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 180		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (7 congeners)		N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

						GW1A	GW1B	GW2A	GW2B	GW4C	GW5C-D	GW6A	GW6B	GW7B	GW8A	GW8B	GW10A	GW10B	GW12C-S	GW12C-D		
tributyltin (TBT)				ng/L	< 0.20	< 0.20	2.3	0.3	0.3	4.3	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.3	< 0.20	< 0.20	4.3

Results Summary

Report No.: 24-10496-1

Customer Reference: Not Supplied

Customer Order No: 28177

Customer Sample No	**1910446**	**1910447**	**1910448**	**1910449**	**1910450**	**1910451**	**1910452**		**1910454**	**1910455**	
RPS Sample No	79543	79544	79545	79546	79547	79548	79549		79550	79551	
Sample Type	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**		**WATER**	**WATER**	
Sample Matrix	W	W	W	W	W	W	W		W	W	
Sampling Date	12/12/2024	12/12/2024	12/12/2024	12/12/2024	12/12/2024	12/12/2024	12/12/2024		12/12/2024	12/12/2024	
Determinand	**CAS No**	**Codes**	**SOP**	**RL**	**Units**						
tributyltin (TBT)	36643-28-4	SIN	SUB08	0.2	ng/L	< 0.20	2.30	0.30	0.30	4.30	< 0.20	< 0.20		< 0.20	< 0.20
dibutyltin (DBT)	1002-53-5	SIN	SUB08	0.2	ng/L	< 0.20	1.10	0.20	0.40	0.50	0.30	< 0.20		< 0.20	0.30

Results Summary

Report No.: 24-10496-1

Customer Reference: Not Supplied

Customer Order No: 28177

Customer Sample No						**1910456**	**1910457**	**1910458**	**1910459**
RPS Sample No						79552	79553	79554	79555
Sample Type						**WATER**	**WATER**	**WATER**	**WATER**
Sample Matrix						W	W	W	W
Sampling Date						12/12/2024	12/12/2024	12/12/2024	12/12/2024
Determinand	**CAS No**	**Codes**	**SOP**	**RL**	**Units**				
tributyltin (TBT)	36643-28-4	SIN	SUB08	0.2	ng/L	< 0.20	< 0.20	< 0.20	0.30
dibutyltin (DBT)	1002-53-5	SIN	SUB08	0.2	ng/L	0.40	0.30	< 0.20	0.80