SOIL & WATER BASELINE REPORT

2019 IED LICENCE APPLICATION

Technical Report Prepared For

Indaver Ireland Limited.

Technical Report Prepared By

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EXECUTIVE SUMMARY

This soil and groundwater quality baseline report has been completed as part of Indaver Ireland Limited's IED licence application. The report has been prepared in compliance with *European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions.*

The relevant hazardous substances (substances stored or used onsite and which are classified as hazardous by the EPA under the Groundwater Regulations and contained in bulk storage) are Ammonium Hydroxide (NH_4OH) Solution, Light Fuel Oil, Aqueous Waste, Flue Gas residues and Boiler Ash. These were identified as hazards present at the site which have the potential to impact soil and groundwater if not adequately mitigated during storage and operation at the plant.

A review of containment and mitigation measures at the facility confirms that the risk of a contamination event resulting in soil or ground water is low. These measures include firefighting systems, closed drainage and containment systems, and spill management procedures.

A review of the site history confirmed that the only previous use for the site was agriculture and potentially some quarrying. The site wraps around an existing facility Hammond Lane Metal Company.

Much of the site will be hard paved reducing the potential for vertical migration to ground. Storage and transport routes have a closed drainage system which ultimately discharges through an interceptor system to an attenuation tank with a shut of valve in the event of contamination being identified during monitoring. Receptors include the aquifer, and Cork harbour. A conceptual site model (CSM) has been presented for the site based on the historical baseline data and additional soil data collected in 2018.

A review of soil and groundwater quality from the 2000/2001 and 2018 baseline assessment confirms that there is no evidence of soil or groundwater contamination at the site.

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) was appointed by Indaver Ireland Limited to complete a screening assessment for a baseline report (and subsequent baseline report) for the planned resource recovery centre in Ringaskiddy, Co. Cork. This report is to accompany an application to the Environmental Protection Agency (EPA) for an IE licence.

This report was completed in accordance with European Commission guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions.

Due to the prescriptive requirements of this assessment, the following report relies on data/surveys collected as part of the EIAR as well as additional data collected specifically for the purposes of completing this assessment in accordance with the Directive.

1.1 Description of Site

The site is currently undeveloped. It is located approximately 15km to the south-east of Cork City, in the townland of Ringaskiddy on the Ringaskiddy Peninsula in the lower part of Cork harbour, 800m east of the village of Ringaskiddy. The L2545 (main road from Ringaskiddy village to Haulbowline Island) forms the northern boundary of the site. The eastern boundary of the site extends to the foreshore of Cork harbour along Gobby Beach. The lands to the immediate south and west are in agricultural use. The site surrounds the Hammond Lane Metal Recycling Co Ltd facility. The site location is presented in Drawing CD5001-Site Location of the licence application.

1.2 Limitations of the Report

The conclusions presented in this report are professional opinions based solely on the tasks outlined herein and the information made available to AWN. They are intended for the purpose outlined herein and for the indicated site and project. Furthermore, this report is produced solely for the benefit of Indaver Ireland Limited to address an EPA requirement for a licence application.

This report may not be relied upon by any other party without explicit agreement from AWN. Opinions and recommendations presented herein apply to the site conditions existing at the time of the recently completed field work and subsequent assessment. They cannot apply to changes at the site of which AWN is not aware and has not had the opportunity to evaluate. This report is intended for use in its entirety; no excerpt may be taken to be representative of this baseline assessment. All work carried out in preparing this report has utilised and is based on AWN professional knowledge and understanding of the current relevant Irish and European Community standards, codes, and legislation.

2.0 Methodology

2.1 Methodology Outlined

Table 5 of the Guidance (European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions), outlines

the requirements for this report. These requirements form the methodology adopted for this report which is outlined below as Stages 1 to 8.

- Stage 1 Identifying the potential hazardous substances that are currently used, produced, or released at the site
- Stage 2 Identifying the relevant hazardous substances i.e. those which have the potential to cause soil and groundwater contamination
- Stage 3 Assessment of the site-specific pollution risk
- Stage 4 Site History
- Stage 5 Environmental Setting
- Stage 6 Conceptual Site Model
- Stage 7 Site Investigation – Soil & Water Quality Assessment
- Stage 8 Production of the Baseline Report.

2.2 Sources of Information

Reference is made in this report to information from a number of existing data sources and reports including the following:

- Ringaskiddy Resource Recovery Centre, Environmental Impact Assessment Report Arup, 2019;
- Geological Survey of Ireland (GSI): On-line mapping resources, available at www.gsi.ie including *inter alia* groundwater well database, Karst feature database, geology, aquifer classification and vulnerability;
- Geology Survey of Ireland (GSI) (2016) Summary of Initial Characterisation, Groundwater Body Descriptions available at www.gsi.ie;
- Environmental Protection Agency (EPA) Catchments data: available at https://www.catchments.ie/;
- Latest EPA *Envision* water quality monitoring data for watercourses in the area: On-line data resources available at http://gis.epa.ie/Envision/;
- National Parks & Wildlife Service (NPWS): On-line data resources available at http://webgis.npws.ie/npwsviewer/;
- National River Basin Management Plan, 2018;
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).

2.3 Scope of Work Undertaken

The scope of the work undertaken for this assessment included the following:

- A desktop review of regional and site geology and hydrogeology.
- Review of available soil and groundwater quality data.
- Review of bulk liquid storage at the site and assessment in terms of likely impact to receiving waters.
- Onsite soil quality investigation.

3.0 STAGE 1 & 2 – IDENTIFYING SUBSTANCES OF CONCERN

This section summarises the hazardous substances that are proposed for storage, in at the planned facility. A full list of substances is presented in Attachment 4-6-2 *Raw Materials, Intermediates and Products.* The bulk liquids to be stored on site are presented in Table 3.1.

Material	Volume stored	Nature of use	Hazard Statement
Ammonia Solution (25% v/v)	80m^3	Neutralise the NO_x present in the flue gas	H400
Diesel	60 m^3	Control heating/cooling of the furnace	H411
Aqueous Waste	250m^3	Storage prior to treatment	

Table 3.1: Bulk liquid storage (hazardous) to the environment stored on site

Our review shows that apart from the bulk liquid storage described above all other storage of chemicals which could be hazardous to the environment are stored within drums or smaller containers on a concrete floor area within the warehouse and small volumes within the self-bunded chemstores adjacent to the tipping hall. Bottom ash, boiler ash and flue gas cleaning residues are generated within the process and are fully contained in steel silos within the main process building and on a concrete floor in the bottom ash building.

Table 3.2 summarises the explanations of Hazard Risk Phrases identified for each chemical listed in table 3.1. In reference to the risk to the soil and water environment the Hazard Statements used to classify the environmental hazard rating (*Only those relevant to Indaver and the water environment are listed*). H400-413 refers specifically to the aquatic environment.

Hazard Statements	Description
H400	Very toxic to aquatic life
H411	Toxic to aquatic life with long-lasting effect

Table 3.2: *Hazardous Status Description*

A summary of the planned bulk storage at the proposed facility is outlined below.

Light Fuel Oil

Light fuel oil will be stored in the southwestern section of the site in the dedicated delivery area. The tank has a capacity of 60m^3 and will be a double skinned construction with leak and overfill protection. The tank is located in a dedicated delivery area.

Smaller volumes of fuel oil are also used for the firewater pumps (c. 3 x 1.5m^3 tanks), and the emergency generator (7m^3 tank).

Ammonia

The ammonia utilised on site is classified as Ammonium Hydroxide (NH_4OH) Solution (25%) which has an environmental hazard rating identified as 'Very toxic to aquatic organisms'.

The Ammonia storage tank has a capacity of 80m^3 and is located in the south western section of the site and is located in a dedicated delivery area. The tank is a double skinned stainless-steel type of construction with leak and overfill protection.

Aqueous Waste

The aqueous waste storage tank will have an operational capacity of 250m^3. The tank will be single skinned and contained within a concrete bund. The liquid comprises dilute effluent with traces of pharmaceutical active (e.g from pharmaceutical wash waters) and other contaminants. Tankers containing aqueous waste will be directed to the unloading area after waste acceptance and initial weighing.

Bottom ash, Boiler ash and Flue gas cleaning residues

Bottom ash, boiler ash and flue gas cleaning residues will be generated from the different process stages at the site. All ash is contained within the internal structure of the building and will not be discharged to the stormwater system on site.

Additional protection is provided by the following measures; manned loading and all dispensing of ash to collection trucks is undertaken in coordination with the collection truck driver. Spill containment procedures are in place in the event of an ash spill. Boiler ash and flue gas cleaning residue transport systems and tanks are fully enclosed.

The bottom ash is quenched in a water bath upon discharge from the furnace. In the event of a release of water from the wet bath, spilled material will be contained in the area and any material reaching indoor drains will be contained in the internal drainage recovery tanks where the water can be removed for treatment or reused within the treatment process. The wet bath will be inspected and maintained as part of the site's maintenance programme.

As such the Bottom ash, Boiler ash and Flue gas cleaning residues are screened out.

4.0 STAGE 3 – ASSESSMENT OF SITE-SPECIFIC POLLUTION RISK

This section includes a review of the containment measures proposed for potential hazardous substances and potential conduits for migration at the site.

4.1 Containment Systems and Procedures

Storage and transport routes have a closed drainage system which ultimately discharges surface water through a class 1 Full Retention interceptor system to firewater retention tank (with a shut off valve) which drains into a stormwater attenuation tank prior to discharge off the site (with a shut off valve). The discharge from the attenuation tank will be monitored continuously for TOC, pH and conductivity and will be sampled for any other parameters required by the EPA licencing procedures. Continuous monitoring will also be in place on the inlet to the firewater retention tank and any exceedances will trigger the automatic isolation of the firewater tank from the attenuation tank.

The following containment arrangements are planned to be in place at the site to prevent any accidental release of hazardous substances, including substances that may be hazardous to the environment:

- The ammonia solution and light fuel oil tanks are double skinned with leak detection systems and have over-fill protection in the form of level switches/ interlocks.
- The bulk storage tanks are located on hard standing ground.

- The drainage channel in the delivery area, where the light fuel oil and the ammonia solution are unloaded, are planned to discharge to a Class 1 by-pass petrol interceptor (where any oil spills can be separated or partially contained if required) via a 2m^3 holding tank which will be isolated during loading and unloading operations in this area.
- A separate unloading area will be provided for the aqueous waste deliveries adjacent to the aqueous waste storage tank. This area will be fully contained and will have the capacity to contain the full contents (25m^3) of a tanker.
- All run-off from the road and hardstand area drain direct to the firewater retention tank which is to be monitored continuously. In the event of an out of specification reading, this tank can be isolated from the stormwater attenuation tank and the water removed. The arrangement allows for the roof run-off to discharge independently via the stormwater attenuation tank. Monitoring will also take place at the outlet of the stormwater attenuation tank. If required, the outlet valve will be closed automatically and contaminated water from either tank removed by tanker to the aqueous waste tank for appropriate disposal.
- The ammonia solution and light fuel oil pipelines run on over ground tray racks above hardstanding areas to the process building. There are no underground process lines at the facility.
- All containers storing materials that are hazardous to the environment are stored over paved areas and chem store units with spill trays are used for any chemical stores in the contractors' compound (warehouse area).
- Drains will be painted for high visibility and in accordance with conditions set out in the final IED Licence.
- The waste bunker which extends below ground is designed to be water-retaining and will have concrete walls over 1 metre thick.

The firewater retention tank has a capacity of 1,690 m^3 and should this capacity be exceeded the system will overflow to the surface water attenuation tank (capacity 1,250 m^3).

4.2 Surface Water Drainage

Drawing CD5013-Drainage Plan of the application presents the site drainage. A combined surface water tank (attenuation tank) and a firewater retention tank will be installed prior to discharge from the site. Both tanks will be located underground beneath the administration car park to the west of the main entrance.

A dedicated surface water drainage network will collect and convey all the service yard run-off to the Firewater Retention Tank (Tank 01) with a capacity of 1,690m^3 via one of two Class 1 full retention hydrocarbon interceptors. A second dedicated drainage network will collect and convey all runoff from all roof areas and discharge them direct to the Stormwater Attenuation Tank (Tank 02) with a capacity of 1,250 m^3.

The tanker unloading area (for ammonia and fuel oil), which is located adjacent to the fuel tank in the south east of the site, will be provided with cut-off drains to collect and minor spillage that may occur during loading of the fuel and ammonia tanks. A local holding tank with a 2 m^3 capacity will be provided for local collection. The outlet valve of the holding tank will be closed during any tanker unloading operation. If a spillage occurs during a loading or unloading operation, the spilled liquid will be collected in the holding tank. The contents of the tank will be pumped out and disposed of appropriately. When the unloading operation is complete, if no spillage has occurred,

the valve will be opened in the direction of a forecourt interceptor and then on to the main stormwater networks on site.

4.3 Wastewater Drainage lines

Domestic sewage from toilets, changing and kitchen areas will discharge via the foul drainage system and will be pumped directly to the Irish Water sewer located east of Ringaskiddy Village, which will then be pumped to the Shanbally Wastewater Treatment Plant (WWTP).

4.4 Summary of Stages 1 to 3

Stages 1 to 3 of the Baseline Assessment have concluded that the Indaver site will store three bulk tanks of chemicals which have potential to be hazardous to the environment. Bottom Ash, boiler ash and FGC residues are retained in bulk on site but are in solid form and are at a low risk of discharging to ground/stormwater. There are sufficient containment measures in place to ensure that the risk to the soil and water environments is minimised. A Stage 4 to 8 assessment has been completed below.

5.0 STAGE 4 – SITE HISTORY

5.1 Prior Use

This section includes an evaluation of the likelihood of the presence of any contamination on soil/ groundwater at the site and an overview of the site history.

The site has not previously been developed. Significant areas of infill are noted to the north of the site but no significant infill was noted on site and some toward the adjacent site, Hammond Lane Metal Company. Historical and recent groundwater quality (range of parameters based on use for a metal processing facility) for this site have been reviewed (Appendix B) and no evidence of significant contamination has been identified.

There is a steep escarpment in the centre of the site, aligning in a north east to south west direction. The EIA states that anecdotal evidence suggest that the site was used as a source of material for land reclamation elsewhere in Ringaskiddy and that this accounts for the escarpment.

Aerial Imagery from the Ordnance Survey Ireland (OSi) and historic maps (refer Figure 5.1-5.3) were analysed and do not show any prior land use besides agricultural purposes at the site.



Figure 5.1 *OSi Aerial Image (1837) (source www.osi.ie)*

No change in land use is noted in follow on 1880-1913 mapping. Aerial photography from 1995 show that the site remained undeveloped.



Figure 5.2 *OSi Aerial Image (1995) (source www.osi.ie)*

6.0 STAGE 5 - ENVIRONMENTAL SETTING

This section includes an assessment of the likely fate of any spill/leak event based on the topography, soil, and groundwater characteristics at the location. Based on the findings of Stages 1 to 4 above, the location where hazardous substances are stored has also been assessed with regard to confirming source-pathway-receptor linkages i.e. in the unlikely event of a leakage/spillage.

The following information includes data/surveys that were carried out as part of the EIAR as well as additional information collected specifically for the purpose of completing the Baseline in accordance with the Directive.

6.1 Topography

The topography of the site varies considerably. In the south of the site the levels vary from c.10 m OD to 41mOD. In the North of the site the ground levels vary from c. 2.05m OD to c. 4 mOD. There is a steep escarpment in the centre of the site, aligning in a north east to south west direction.

6.2 Hydrology

The closest surface water feature to the development is the West Channel of Cork Harbour, which is adjacent to the eastern boundary of the site. (refer to Figure 6.1). The online EPA envision mapping (consulted December 2018) shows the water quality in Cork Harbour to be “unpolluted”.

The undeveloped site is drained through natural channels along field boundaries following the natural topography towards the north east. The relatively flat and low lying areas in the north of the site, to the east and west of the Hammond Lane facility are more poorly drained, with ponding noted in winter. This is most likely due to the gradient and presence of thicker low permeability glacial deposits in this area.



Figure 6.1 Regional Hydrology

6.2.1 Surface Water Quality

Available data for 2018 (Dec 7th) from the EPA on-line mapping database Envision is presented confirms the coastal water body risk score for Cork Harbour IE SW 060_0000 is “under review”. The water quality status is determined as “Good”.

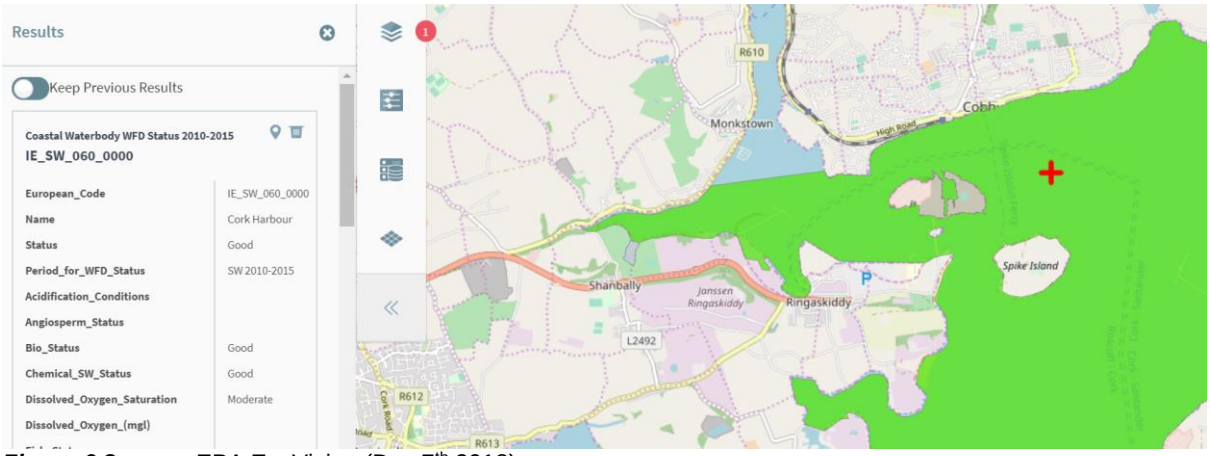


Figure 6.2 EPA EnvVision (Dec 7th 2018)

6.2.2 Flood Risk

The potential risk of flooding on the site was also assessed within the EIS prepared for planning. A summary of the findings of the flood risk assessment are:
The risk of fluvial flooding or groundwater flooding is low. The site lies within Flood Zone C and is therefore suitable for this type of development.

The 1 in 200-year design tidal level could result in localised flooding along Gobby beach car park and small areas of the site which are below 2.73 m OD. The proposed development includes raised site levels and road levels to avoid this risk in the future.

6.3 Geology & Hydrogeology

6.3.1 Geology

Information obtained from the GSI (2018) indicates a sequence of different lithological groups within the area surrounding the site. As shown in figure 6.4 below, the site is underlain by Lower Carboniferous marine interbedded grey/brown sandstone, siltstone and mudstone referred to as the Cuskinny Formation of the Kinsale group.



Figure 6.4 Site Geology (GSI, 2018)

Site investigations confirmed pale green Mudstone/green grey fine grained Sandstone. Depth to bedrock varies across the site, from 0.3 m below ground level (bgl) in the centre of the site, to 10.1 m bgl in the east of the site. Bedrock encountered in trial pits TP1, TP2, TP 3, TP 7 TP9 and TP 10 and the top metre of bedrock in the monitoring boreholes at Hammond Land was described as weathered.

6.3.2 Soils & Subsoils

Figure 6.5 presents the GSI description of soil and subsoil types predominantly at and surrounding the Indaver site. According to the GSI (2018), the natural subsoil type located at the site is predominantly glacial tills (carboniferous limestone till).



Figure 6.5: *Subsoil (GSI, 2018)*

The Teagasc Subsoils Map shows that that the region is predominantly till derived from Devonian sandstones, with some areas of till derived from Namurian shales and sandstones and from Carboniferous limestone. The EPA soil mapping classifies the upper soil profile as acid brown earths that are glacial in origin derived from Old Red Sandstones and Carboniferous Limestone.

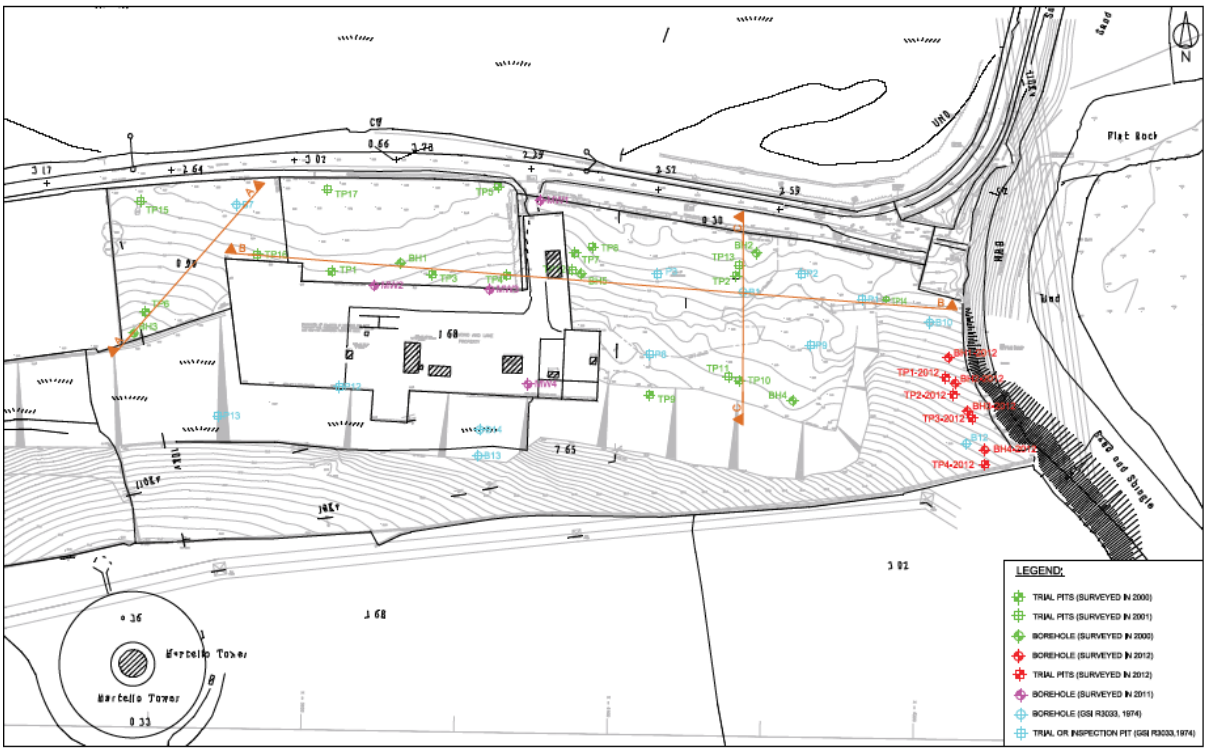


Figure 6.6a Site Investigation Locations 2001 (BH 1-BH 5) to 2012 (TP1-TP4 and BH1-BH4)

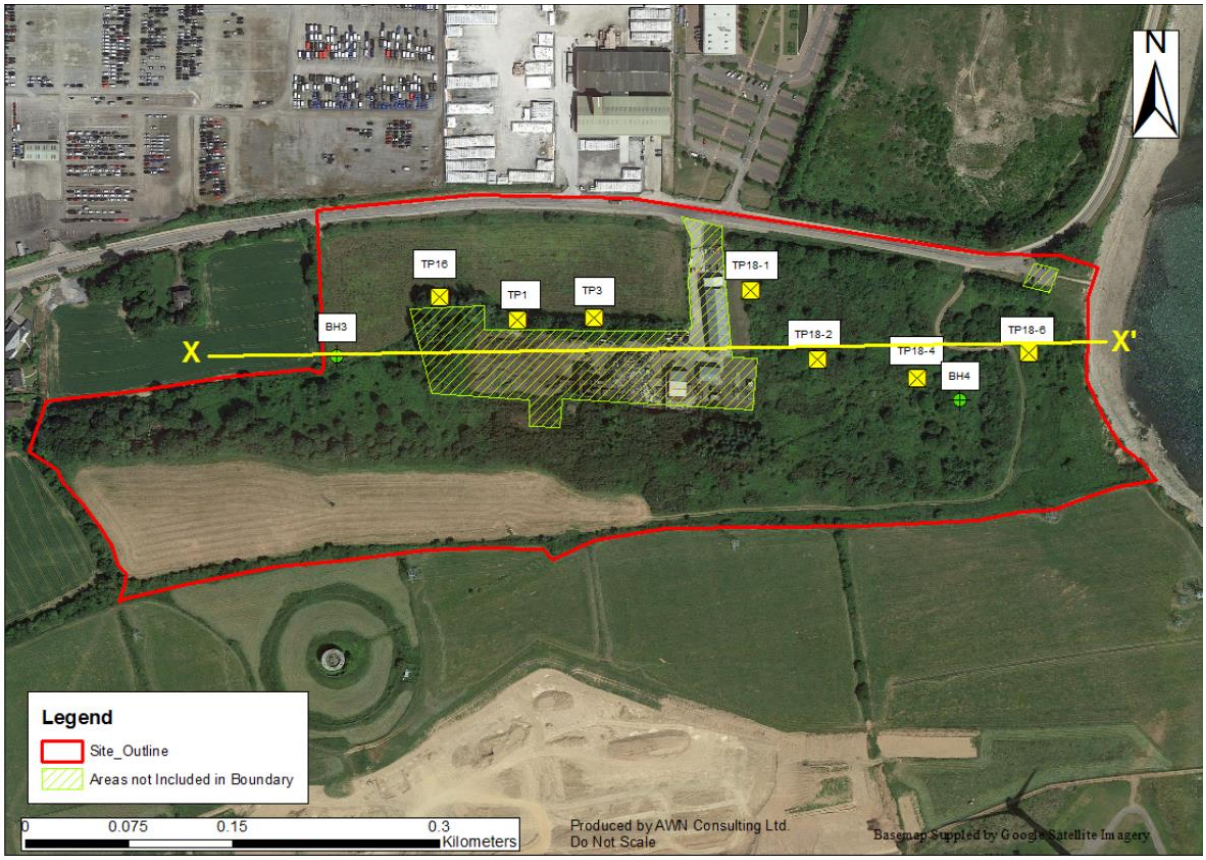


Figure 6.6b *Site Investigation Locations 2018*

Seventeen trial pits (TP1-TP17) and five monitoring boreholes (BH1 to BH5) were completed during the 2000 and 2001 investigations (K.T. Cullen & Co. Ltd. 2001). The trial pits were excavated to depths ranging from 1.0m and 5.6 m below ground level and the boreholes reached depths between 7.6m and 15.0 m bgl respectively. Information was also derived from site investigations on the adjacent site, Hammond Lane Metal company. Four boreholes (MW1 to MW 4) were installed in 2011 to depths between 10.0m and 14.0m bgl. Seven additional boreholes (TP18-1- TP18-7) were excavated to 2 m bgl in November 2018. These latter trial pits are located beneath the footprint of the proposed plant.

Topsoil overlies brown gravelly Clay and brown gravelly Silt beneath the Indaver site. Pockets of localised Sand and Made ground were also encountered on the adjacent Hammond Lane site.

Figure 6.7 below presents a schematic cross section for the site based on a collation of the available dataset.

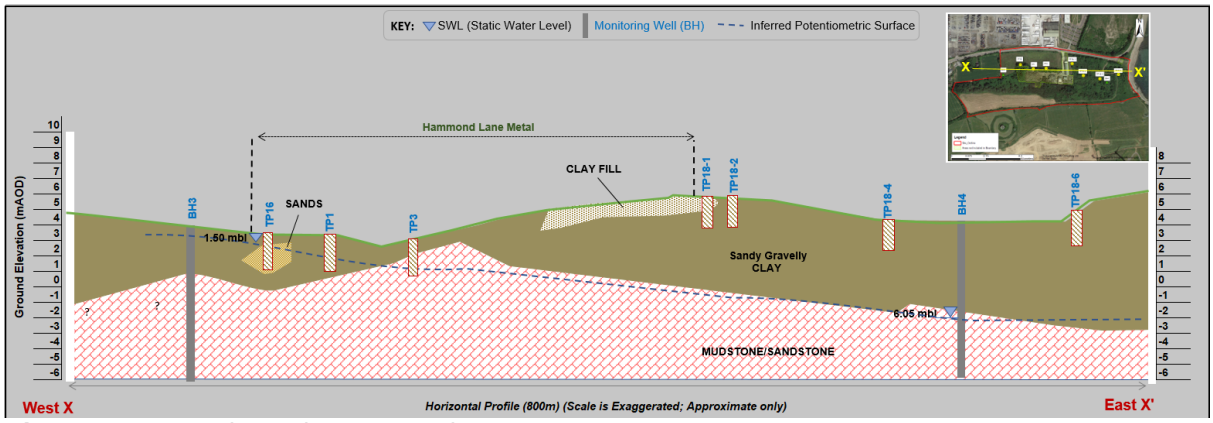


Figure 6.7 Schematic cross section.

6.3.3 Soil Quality

Seven representative soil samples were collected during the soil investigation undertaken in 2018 (TP18-1-TP18-7). The samples were sent to Exova Environmental Forensics laboratory in the UK for analysis. The parameters selected covered a broad range of potential contaminants based on the surrounding land use and future use of the facility. This included metals, Volatile Organic Compounds (VOCs), Semi Volatile Organic Compounds (SVOCs), Polychlorinated BiPhenols (PCBs) and hydrocarbons (EPH CWG).

There are no legislated threshold values for soils in Ireland. As such soil samples were compared to a Generic Assessment Criteria (GAC) derived to be protective of human health, water bodies (including groundwater) and also ecology for a resident and commercial/industrial end use.

Generic Assessment Criteria in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. LQM (Land Quality Management) and the CIEH (Chartered Institute of Environmental Health) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial/industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM/CIEH Suitable 4 Use Level (S4UL). The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently -derived and cautious "trigger values" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils. A prudent approach has been taken by considering the lower 1% SOM content.

The results indicated that there was no significant soil contamination at the site. All results were below the threshold for land suitable for commercial use. Laboratory results compared with threshold concentrations are tabulated in Appendix B.

6.3.4 Regional Hydrogeology

Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities.

The GSI (2018) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer
- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd - Regionally Important Aquifer (karstified diffuse)

Gravel Aquifer
- Lg - Locally Important Aquifer - Sand & Gravel
- Rg - Regionally Important Aquifer - Sand & Gravel

Reference to the GSI (2018) National Draft Bedrock Aquifer Map for the site (see Figure 6.8 below) indicates that the site is underlain by a (Ll) Locally Important Bedrock Aquifer, which is moderately productive, only in local zones and (LK) Locally Important Aquifer – karstified in the northwest of the site. However, there was no evidence of the karstified limestone identified during site investigation.



Figure 6.8 Aquifer Classification (GSI, 2018)

There are no source protection areas relating to group water schemes or public water supplies within 2km of the site.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely/ or of mixtures of peat, sand, gravel, glacial till, clays, or silts).

The GSI Interim Vulnerability Map (see Figure 6.9 below) presently classifies the aquifer in the area of the subject site as *extreme* which indicates bedrock is at or near surface. Based on site assessment the vulnerability varies from extreme to high.



Figure 6.9 Aquifer Vulnerability Map (GSI, 2018)

6.3.5 Groundwater Quality

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy, (commonly known as the Water Framework Directive [WFD]). The WFD required 'Good Water Status' for all European waters by December 2015, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'.

The Groundwater Body (GWB) underlying the site is the Ringaskiddy Water Body (IE_SW_G_072) Currently, the EPA (2018) on-line mapping classifies the Ringaskiddy water body as having 'Good Status', with a WFD risk is "under review".

Monitoring wells will be installed as required by future IE licencing. However, data from a site investigation borehole (BH4) was collected and analysed for a broad range of potential contaminants based on the surrounding land use and future use of the facility. Laboratory results are included in Appendix B.

The analytical suite included metals, Volatile Organic Compounds (VOCs), Semi Volatile Organic Compounds (SVOCs), Polychlorinated BiPhenols (PCBs) and hydrocarbons (EPH CWG). Groundwater results were compared with Groundwater Threshold Value (Groundwater Directive S.I. No. 9 of 2010 and amendment; S.I. No. 366 of 2016) and EPA Interim Guidelines for groundwater where available.

All metals were below threshold concentrations and all other parameters were mostly below the laboratory limit of detection and results showed no exceedances above relevant threshold concentrations.

Water quality data collected for Hammond Lane were also reviewed and are included in Appendix B. The data shows that the overall groundwater quality is good with some exceedances in hydrocarbons and metals. Data from samples from BH 1-BH5 collected in 2000/2001 for hydrocarbons, VOCs and PAHs, PCBs and pesticides also showed no exceedances above laboratory detection limit.

6.3.6 Groundwater Wells & Flow Direction

There is no licensing system for wells in Ireland at present and as such no complete data set exists. As noted above, the aquifer is moderately productive but is not used extensively locally for water supply. There are no source protection areas noted within 2 km of the site (source GSI, 2018).

Additional monitoring wells will be installed as part of licence compliance requirements which will allow more accurate groundwater flow direction across the site to be determined. Based on a review of topography and water strikes it is likely that the ground water flow in in a south west to north east direction discharging to the bay. Drawing CD5010-Ground Well & Soil Sampling Location of the application present the proposed location of monitoring wells.

6.4 Man-Made Pathways

As identified in Stages 1-4 there is some bulk storage of chemicals on the Indaver site. Due to the volumes stored and the hazard classifications of these substances they could pose a risk to receiving waters if a source-pathway-receptor linkage existed. As the tanks are fully bunded within a hardstand area and a closed drainage system, there is no direct pathway to any surface or groundwater body from the site.

Storage and transport routes will have a closed drainage system which ultimately discharges to surface water through a Class 1 interceptor system to an attenuation pond (with a shut off valve). The stormwater discharges will be required to be in compliance with EPA licence requirements. The discharge will be monitored continuously for TOC, pH and conductivity or as required by IE licence requirements. Discharge will be shut down automatically if trigger levels are exceeded.

7.0 STAGE 6 – CONCEPTUAL SITE MODEL

A summary of the conceptual site model (CSM) is described below with reference to schematic cross section in Figure 6.7.

- The profile on site comprises topsoil overlying brown gravelly Clay and brown gravelly Silt with pockets of localised Sand and Made Ground encountered on the adjacent Hammond Lane site.
- The overburden overlays pale green Mudstone/green grey fine grained Sandstone. Depth to bedrock varies across the site, from 0.3 m below ground level (bgl) in the centre of the site to 10.1 m bgl in the east of the site.
- There is not a continuous perched water table but groundwater is encountered at a shallow level within the weathered surface of the bedrock.
- There are no groundwater dependent terrestrial ecosystems which have potential to be impacted by the proposed development. The site drainage (closed system) will ultimately discharge to the west channel of Cork harbour.
- The land is zoned for industrial development of this type and is not currently in agricultural use. The land is within flood zone C and therefore suitable for industrial development.
- There was no evidence of disposal of waste material or contaminated soil or groundwater identified during the previous or recent site investigations undertaken at the site.

The pollutant linkages based on the primary sources of possible contaminants on site are summaries in Table 7.1.

Source	**Pathways**	**Receptor**	**Impact Assessment**
Ammonia and/or Diesel Fuel Spill or leakage impacting lands outside containment area. Tanker leakage impacting area outside of site drainage area.	Vertical and lateral migration via shallow overburden to underlying bedrock Lateral migration via groundwater within the bedrock aquifer Lateral migration via drainage system	Locally Important Bedrock Aquifer with Extreme to high vulnerability Stormwater system & Western Channel Cork Harbour.	Low – Tanks are bunded or double skinned and on hard stand areas with a closed drainage system. Low: - Closed drainage system, monitored and shut off valve in the event of a spill to drainage occurring.

Table 7.1 Pollutant Linkages

8.0 STAGE 7 – SITE INVESTIGATION & BASELINE SOIL & WATER QUALITY ASSESSMENT

Site investigations were undertaken in 2000 and 2001 by K.T Cullen & Co. Ltd. Additional soil quality investigation has been completed by AWN in November 2018. Locations for trial holes and boreholes are presented in Figure 6.

The 2018 trial pit logs are presented in Appendix A. Laboratory results are presented in Appendix B and described in Section 6.34 and 6.35 above.

The investigations did not identify any evidence of soil or groundwater contamination on the site as a result of previous use of the site.

9.0 CONCLUSIONS

On the basis of the soil and groundwater investigations undertaken prior to construction of the Indaver facility and an assessment of source-pathways-receptors, the following conclusions have been made:

- The overburden across the site comprises variable thickness of clay with extreme to high vulnerability in places. The site is underlain by a Locally Important aquifer. There are no downgradient water abstractions from the aquifer or groundwater dependent ecosystems. The primary water receptor is Cork Harbour.

- A review of soil and water quality from the 2000/2001 baseline assessment and 2018 baseline assessment confirm that there is no evidence of any residual contamination beneath the site.

- Ammonium Hydroxide (NH_4OH) Solution, Light Fuel Oil, Aqueous Waste, Bottom Ash, Flue Gas residues and Boiler Ash were identified as hazards present at the site which have the potential to impact soil and groundwater if not adequately mitigated during storage and operation at the plant. However, the risk prevention measures present at the Indaver facility significantly reduce the potential for an environmental impact to soil or water to occur. These measures include bunded or double contained vessels, closed drainage and containment systems and spill management procedures.

- Source-pathway-receptor linkages were assessed for the bulk storage areas. It was concluded that there are no direct pathways to either the soil and groundwater environment or the surface water environment. A leakage from a bulk tank would be fully contained in the designated bund or the double skin lining of the tank, with leaks during delivery fully contained within the continuous hard stand delivery area. Any leakage outside of the delivery area would be contained within the closed drainage system

10.0 REFERENCES

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APPENDIX A

Trial Pit Logs

awnconsulting

Trial Pit Log:	TP18-1
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
0.0 MADE GROUND. Gravel fill material with topsoil and clays.			
0.2 MADE GROUND. Soft to firm sandy gravelly CLAY with occaional cobbles. Gravels are angular to subangular	0.2		
1.0 NATURAL GROUND. Firm dark brown sandy gravelly CLAY. Gravels are sub angular to angular.	1.0		
2.0 **End of Trial Pit 2.00mbgl**	2.0		BACKFILLED WITH ARISINGS
3.0			

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-2
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
0.0 TOPSOIL. Roots and Vegitation 0.1 0.2	0.2		BACKFILLED WITH ARISINGS
0.3 NATURAL GROUND. Firm dark brown vey sandy gravelly CLAY. Gravels are sub angular to angular. 0.4 **0.5** 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 **1.5** 1.6 1.7 1.8 1.9 **2.0**			
2.1 **End of Trial Pit 2.00mbgl** 2.2 2.3 2.4 **2.5** 2.6 2.7 2.8 2.9 **3.0**	**2.0**		

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-3
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
TOPSOIL. Roots and Vegitation	0.15		BACKFILLED WITH ARISINGS
NATURAL GROUND. Soft to firm dark brown vey sandy gravelly CLAY. Gravels are sub angular to angular.			
End of Trial Pit 2.00mbgl	**2.0**		

0.0 0.1 0.2 0.3 0.4 **0.5** 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 **1.5** 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 **2.5** 2.6 2.7 2.8 2.9 **3.0**

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-4
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
TOPSOIL. Roots and Vegitation			
NATURAL GROUND. Soft to firm dark brown vey sandy gravelly CLAY with occasional cobbles. Gravels are sub angular to angular.	0.2		
Note: Gravels Become more rounded @ 1.00			BACKFILLED WITH ARISINGS
End of Trial Pit 2.00mbgl	**2.0**		

0.0 0.1 0.2 0.3 0.4 **0.5** 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 **1.5** 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 **2.5** 2.6 2.7 2.8 2.9 **3.0**

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-5
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
0.0 TOPSOIL. Roots and Vegitation			
0.2 NATURAL GROUND. Soft to firm dark brown vey sandy gravelly CLAY with occasional cobbles. Gravels are sub angular to angular.	0.2		
1.0 NATURAL GROUND: Sub angular to angular sandy GRAVELS with clays and occasional cobbles	1.0		
1.2 NATURAL GROUND. Stiff dark brown vey sandy gravelly CLAY with occasional cobbles. Gravels are sub angular to angular.	1.2		
1.5 Note: Slow seepage @ 1.5 mbgl			
2.0 **End of Trial Pit 2.00mbgl**	2.0		
3.0			

BACKFILLED WITH ARISINGS

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-6
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
TOPSOIL. Roots and Vegitation. Some waste on ground surface including plastic bag, food wrappers ceramics			BACKFILLED WITH ARISINGS
NATURAL GROUND. Soft to firm dark brown vey sandy gravelly CLAY with occasional cobbles. Gravels are sub angular to angular.	0.25		
End of Trial Pit 2.00mbgl	2.0		

0.0 0.1 0.2 0.3 0.4 **0.5** 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 **1.5** 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 **2.5** 2.6 2.7 2.8 2.9 **3.0**

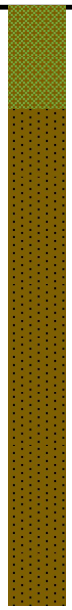
Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

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Trial Pit Log:	TP18-7
Sheet 1/1	

AWN Project F 18_10501	Client: Indaver Cork	Excavation date: 13/11/2018
Ground Level (mAOD):		
Grid Reference:	Location: Ringaskiddy, Co. Cork	Geology log: PC

SUBSURFACE PROFILE	Depth mbgl (mAOD)	Lithology	Reinstatement Details
Ground surface			
TOPSOIL. Roots and Vegitation. Some waste on ground surface including plastic bag, food wrappers ceramics			
	0.30		
NATURAL GROUND. Soft to firm dark brown vey sandy gravelly CLAY with occasional cobbles. Gravels are sub angular to angular.			
End of Trial Pit 2.00mbgl	**2.0**		



BACKFILLED WITH ARISINGS

0.0 0.1 0.2 0.3 0.4 **0.5** 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 **1.5** 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 **2.5** 2.6 2.7 2.8 2.9 **3.0**

Excavation Method: 3 Tonne Excavator	Pit dimensions:	1m X 1m X 2m		
Comments: No signs of contamination	G/level (mAOD):	-		
	Water Strikes (mbgl):	-	-	-
Contractor: N/A	Static Water Level (mbgl):	-		

APPENDIX B

Soil and Groundwater Analysis Results

Laboratory Test Results: SOIL Heavy Metals Suite

Client: INDAVER IRELAND
Location: Ringaskiddy, Co. Cork
AWN Ref: Indaver Cork
Ref: 18/10501

					SOIL						
Sample ID	Details				**TP18-01**	**TP18-02**	**TP18-03**	**TP18-04**	**TP18-05**	**TP18-06**	**TP18-07**
Depth (mbgl)					1	2	1	1	2	1	2
Laboratory					JEL	JEL	JEL	JEL	JEL	JEL	JEL
Sample Type					Primary	Primary	Primary	Primary	Primary	Primary	Primary
Sample Date					17/09/18 - 18/09/18						
Parameters	**Units**	**MDL**	**LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)**	**LQM/CIEH S4ul for HHRA Commercial Threshold at 1% SOM (mg/kg)**							
Arsenic	mg/kg	<0.5	40	640	16.8	15.4	16.7	16.9	33.1	12.5	22.1
Cadmium	mg/kg	<0.1	85	190	0.1	0.2	<0.1	1.1	<0.1	<0.1	0.1
Chromium	mg/kg	<0.5	910	8600	80.1	79.2	53.1	64.5	50.4	73.1	65.5
Copper	mg/kg	<1	7100	68000	6	14	11	14	10	21	14
Lead	mg/kg	<5	*nv*	*nv*	35	31	22	41	21	31	28
Mercury	mg/kg	<0.1	1.2	25.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<0.7	180	980	20.1	33.1	36.2	42.5	44.1	40.3	35.7
Selenium	mg/kg	<1	430	12000	1	<1	<1	1	<1	1	<1
Zinc	mg/kg	<5	40000	730000	68	96	95	122	114	106	104
Natural Moisture Content	%	<0.1	*nv*	*nv*	10.3	12.9	11.5			9.6	9.7
Fraction Organic Carbon	None	<0.001	*nv*	*nv*	*nt*	0.005	0.007			0.005	*nt*

Key

	Value exceeds the LQM Residential Threshold Value without homegrown produce
Underlined	*Value exceeds the LQM Commerical Threshold Value*
MDL	*Method Detection Limit*
-	*Less than the MDL*
nv	*No Value*

nt Not Tested

Laboratory Test Results: SOIL Volatile Organic Compounds (VOCs)

Client: INDAVER IRELAND
Location: Ringaskiddy. Co. Cork
AWN Ref: Indaver Cork
Ref: 18/10501

						SOIL						
Sample ID						**TP18-01**	**TP18-02**	**TP18-03**	**TP18-04**	**TP18-05**	**TP18-06**	**TP18-07**
Depth (mbgl)						1	2	1	1	2	1	2
Laboratory	Details					JEL	JEL	JEL	JEL	JEL	JEL	JEL
Sample Type						Primary	Primary	Primary	Primary	Primary	Primary	Primary
Sample Date						17/09/18 - 18/09/18						
Parameters	**Units**	**MDL**	**LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)**	**LQM/CIEH S4ul for HHRA Commercial Threshold at 1% SOM (mg/kg)**								
Dichlorodifluoromethane	mg/kg	0.002	*nv*	*nv*		<2	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	mg/kg	0.002				<2	<2	<2	<2	<2	<2	<2
Chloromethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	mg/kg	0.002				<2	<2	<2	<2	<2	<2	<2
Bromomethane	mg/kg	0.001				<1	<1	<1	<1	<1	<1	<1
Chloroethane	mg/kg	0.002				<2	<2	<2	<2	<2	<2	<2
Trichlorofluoromethane	mg/kg	0.002				<2	<2	<2	<2	<2	<2	<2
1,1-Dichloroethene (1,1 DCE)	mg/kg	0.006				<6	<6	<6	<6	<6	<6	<6
C (DCM)	mg/kg	0.03				<30	<30	<30	<30	<30	<30	<30
trans-1-2-Dichloroethene	mg/kg	0.003	0.0092	0.67		<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	mg/kg	0.003	*nv*	*nv*		<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
Bromochloromethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Chloroform	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,1,1-Trichloroethane	mg/kg	0.003	9	660		<3	<3	<3	<3	<3	<3	<3
1,1-Dichloropropene	mg/kg	0.003	*nv*	*nv*		<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
1,2-Dichloroethane	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
Benzene	mg/kg	0.003	0.38	27		<3	<3	<3	<3	<3	<3	<3
Trichloroethene (TCE)	mg/kg	0.003	*nv*	*nv*		<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	mg/kg	0.006				<6	<6	<6	<6	<6	<6	<6
Dibromomethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Bromodichloromethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
cis-1-3-Dichloropropene	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
Toluene	mg/kg	0.003	869	869		<3	<3	<3	<3	<3	<3	<3
trans-1-3-Dichloropropene	mg/kg	0.003	*nv*	*nv*		<3	<3	<3	<3	<3	<3	<3
1,1,2-Trichloroethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Tetrachloroethene (PCE)	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Dibromochloromethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,2-Dibromoethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Chlorobenzene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,1,1,2-Tetrachloroethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Ethylbenzene	mg/kg	0.003	83	518		<3	<3	<3	<3	<3	<3	<3
p/m-Xylene	mg/kg	0.005	79	576		<5	<5	<5	<5	<5	<5	<5
o-Xylene	mg/kg	0.003	88	478		<3	<3	<3	<3	<3	<3	<3
Styrene	mg/kg	0.003	*nv*	*nv*		<3	<3	<3	<3	<3	<3	<3
Bromoform	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Isopropylbenzene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
Bromobenzene	mg/kg	0.002				<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
Propylbenzene	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
2-Chlorotoluene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	mg/kg	0.003				<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	mg/kg	0.005				<5	<5	<5	<5	<5	<5	<5
1,2,4-Trimethylbenzene	mg/kg	0.006				<6	<6	<6	<6	<6	<6	<6
sec-Butylbenzene	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
4-Isopropyltoluene	mg/kg	0.004				<4	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	mg/kg	0.004	0.44	30		<4	<4	<4	<4	<4	<4	<4
1,4-Dichlorobenzene	mg/kg	0.004	61	4400		<4	<4	<4	<4	<4	<4	<4
n-Butylbenzene	mg/kg	0.004	*nv*	*nv*		<4	<4	<4	<4	<4	<4	<4
1,2-Dichlorobenzene	mg/kg	0.004	24	2000		<4	<4	<4	<4	<4	<4	<4
1,2-Dibromo-3-chloropropane	mg/kg	0.004	*nv*	*nv*		<4	<4	<4	<4	<4	<4	<4
1,2,4-Trichlorobenzene	mg/kg	0.007	2.6	220		<7	<7	<7	<7	<7	<7	<7
Hexachlorobutadiene	mg/kg	0.004	0.32	31		<4	<4	<4	<4	<4	<4	<4
Naphthalene	mg/kg	0.027	*nv*	*nv*		<27	<27	<27	<27	<27	<27	<27
1,2,3-Trichlorobenzene	mg/kg	0.007				<7	<7	<7	<7	<7	<7	<7

Key

	Value exceeds the LQM Residential Threshold Value without homegrown produce
Underlined	*Value exceeds the LQM Commerical Threshold Value*
MDL	*Method Detection Limit*
-	*Less than the MDL*
nv	*No Value* *nt* Not Tested

Laboratory Test Results: SOIL Semi-Volatile Organic Compounds (SVOCs)

Client: INDAVER IRELAND
Location: Ringaskiddy, Co. Cork
AWN Ref: Indaver Cork
Ref: 18/10501

						SOIL						
Sample ID	Details					**TP18-01**	**TP18-02**	**TP18-03**	**TP18-04**	**TP18-05**	**TP18-06**	**TP18-07**
Depth						1	2	1	1	2	1	2
Laboratory						JEL	JEL	JEL	JEL	JEL	JEL	JEL
Sample Type						Primary	Primary	Primary	Primary	Primary	Primary	Primary
Sample Date						17/09/18 - 18/09/18						
Parameters	**Units**	**MDL**	**LQM/CIEH S4ul for HHRA Residental Threshold at 1% SOM (mg/kg)**	**LQM/CIEH S4ul for HHRA Commercial Threshold at 1% SOM (mg/kg)**								
2-Chlorophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2-Methylphenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2-Nitrophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Methylphenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Phenol	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2-Chloronaphthalene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl) phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
Butylbenzyl phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
Di-n-butyl phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
Di-n-Octyl phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
Diethyl phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
Diethyl phthalate	ug/kg	<100				<100	<100	<100	<100	<100	<100	<100
1,2-Dichlorobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	<10	*nv*	*nv*		<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2-Nitroaniline	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
3-Nitroaniline	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Bromophenylphenylether	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Chloroaniline	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Chlorophenylphenylether	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
4-Nitroaniline	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Azobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Carbazole	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Dibenzofuran	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Isophorone	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
N-nitrosodi-n-propylamine	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10
Nitrobenzene	ug/kg	<10				<10	<10	<10	<10	<10	<10	<10

Key

	Value exceeds the LQM Residential Threshold Value without homegrown produce
Underlined	*Value exceeds the LQM Commerical Threshold Value*
MDL	*Method Detection Limit*
-	*Less than the MDL*
nv	*No Value* *nt* Not Tested

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

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AWN Consulting
Tecpro Building
Clonshaugh Business & Technology Park
Dublin
Dublin 17
Ireland

Attention :	Teri Hayes
Date :	27th November, 2018
Your reference :	
Our reference :	Test Report 18/18457 Batch 1
Location :	Indaver Cork
Date samples received :	15th November, 2018
Status :	Final report
Issue :	1

Eight samples were received for analysis on 15th November, 2018 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Lucas Halliwell
Project Co-ordinator

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-2	3-4	5-6	7-9	10-11	12-13	14-15				LOD/LOR	Units	Method No.
Sample ID	TP18-1	TP18-2	TP18-3	TP18-4	TP18-5	TP18-6	TP18-7						
Depth	1.00	2.00	1.00	1.00	2.00	1.00	2.00						
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018						
Arsenic #	16.8	15.4	16.7	16.9	33.1	12.5	22.1				<0.5	mg/kg	TM30/PM15
Cadmium #	0.1	0.2	<0.1	1.1	<0.1	<0.1	0.1				<0.1	mg/kg	TM30/PM15
Chromium #	80.1	79.2	53.1	64.5	50.4	73.1	65.5				<0.5	mg/kg	TM30/PM15
Copper #	6	14	11	14	10	21	14				<1	mg/kg	TM30/PM15
Lead #	35	31	22	41	21	31	28				<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM30/PM15
Nickel #	20.1	33.1	36.2	42.5	44.1	40.3	35.7				<0.7	mg/kg	TM30/PM15
Selenium #	1	<1	<1	1	<1	1	<1				<1	mg/kg	TM30/PM15
Zinc #	68	96	95	122	114	106	104				<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06				<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07				<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6				<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	105	104	101	94	92	91	91				<0	%	TM4/PM8
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
p/m-Xylene #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	95	100	102	100	104	103	103				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91	101	102	103	107	109	107				<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-2	3-4	5-6	7-9	10-11	12-13	14-15				LOD/LOR	Units	Method No.
Sample ID	TP18-1	TP18-2	TP18-3	TP18-4	TP18-5	TP18-6	TP18-7						
Depth	1.00	2.00	1.00	1.00	2.00	1.00	2.00						
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J						
Sample Date	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018						
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19	<19				<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	<19	<19	<19	<19				<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38	<38				<38	mg/kg	TM5/TM36/PM8/PM12/PM16
PCB 28 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35				<35	ug/kg	TM17/PM8
Natural Moisture Content	21.0	6.5	10.6	14.1	15.5	13.3	11.7				<0.1	%	PM4/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	16-20										Please see attached notes for all abbreviations and acronyms		
Sample ID	BH4 SW4												
Depth													
COC No / misc													
Containers	V P G												
Sample Date	13/11/2018												
Sample Type	Surface Water												
Batch Number	1										LOD/LOR	Units	Method No.
Date of Receipt	15/11/2018												
Dissolved Arsenic #	<2.5										<2.5	ug/l	TM30/PM14
Dissolved Boron	45										<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5										<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5										<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7										<7	ug/l	TM30/PM14
Dissolved Lead #	<5										<5	ug/l	TM30/PM14
Dissolved Mercury #	<1										<1	ug/l	TM30/PM14
Dissolved Nickel #	<2										<2	ug/l	TM30/PM14
Dissolved Selenium #	<3										<3	ug/l	TM30/PM14
Dissolved Zinc #	<3										<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1										<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013										<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013										<0.013	ug/l	TM4/PM30
Fluorene #	<0.014										<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011										<0.011	ug/l	TM4/PM30
Anthracene #	<0.013										<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012										<0.012	ug/l	TM4/PM30
Pyrene #	<0.013										<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015										<0.015	ug/l	TM4/PM30
Chrysene #	<0.011										<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018										<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016										<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011										<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01										<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011										<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195										<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01										<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01										<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	72										<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<0.1										<0.1	ug/l	TM15/PM10
Benzene #	<0.5										<0.5	ug/l	TM15/PM10
Toluene #	<5										<5	ug/l	TM15/PM10
Ethylbenzene #	<1										<1	ug/l	TM15/PM10
p/m-Xylene #	<2										<2	ug/l	TM15/PM10
o-Xylene #	<1										<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	111										<0	%	TM15/PM10

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

J E Sample No.	16-20												
Sample ID	BH4 SW4												
Depth													
COC No / misc													
Containers	V P G												
Sample Date	13/11/2018												
Sample Type	Surface Water												
Batch Number	1												
Date of Receipt	15/11/2018												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<10										<10	ug/l	TM36/PM12
>C6-C8 #	<10										<10	ug/l	TM36/PM12
>C8-C10 #	<10										<10	ug/l	TM36/PM12
>C10-C12 #	<5										<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10										<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10										<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10										<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10										<10	ug/l	TM36/PM12
>EC7-EC8 #	<10										<10	ug/l	TM36/PM12
>EC8-EC10 #	<10										<10	ug/l	TM36/PM12
>EC10-EC12 #	<5										<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10										<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10										<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10										<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10										<10	ug/l	TM5/TM36/PM12/PM16/PM30
PCB 28	<0.1										<0.1	ug/l	TM17/PM30
PCB 52	<0.1										<0.1	ug/l	TM17/PM30
PCB 101	<0.1										<0.1	ug/l	TM17/PM30
PCB 118	<0.1										<0.1	ug/l	TM17/PM30
PCB 138	<0.1										<0.1	ug/l	TM17/PM30
PCB 153	<0.1										<0.1	ug/l	TM17/PM30
PCB 180	<0.1										<0.1	ug/l	TM17/PM30
Total 7 PCBs	<0.7										<0.7	ug/l	TM17/PM30

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

SVOC Report : **Solid**

J E Sample No.	1-2	3-4	5-6	7-9	10-11	12-13	14-15					
Sample ID	TP18-1	TP18-2	TP18-3	TP18-4	TP18-5	TP18-6	TP18-7					
Depth	1.00	2.00	1.00	1.00	2.00	1.00	2.00					
COC No / misc												
Containers	V J	V J	V J	V J	V J	V J	V J					
Sample Date	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1					
Date of Receipt	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018					
SVOC MS												
Phenols												
2-Chlorophenol #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2-Methylphenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2-Nitrophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,4-Dichlorophenol #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,4-Dimethylphenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Methylphenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Pentachlorophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Phenol #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
PAHs												
2-Chloronaphthalene #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2-Methylnaphthalene #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Phthalates												
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Butylbenzyl phthalate	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Di-n-butyl phthalate	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Di-n-Octyl phthalate	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Diethyl phthalate	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Dimethyl phthalate #	<100	<100	<100	<100	<100	<100	<100				<100	ug/kg
Other SVOCs												
1,2-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
1,2,4-Trichlorobenzene #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
1,3-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
1,4-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2-Nitroaniline	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,4-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
2,6-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
3-Nitroaniline	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Bromophenylphenylether #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Chloroaniline	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Chlorophenylphenylether	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
4-Nitroaniline	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Azobenzene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Bis(2-chloroethoxy)methane	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Carbazole	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Dibenzofuran #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Hexachlorobenzene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Hexachlorobutadiene #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Hexachloroethane	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Isophorone #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
N-nitrosodi-n-propylamine #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Nitrobenzene #	<10	<10	<10	<10	<10	<10	<10				<10	ug/kg
Surrogate Recovery 2-Fluorobiphenyl	123	123	126	124	130	125	125				<0	%
Surrogate Recovery p-Terphenyl-d14	123	126	127	127	128	127	128				<0	%

Please see attached notes for all abbreviations and acronyms

LOD/LOR	Units	Method No.

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

SVOC Report : **Liquid**

J E Sample No.	16-20												
Sample ID	BH4 SW4												
Depth													
COC No / misc													
Containers	V P G												
Sample Date	13/11/2018												
Sample Type	Surface Water												
Batch Number	1												
Date of Receipt	15/11/2018												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<1										<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5										<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5										<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5										<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1										<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5										<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1										<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5										<0.5	ug/l	TM16/PM30
4-Methylphenol	<1										<1	ug/l	TM16/PM30
4-Nitrophenol	<10										<10	ug/l	TM16/PM30
Pentachlorophenol	<1										<1	ug/l	TM16/PM30
Phenol	<1										<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1										<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1										<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5										<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1										<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5										<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1										<1	ug/l	TM16/PM30
Diethyl phthalate #	<1										<1	ug/l	TM16/PM30
Dimethyl phthalate	<1										<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1										<1	ug/l	TM16/PM30
2-Nitroaniline	<1										<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5										<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1										<1	ug/l	TM16/PM30
3-Nitroaniline	<1										<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1										<1	ug/l	TM16/PM30
4-Chloroaniline	<1										<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1										<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5										<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5										<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5										<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1										<1	ug/l	TM16/PM30
Carbazole #	<0.5										<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5										<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1										<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1										<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1										<1	ug/l	TM16/PM30
Hexachloroethane #	<1										<1	ug/l	TM16/PM30
Isophorone #	<0.5										<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5										<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1										<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	128										<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	124										<0	%	TM16/PM30

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

VOC Report : **Solid**

J E Sample No.	1-2	3-4	5-6	7-9	10-11	12-13	14-15					
Sample ID	TP18-1	TP18-2	TP18-3	TP18-4	TP18-5	TP18-6	TP18-7					
Depth	1.00	2.00	1.00	1.00	2.00	1.00	2.00					
COC No / misc												
Containers	V J	V J	V J	V J	V J	V J	V J					
Sample Date	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1					
Date of Receipt	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018	15/11/2018					

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1				<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6				<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30	<30	<30	<30	<30				<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6				<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
p/m-Xylene #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2	<2	<2				<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3				<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5				<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	<6	<6	<6				<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7	<7	<7	<7	<7				<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4				<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	<27	<27	<27				<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7	<7	<7	<7	<7				<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	95	100	102	100	104	103	103				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	91	101	102	103	107	109	107				<0	%	TM15/PM10

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes
JE Job No.: 18/18457

VOC Report : **Liquid**

J E Sample No.	16-20												
Sample ID	BH4 SW4												
Depth													
COC No / misc													
Containers	V P G												
Sample Date	13/11/2018												
Sample Type	Surface Water												
Batch Number	1												
Date of Receipt	15/11/2018												

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2										<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1										<0.1	ug/l	TM15/PM10
Chloromethane #	<3										<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1										<0.1	ug/l	TM15/PM10
Bromomethane	<1										<1	ug/l	TM15/PM10
Chloroethane #	<3										<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3										<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3										<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5										<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3										<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3										<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3										<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1										<1	ug/l	TM15/PM10
Bromochloromethane #	<2										<2	ug/l	TM15/PM10
Chloroform #	<2										<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2										<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3										<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2										<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2										<2	ug/l	TM15/PM10
Benzene #	<0.5										<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3										<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2										<2	ug/l	TM15/PM10
Dibromomethane #	<3										<3	ug/l	TM15/PM10
Bromodichloromethane #	<2										<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2										<2	ug/l	TM15/PM10
Toluene #	<5										<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2										<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2										<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3										<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2										<2	ug/l	TM15/PM10
Dibromochloromethane #	<2										<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2										<2	ug/l	TM15/PM10
Chlorobenzene #	<2										<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2										<2	ug/l	TM15/PM10
Ethylbenzene #	<1										<1	ug/l	TM15/PM10
p/m-Xylene #	<2										<2	ug/l	TM15/PM10
o-Xylene #	<1										<1	ug/l	TM15/PM10
Styrene	<2										<2	ug/l	TM15/PM10
Bromoform #	<2										<2	ug/l	TM15/PM10
Isopropylbenzene #	<3										<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4										<4	ug/l	TM15/PM10
Bromobenzene #	<2										<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3										<3	ug/l	TM15/PM10
Propylbenzene #	<3										<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3										<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3										<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3										<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3										<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3										<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3										<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3										<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3										<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3										<3	ug/l	TM15/PM10
n-Butylbenzene #	<3										<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3										<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2										<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3										<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3										<3	ug/l	TM15/PM10
Naphthalene	<2										<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3										<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	111										<0	%	TM15/PM10

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/18457	1	TP18-1	1.00	2	19/11/2018	**General Description (Bulk Analysis)**	soil.stones
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-2	2.00	4	19/11/2018	**General Description (Bulk Analysis)**	soil.stones
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-3	1.00	6	19/11/2018	**General Description (Bulk Analysis)**	Soil/Stone
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-4	1.00	9	19/11/2018	**General Description (Bulk Analysis)**	Soil/Stone
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-5	2.00	11	19/11/2018	**General Description (Bulk Analysis)**	Soil/Stone
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-6	1.00	13	19/11/2018	**General Description (Bulk Analysis)**	Soil/Stone
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD
					19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD
18/18457	1	TP18-7	2.00	15	19/11/2018	**General Description (Bulk Analysis)**	Soil/Stone
					19/11/2018	**Asbestos Fibres**	NAD
					19/11/2018	**Asbestos ACM**	NAD

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/18457	1	TP18-7	2.00	15	19/11/2018	**Asbestos Type**	NAD
					19/11/2018	**Asbestos Level Screen**	NAD

Client Name: AWN Consulting
Reference:
Location: Indaver Cork
Contact: Teri Hayes

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 18/18457						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/18457

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/18457

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes

JE Job No: 18/18457

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

JE Job No: 18/18457

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW1	Acenaphthene (aq)	<0.005	µg/l
MW1	Acenaphthylene (aq)	0.00551	µg/l
MW1	Ammoniacal Nitrogen as N	0.623	mg/l
MW1	Ammoniacal Nitrogen as NH3	0.757	mg/l
MW1	Anthracene (aq)	<0.005	µg/l
MW1	Benzene	<1	µg/l
MW1	Benzene	<7	µg/l
MW1	Benzo(a)anthracene (aq)	0.0104	µg/l
MW1	Benzo(a)pyrene (aq)	<0.002	µg/l
MW1	Benzo(b)fluoranthene (aq)	<0.005	µg/l
MW1	Benzo(g,h,i)perylene (aq)	<0.005	µg/l
MW1	Benzo(k)fluoranthene (aq)	<0.005	µg/l
MW1	Boron (diss.filt)	538	µg/l
MW1	Cadmium (diss.filt)	0.794	µg/l
MW1	Calcium (Dis.Filt)	448	mg/l
MW1	Chloride	3470	mg/l
MW1	Chromium (diss.filt)	<1	µg/l
MW1	Chrysene (aq)	<0.005	µg/l
MW1	COD, unfiltered	<140	mg/l
MW1	Conductivity @ 20 deg.C	9.31	mS/cm
MW1	Copper (diss.filt)	0.393	µg/l
MW1	Dibenzo(a,h)anthracene (aq)	<0.005	µg/l
MW1	EPH (C6-C10)	<100	µg/l
MW1	EPH Range >C10 - C40 (aq)	<100	µg/l
MW1	Ethylbenzene	<1	µg/l
MW1	Ethylbenzene	<5	µg/l
MW1	Fluoranthene (aq)	<0.005	µg/l
MW1	Fluorene (aq)	<0.005	µg/l
MW1	Fluoride	<0.5	mg/l
MW1	GRO >C5-C10	<10	µg/l
MW1	Indeno(1,2,3-cd)pyrene (aq)	<0.005	µg/l
MW1	Iron (Dis.Filt)	<0.019	mg/l
MW1	m,p-Xylene	<1	µg/l
MW1	m,p-Xylene	<8	µg/l
MW1	Magnesium (Dis.Filt)	220	mg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW1	Manganese (diss.filt)	101	µg/l
MW1	Mercury (diss.filt)	<0.01	µg/l
MW1	Methyl tertiary butyl ether (MTBE)	<1	µg/l
MW1	Methyl tertiary butyl ether (MTBE)	<3	µg/l
MW1	Naphthalene (aq)	0.0363	µg/l
MW1	Nickel (diss.filt)	1.81	µg/l
MW1	Nitrate as N	0.488	mg/l
MW1	Nitrogen, Total	6.66	mg/l
MW1	o-Xylene	<1	µg/l
MW1	o-Xylene	<3	µg/l
MW1	PAH, Total Detected USEPA 16 (aq)	<0.082	µg/l
MW1	pH	7.17	pH Units
MW1	Phenanthrene (aq)	<0.005	µg/l
MW1	Phosphate (Ortho as P)	<0.02	mg/l
MW1	Potassium (Dis.Filt)	18.5	mg/l
MW1	Pyrene (aq)	<0.005	µg/l
MW1	Sodium (Dis.Filt)	1410	mg/l
MW1	Sulphate	478	mg/l
MW1	Sum of BTEX	<5	µg/l
MW1	Sum of detected BTEX	<28	µg/l
MW1	Toluene	<1	µg/l
MW1	Toluene	<4	µg/l
MW1	Toluene-d8**	94	%
MW1	Total EPH (C6-C40) (aq)	<100	µg/l
MW1	Zinc (diss.filt)	3.17	µg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW2	Acenaphthene (aq)	0.0154	µg/l
MW2	Acenaphthylene (aq)	<0.005	µg/l
MW2	Ammoniacal Nitrogen as N	<0.2	mg/l
MW2	Ammoniacal Nitrogen as NH3	<0.2	mg/l
MW2	Anthracene (aq)	<0.005	µg/l
MW2	Benzene	<1	µg/l
MW2	Benzene	<7	µg/l
MW2	Benzo(a)anthracene (aq)	<0.005	µg/l
MW2	Benzo(a)pyrene (aq)	<0.002	µg/l
MW2	Benzo(b)fluoranthene (aq)	<0.005	µg/l
MW2	Benzo(g,h,i)perylene (aq)	<0.005	µg/l
MW2	Benzo(k)fluoranthene (aq)	<0.005	µg/l
MW2	Boron (diss.filt)	317	µg/l
MW2	Cadmium (diss.filt)	0.125	µg/l
MW2	Calcium (Dis.Filt)	107	mg/l
MW2	Chloride	52.9	mg/l
MW2	Chromium (diss.filt)	<1	µg/l
MW2	Chrysene (aq)	<0.005	µg/l
MW2	COD, unfiltered	83.2	mg/l
MW2	Conductivity @ 20 deg.C	0.694	mS/cm
MW2	Copper (diss.filt)	<0.3	µg/l
MW2	Dibenzo(a,h)anthracene (aq)	<0.005	µg/l
MW2	EPH (C6-C10)	<100	µg/l
MW2	EPH Range >C10 - C40 (aq)	111	µg/l
MW2	Ethylbenzene	<1	µg/l
MW2	Ethylbenzene	<5	µg/l
MW2	Fluoranthene (aq)	<0.005	µg/l
MW2	Fluorene (aq)	0.00816	µg/l
MW2	Fluoride	<0.5	mg/l
MW2	GRO >C5-C10	<10	µg/l
MW2	Indeno(1,2,3-cd)pyrene (aq)	<0.005	µg/l
MW2	Iron (Dis.Filt)	<0.019	mg/l
MW2	m,p-Xylene	<1	µg/l
MW2	m,p-Xylene	<8	µg/l
MW2	Magnesium (Dis.Filt)	20.7	mg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW2	Manganese (diss.filt)	178	µg/l
MW2	Mercury (diss.filt)	<0.01	µg/l
MW2	Methyl tertiary butyl ether (MTBE)	<1	µg/l
MW2	Methyl tertiary butyl ether (MTBE)	<3	µg/l
MW2	Naphthalene (aq)	<0.01	µg/l
MW2	Nickel (diss.filt)	2.8	µg/l
MW2	Nitrate as NO3	<0.3	mg/l
MW2	Nitrogen, Total	<1	mg/l
MW2	o-Xylene	<1	µg/l
MW2	o-Xylene	<3	µg/l
MW2	PAH, Total Detected USEPA 16 (aq)	<0.082	µg/l
MW2	pH	7.94	pH Units
MW2	Phenanthrene (aq)	<0.005	µg/l
MW2	Phosphate (Ortho as P)	<0.02	mg/l
MW2	Potassium (Dis.Filt)	1.77	mg/l
MW2	Pyrene (aq)	0.0064	µg/l
MW2	Sodium (Dis.Filt)	38.7	mg/l
MW2	Sulphate	116	mg/l
MW2	Sum of BTEX	<5	µg/l
MW2	Sum of detected BTEX	<28	µg/l
MW2	Toluene	<1	µg/l
MW2	Toluene	<4	µg/l
MW2	Toluene-d8**	95.1	%
MW2	Total EPH (C6-C40) (aq)	111	µg/l
MW2	Zinc (diss.filt)	9.19	µg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW3	Acenaphthene (aq)	<0.005	µg/l
MW3	Acenaphthylene (aq)	<0.005	µg/l
MW3	Ammoniacal Nitrogen as N	3.72	mg/l
MW3	Ammoniacal Nitrogen as NH3	4.52	mg/l
MW3	Anthracene (aq)	<0.005	µg/l
MW3	Benzene	<1	µg/l
MW3	Benzene	<7	µg/l
MW3	Benzo(a)anthracene (aq)	<0.005	µg/l
MW3	Benzo(a)pyrene (aq)	<0.002	µg/l
MW3	Benzo(b)fluoranthene (aq)	<0.005	µg/l
MW3	Benzo(g,h,i)perylene (aq)	<0.005	µg/l
MW3	Benzo(k)fluoranthene (aq)	<0.005	µg/l
MW3	Boron (diss.filt)	407	µg/l
MW3	Cadmium (diss.filt)	<0.08	µg/l
MW3	Calcium (Dis.Filt)	118	mg/l
MW3	Chloride	89	mg/l
MW3	Chromium (diss.filt)	<1	µg/l
MW3	Chrysene (aq)	<0.005	µg/l
MW3	COD, unfiltered	51	mg/l
MW3	Conductivity @ 20 deg.C	0.897	mS/cm
MW3	Copper (diss.filt)	<0.3	µg/l
MW3	Dibenzo(a,h)anthracene (aq)	<0.005	µg/l
MW3	EPH (C6-C10)	<100	µg/l
MW3	EPH Range >C10 - C40 (aq)	257	µg/l
MW3	Ethylbenzene	<1	µg/l
MW3	Ethylbenzene	<5	µg/l
MW3	Fluoranthene (aq)	<0.005	µg/l
MW3	Fluorene (aq)	0.00979	µg/l
MW3	Fluoride	<0.5	mg/l
MW3	GRO >C5-C10	<10	µg/l
MW3	Indeno(1,2,3-cd)pyrene (aq)	<0.005	µg/l
MW3	Iron (Dis.Filt)	9.52	mg/l
MW3	m,p-Xylene	<1	µg/l
MW3	m,p-Xylene	<8	µg/l
MW3	Magnesium (Dis.Filt)	15.7	mg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW3	Manganese (diss.filt)	18500	µg/l
MW3	Mercury (diss.filt)	<0.01	µg/l
MW3	Methyl tertiary butyl ether (MTBE)	<1	µg/l
MW3	Methyl tertiary butyl ether (MTBE)	<3	µg/l
MW3	Naphthalene (aq)	0.0707	µg/l
MW3	Nickel (diss.filt)	4.48	µg/l
MW3	Nitrate as N	<0.0677	mg/l
MW3	Nitrogen, Total	4.57	mg/l
MW3	o-Xylene	<1	µg/l
MW3	o-Xylene	<3	µg/l
MW3	PAH, Total Detected USEPA 16 (aq)	<0.082	µg/l
MW3	pH	7.42	pH Units
MW3	Phenanthrene (aq)	<0.005	µg/l
MW3	Phosphate (Ortho as P)	<0.02	mg/l
MW3	Potassium (Dis.Filt)	12.2	mg/l
MW3	Pyrene (aq)	<0.005	µg/l
MW3	Sodium (Dis.Filt)	59.2	mg/l
MW3	Sulphate	215	mg/l
MW3	Sum of BTEX	<5	µg/l
MW3	Sum of detected BTEX	<28	µg/l
MW3	Toluene	<1	µg/l
MW3	Toluene	<4	µg/l
MW2	Toluene-d8**	95.1	%
MW2	Total EPH (C6-C40) (aq)	257	µg/l
MW2	Zinc (diss.filt)	2.16	µg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW4	Acenaphthene (aq)	<0.005	µg/l
MW4	Acenaphthylene (aq)	<0.005	µg/l
MW4	Ammoniacal Nitrogen as N	<0.2	mg/l
MW4	Ammoniacal Nitrogen as NH3	<0.2	mg/l
MW4	Anthracene (aq)	<0.005	µg/l
MW4	Benzene	<1	µg/l
MW4	Benzene	<7	µg/l
MW4	Benzo(a)anthracene (aq)	<0.005	µg/l
MW4	Benzo(a)pyrene (aq)	<0.002	µg/l
MW4	Benzo(b)fluoranthene (aq)	<0.005	µg/l
MW4	Benzo(g,h,i)perylene (aq)	<0.005	µg/l
MW4	Benzo(k)fluoranthene (aq)	<0.005	µg/l
MW4	Boron (diss.filt)	186	µg/l
MW4	Cadmium (diss.filt)	<0.08	µg/l
MW4	Calcium (Dis.Filt)	41.1	mg/l
MW4	Chloride	30.4	mg/l
MW4	Chromium (diss.filt)	<1	µg/l
MW4	Chrysene (aq)	<0.005	µg/l
MW4	COD, unfiltered	7.66	mg/l
MW4	Conductivity @ 20 deg.C	0.366	mS/cm
MW4	Copper (diss.filt)	<0.3	µg/l
MW4	Dibenzo(a,h)anthracene (aq)	<0.005	µg/l
MW4	EPH (C6-C10)	<100	µg/l
MW4	EPH Range >C10 - C40 (aq)	<100	µg/l
MW4	Ethylbenzene	<1	µg/l
MW4	Ethylbenzene	<5	µg/l
MW4	Fluoranthene (aq)	<0.005	µg/l
MW4	Fluorene (aq)	<0.005	µg/l
MW4	Fluoride	<0.5	mg/l
MW4	GRO >C5-C10	<10	µg/l
MW4	Indeno(1,2,3-cd)pyrene (aq)	<0.005	µg/l
MW4	Iron (Dis.Filt)	<0.019	mg/l
MW4	m,p-Xylene	<1	µg/l
MW4	m,p-Xylene	<8	µg/l
MW4	Magnesium (Dis.Filt)	10.8	mg/l

Site Location Hammond Lane, Cork
Sample Date 29/08/18

Water Matrix Groundwater
Analysis Date 01/09/18

Sampled By Paul Lynch
Report Date 01/10/18

Sample ID	Test	Result	Result Units
MW4	Manganese (diss.filt)	22.8	µg/l
MW4	Mercury (diss.filt)	<0.01	µg/l
MW4	Methyl tertiary butyl ether (MTBE)	<1	µg/l
MW4	Methyl tertiary butyl ether (MTBE)	<3	µg/l
MW4	Naphthalene (aq)	0.0596	µg/l
MW4	Nickel (diss.filt)	0.54	µg/l
MW4	Nitrate as N	5.09	mg/l
MW4	Nitrogen, Total	4.87	mg/l
MW4	o-Xylene	<1	µg/l
MW4	o-Xylene	<3	µg/l
MW4	PAH, Total Detected USEPA 16 (aq)	<0.082	µg/l
MW4	pH	7.03	pH Units
MW4	Phenanthrene (aq)	<0.005	µg/l
MW4	Phosphate (Ortho as P)	0.0441	mg/l
MW4	Potassium (Dis.Filt)	0.719	mg/l
MW4	Pyrene (aq)	<0.005	µg/l
MW4	Sodium (Dis.Filt)	22.9	mg/l
MW4	Sulphate	57	mg/l
MW4	Sum of BTEX	<5	µg/l
MW4	Sum of detected BTEX	<28	µg/l
MW4	Toluene	<1	µg/l
MW4	Toluene	<4	µg/l
MW4	Toluene-d8**	94.1	%
MW4	Total EPH (C6-C40) (aq)	<100	µg/l
MW4	Zinc (diss.filt)	3.25	µg/l

Table 1. Soil Analytical Results - PRO, DRO, Mineral Oil - PM, Ringaskiddy (Dec 2000)

Location	TP 1	TP 2	TP 3	TP 4	TP 5	TP 6	TP 7	TP 7	TP 10
Depth (m)	1.8	0 - 5.5	0 - 1.5	0 - 3	0 - 3	0 - 3.2	0 - 2	3 - 4.1	0 - 1
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Diesel Range Organics	60	43	95	29	45	27	181	-	28
Mineral Oil	18	13	29	9	13	8	18	-	8
Petrol Range Organics	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Dutch MACs	
S-Value	I-Value
mg/kg	mg/kg
-	-
50	5000
-	-

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Legend:
mg/kg - milligrams per kilogram
Dutch MACs - Dutch Maximum Admissible Concentration guidelines
S-Value= Target Value
I-Value= Intervention Value
Results are underlined where the Dutch S-MAC for Mineral Oil is exceeded.
"-" = Dutch MAC not available
"<" = Less than

Table 2. Soil Analytical Results - BTEX - PM Ringaskiddy (Dec 2000)

Location	TP 1	TP 2	TP 3	TP 4	TP 5	TP 6	TP 7	TP 7	TP 10	Dutch MACs	
Depth (m)	1.8	0 - 5.5	0 - 1.5	0 - 3	0 - 3	0 - 3.2	0 - 2	3 - 4.1	0 - 1	S-Value	I-Value
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	1
Toluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	130
Ethylbenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	50
Xylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	25

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Legend:
mg/kg - milligrams per kilogram
Dutch MACs - Dutch Maximum Admissible Concentration guidelines
S-Value= Target Value
I-Value= Intervention Value
Results are underlined where the Dutch S-MAC for Mineral Oil is exceeded.
"-" = Dutch MAC not available
"<" = Less than

Table 3a. Soil Analytical Results - VOCs - PM, Ringaskiddy (Dec 2000)

Trace Organics (VOCs)		TP1	TP3	TP4	TP5	Dutch MACs	
	Depth (m)	1.8	0 - 1.5	0 - 3.0	0 - 3.0	S-Value	I-Value
	Units						
Dichlorofluoromethane	µg/kg	<1	<1	<1	<1	-	-
Chloromethane	µg/kg	<1	<1	<1	<1	-	-
Vinylchloride	µg/kg	<1	<1	<1	<1	-	100
Bromomethane	µg/kg	<1	<1	<1	<1	-	-
Chloroethane	µg/kg	<1	<1	<1	<1	-	-
Trichlorofluoromethane	µg/kg	<1	<1	<1	<1	-	-
trans-1,2-Dichloroethene	µg/kg	<1	<1	<1	<1	-	-
Dichloromethane	µg/kg	<1	<1	<1	<1	-	20,000
1,1 Dichloroethene	µg/kg	<1	<1	<1	<1	-	-
1,1 Dichloroethane	µg/kg	<1	<1	<1	<1	-	-
cis-1,2-Dichloroethene	µg/kg	<1	<1	<1	<1	-	-
Bromochloromethane	µg/kg	<1	<1	<1	<1	-	-
Chloroform	µg/kg	<1	<1	<1	<1	-	-
2,2-Dichloropropane	µg/kg	<1	<1	<1	<1	-	-
1,2-Dichloroethane	µg/kg	<1	<1	<1	<1	-	4,000
1,1,1-Trichloroethane	µg/kg	<1	<1	<1	<1	-	-
1,1-Dichloropropene	µg/kg	<1	<1	<1	<1	-	-
Benzene	µg/kg	<1	<1	<1	<1	50	1,000
Carbontetrachloride	µg/kg	<1	<1	<1	<1	-	-
Dibromomethane	µg/kg	<1	<1	<1	<1	-	-
1,2-Dichloropropane	µg/kg	<1	<1	<1	<1	-	-
Bromodichloromethane	µg/kg	<1	<1	<1	<1	-	-
Trichloroethene	µg/kg	<1	<1	<1	<1	1	60,000
cis-1,3-Dichloropropene	µg/kg	<1	<1	<1	<1	-	-
trans-1,3-Dichloropropene	µg/kg	<1	<1	<1	<1	-	-
1,1,2-Trichloroethane	µg/kg	<1	<1	<1	<1	-	-
Toluene	µg/kg	<1	<1	<1	<1	50	130,000
1,3-Dichloropropane	µg/kg	<1	<1	<1	<1	-	-
Dibromochloromethane	µg/kg	<1	<1	<1	<1	-	-
1,2-Dibromoethane	µg/kg	<1	<1	<1	<1	-	-
Tetrachloroethene	µg/kg	<1	<1	<1	<1	10	4,000
1,1,1,2 -Tetrachloroethane	µg/kg	<1	<1	<1	<1		
Chlorobenzene	µg/kg	<1	<1	<1	<1	-	-
Ethylbenzene	µg/kg	<1	<1	<1	<1	50	50,000

LEGEND

µg/kg: micrograms per kilogram
MAC: Maximum Admissible Concentration
Dutch S-Value: Target Value
Dutch I-Value: Intervention Value
'-': MAC Guideline Not Available
< = Below current laboratory detection limit

Trace Organics (VOCs)		TP1	TP3	TP4	TP5	Dutch MACs	
	Depth (m)	1.8	0 - 1.5	0 - 3.0	0 - 3.0	S-Value	I-Value
	Units						
p/m Xylenes	µg/kg	<1	<1	<1	<1	50	25,000
Bromoform	µg/kg	<1	<1	<1	<1	-	-
Styrene	µg/kg	<1	<1	<1	<1	100	100,000
1,1,2,2-Tetrachloroethane	µg/kg	<1	<1	<1	<1	-	-
o - Xylene	µg/kg	<1	<1	<1	<1	-	-
1,2,3-Trichloropropane	µg/kg	<1	<1	<1	<1	-	-
Isopropylbenzene	µg/kg	<1	<1	<1	<1	-	-
Bromobenzene	µg/kg	<1	<1	<1	<1	-	-
2-Chlorotoluene	µg/kg	<1	<1	<1	<1	-	-
Propylbenzene	µg/kg	<1	<1	<1	<1	-	-
4-Chlorotoluene	µg/kg	<1	<1	<1	<1	-	-
1,2,4-Trimethylbenzene	µg/kg	<1	<1	<1	<1	-	-
4-Isopropyltoluene	µg/kg	<1	<1	<1	<1	-	-
1,3,5-Trimethylbenzene	µg/kg	<1	<1	<1	<1	10	-
1,2-Dichlorobenzene	µg/kg	<1	<1	<1	<1	10	-
1,4-Dichlorobenzene	µg/kg	<1	<1	<1	<1	-	-
sec-Butylbenzene	µg/kg	<1	<1	<1	<1	-	-
tert-Butylbenzene	µg/kg	<1	<1	<1	<1	10	-
1,3-Dichlorobenzene	µg/kg	<1	<1	<1	<1	-	-
n-Butylbenzene	µg/kg	<1	<1	<1	<1	-	-
1,2-Dibromo-3-Chloropropane	µg/kg	<1	<1	<1	<1	10	-
1,2,4-Trichlorobenzene	µg/kg	<1	<1	<1	<1	-	-
Naphthalene	µg/kg	<1	<1	<1	<1	-	-
1,2,3-trichlorobenzene	µg/kg	<1	<1	<1	<1	-	-
Hexachlorobutadiene	µg/kg	<1	<1	<1	<1		

LEGEND
µg/kg: micrograms per kilogram
MAC: Maximum Admissible Concentration
Dutch S-Value: Target Value
Dutch I-Value: Intervention Value
'-': MAC Guideline Not Available
< = Below current laboratory detection limit

Table 4a. Soil Analytical Results - PAHs - PM, Ringaskiddy (Dec 2000)

Parameters		TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7	TP10	Dutch MAC Values	
	Depth (m)	1.8	0 - 5.5	0 - 1.5	0 - 3	0 - 3	0 - 3.2	0 - 2	3 - 4.1	0 - 1	S-Value	I-Value
	Units											
Acenaphthene	µg/kg	24	27	56	14	32	<1	<1	<1	55	-	-
Acenaphthylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	340	-	-
Benzo(B)fluoranthene	µg/kg	30	149	27	<1	27	26	<1	31	1142	-	-
Dibenz(AH)anthracene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Fluorene	µg/kg	<1	29	<1	<1	<1	<1	<1	<1	250	-	-
Pyrene	µg/kg	244	308	202	<1	<1	<1	<1	95	6321	-	-
PAHs included in 'PAH (Sum of 10)' Dutch S and I MAC values for PAHs in soil												
Anthracene	µg/kg	25	25	25	5	14	17	7	14	862	-	-
Benzo(a)anthracene	µg/kg	113	183	147	1	67	97	<1	121	1081	-	-
Benzo(a)pyrene	µg/kg	12	131	14	1	31	14	<1	27	245	-	-
Benzo(ghi)perylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Benzo(k)flouranthene	µg/kg	29	277	22	<1	31	22	<1	30	979	-	-
Chrysene	µg/kg	65	295	97	<1	83	74	<1	97	3064	-	-
Fluoranthene	µg/kg	261	281	216	<1	<1	<1	<1	100	5804	-	-
Indeno(123-cd)pyrene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Naphthalene	µg/kg	2112	2153	2731	1932	1190	2291	2162	1821	10024	-	-
Phenanthrene	µg/kg	149	152	203	98	112	119	95	144	7221	-	-
PAH (Sum of 10)	µg/kg	2768	3499	3457	2042	1530	2636	2271	2356	29282	1000	40000
PAH (Total)	µg/kg	3066	4010	3741	2049	1588	2659	2264	2480	37388	-	-

Legend

µg/kg: micrograms per kilogram
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
Results awaiting confirmation
"-": MAC not available
< = below laboratory detection limit

Table 4b. Soil Analytical Results - PAHs - PM, Ringaskiddy (Dec 2000)

Parameters		TP11	TP11	TP12	TP12	TP13	TP13	TP14	TP15	TP16	TP17	Dutch MAC Values	
	Depth (m)	0-1	1-3	0-1	1-2.6	0-1	1-3.4	0-3.8	0-2	0-2.5	0-2	S-Value	I-Value
	Units												
Acenaphthene	µg/kg	1	<1	66	4	45	45	2	4	2	26	-	-
Acenaphthylene	µg/kg	1	<1	37	<1	<1	13	<1	<1	<1	2	-	-
Benzo(B)fluoranthene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Dibenz(AH)anthracene	µg/kg	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Fluorene	µg/kg	1	<1	5	<1	<1	1	<1	<1	<1	1	-	-
Pyrene	µg/kg	5	<1	3	<1	<1	2	<1	1	1	4	-	-
PAHs included in 'PAH (Sum of 10)' Dutch S and I MAC values for PAHs in soil													
Anthracene	µg/kg	2	<1	2	<1	<1	3	4	<1	<1	2	-	-
Benzo(a)anthracene	µg/kg	1	<1	<1	<1	<1	3	<1	<1	<1	1	-	-
Benzo(a)pyrene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Benzo(ghi)perylene	µg/kg	2	<1	<1	<1	<1	1	<1	<1	<1	<1	-	-
Benzo(k)flouranthene	µg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Chrysene	µg/kg	6	<1	2	<1	<1	3	<1	<1	1	4	-	-
Fluoranthene	µg/kg	20	1	10	4	2	8	1	2	6	13	-	-
Indeno(123-cd)pyrene	µg/kg	2	<1	<1	<1	<1	1	<1	<1	<1	<1	-	-
Naphthalene	µg/kg	2	1	14	2	3	8	<1	1	<1	2	-	-
Phenanthrene	µg/kg	18	4	20	7	5	19	4	4	7	23	-	-
PAH (Sum of 10)	µg/kg	54	6	48	13	10	46	9	7	14	45	1000	40000
PAH (Total)	µg/kg	64	6	159	17	55	107	11	12	17	78	-	-

Legend
µg/kg: micrograms per kilogram
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
"-": MAC not available
< = below laboratory detection limit

Table 5. Soil Analytical Results Metals - PM, Ringaskiddy (Dec 2000)

Sample Identity	Depth (m)	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Mercury mg/kg	Nickel mg/kg	Lead mg/kg	Selenium mg/kg	Zinc mg/kg	Total Phenols mg/kg
TP1	1.8	11	<1	14	15	<1	26	18	<1	83	<0.01
TP2	0 - 5.5	14	<1	15	19	<1	24	12	<1	95	<0.01
TP3	0 - 1.5	16	<1	20	17	<1	32	13	<1	92	0.04
TP4	0 - 3	17	<1	18	24	<1	25	9	<1	76	<0.01
TP5	0 - 3	13	<1	16	18	<1	20	10	<1	58	<0.01
TP6	0 - 3.2	16	<1	15	21	<1	29	17	<1	126	<0.01
TP7	0 - 2	14	<1	18	16	<1	19	13	<1	62	<0.01
TP-7	3 - 4.1	15	<1	15	18	<1	23	10	<1	62	<0.01
TP-10	0 - 1	15	<1	17	25	<1	23	10	<1	76	<0.01
Dutch MAC S Values		29	0.8	100	36	0.3	35	85	-	140	0.05
Dutch MAC I Values		55	12	380	190	10	210	530	-	720	40

Legend

mg/kg: milligrams per kilogram

MAC: Dutch Standard Maximum Admissible Concentration

S Value: Dutch Guidline for normal uncontaminated soil

I Value; Dutch Guideline for Intervention

"-": MAC Guideline not available

n.a. = not analysed

"<" = below detection limit

Pesticide	Units	TP 1	TP 2	TP 3	TP 4	TP 5	TP 6	TP 7	TP 7	TP 10	Dutch Values	
	Depth (m)	1.8	0 - 5.5	0 - 1.5	0 - 3	0 - 3	0 - 3.2	0 - 2	3 - 4.1	0 - 1	S- Value	I Value
Dichlorvos	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Mevinphos	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Phorate	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Alpha-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	-
Beta-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	-
Gamma-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.05	-
Diazinon	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Disulfoton	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Delta-BHC	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Methyl Parathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Heptachlor	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Fenitrothion	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Aldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	-
Malathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Parathion	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Heptachlor Epoxide	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Endosulfan I	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Dieldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.5	-
4,4-DDE	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Endrin Ketone	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Endosulfan II	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
4,4-DDD	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Ethion	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Endrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	-
Endosulfan Sulphate	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
4,4-DDT	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	4000
Methoxychlor	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Azinphos Methyl	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-

Legend
µg/kg: micrograms per kilogram
MAC: Maximum Admissable Concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Table 7a. Soil Analytical Results - PCBs - PM, Ringaskiddy (Dec 2000)

Parameters		TP 1	TP 2	TP 3	TP 4	TP 5	TP 6	TP 7	TP 7	TP10	Dutch MAC Values	
	Depth (m)	1.8	0 - 5.5	0 - 1.5	0 - 3	0 - 3	0 - 3.2	0 - 2	3 - 4.1	0 - 1	S-Value	I-Vales
	Units										-	-
PCB Congener 28	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Congener 52	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Congener 101	µg/kg	<1	50	<1	<1	<1	<1	23	<1	<1	-	-
PCB Congener 118	µg/kg	<1	14	<1	<1	<1	<1	<1	<1	<1	-	-
PCB Congener 153	µg/kg	<1	182	<1	<1	<1	<1	23	<1	<1	-	-
PCB Congener 138	µg/kg	<1	214	<1	<1	<1	<1	27	<1	<1	-	-
PCB Congener 180	µg/kg	<1	183	<1	<1	<1	<1	25	<1	<1	-	-
PCB total	µg/kg	<1	643	<1	<1	<1	<1	98	<1	<1	20	1000

Legend
µg/kg: micrograms per kilogram
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Table 7b. Soil Analytical Results - PCBs (repeat analysis) - PM, Ringaskiddy (Dec 2000)

Parameters		TP 2	TP 7	Dutch MAC Values	
	Depth (m)	0 - 5.5	0 - 2	S-Value	I-Vales
	Units				
PCB Congener 28	µg/kg	1	<1	-	-
PCB Congener 52	µg/kg	<1	<1	-	-
PCB Congener 101	µg/kg	<1	<1	-	-
PCB Congener 118	µg/kg	<1	<1	-	-
PCB Congener 153	µg/kg	3	1	-	-
PCB Congener 138	µg/kg	4	1	-	-
PCB Congener 180	µg/kg	5	<1	-	-
PCB total	µg/kg	13	2	20	1000

Legend
µg/kg: micrograms per kilogram
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Table 8. Groundwater Analytical Results - PRO, DRO, Mineral Oils - PM, Ringaskiddy (Dec 2000)

Location	BH 1	BH 2	BH 3	BH 4	BH 5
Units	µg/l	µg/l	µg/l	µg/l	µg/l
Diesel Range Organics	<10	<10	<10	<10	<10
Mineral Oil	<10	<10	<10	<10	<10
Petrol Range Organics	<10	<10	<10	<10	<10

Dutch MACs	
S-Value µg/l	I-Value µg/l
-	-
50	600
-	-

Legend:
µg/l - micrograms per Litre
Dutch MACs - Dutch Maximum Admissible Concentration guidelines
S-Value= Target Value
I-Value= Intervention Value
"-" = Dutch MAC not available
"<" = Less than

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Location	BH 1	BH 2	BH 3	BH 4	BH 5	Dutch MACs	
Units	µg/l	µg/l	µg/l	µg/l	µg/l	S-Value µg/l	I-Value µg/l
Benzene	<10	<10	<10	<10	<10	0.20	30
Toluene	<10	<10	<10	<10	<10	0.20	1000
Ethylbenzene	<10	<10	<10	<10	<10	0.20	150
Xylene	<10	<10	<10	<10	<10	0.20	70

Legend:
µg/l - micrograms per Litre
Dutch MACs - Dutch Maximum Admissible Concentration guidelines
S-Value= Target Value
I-Value= Intervention Value
Results are underlined where the Dutch S-MAC for Mineral Oil is exceeded.
"-" = Dutch MAC not available
"<" = Less than

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Table 10a. Groundwater Analytical Results - VOCs - PM, Ringaskiddy (Dec 2000)

Trace Organics (VOCs)	Location	BH 1	BH 2	BH 3	BH 4	BH 5	Dutch MACs	
	Units						S-Value	I-Value
Dichlorofluoromethane	µg/l	<1	<1	<1	<1	<1	-	-
Chloromethane	µg/l	<1	<1	<1	<1	<1	-	-
Vinylchloride	µg/l	<1	<1	<1	<1	<1	-	-
Bromomethane	µg/l	<1	<1	<1	<1	<1	-	-
Chloroethane	µg/l	<1	<1	<1	<1	<1	-	-
Trichlorofluoromethane	µg/l	<1	<1	<1	<1	<1	-	-
trans-1,2-Dichloroethene	µg/l	<1	<1	<1	<1	<1	-	-
Dichloromethane	µg/l	<1	<1	<1	<1	<1	-	-
1,1 Dichloroethene	µg/l	<1	<1	<1	<1	<1	-	-
1,1 Dichloroethane	µg/l	<1	<1	<1	<1	<1	-	-
cis-1,2-Dichloroethene	µg/l	<1	<1	<1	<1	<1	-	-
Bromochloromethane	µg/l	<1	<1	<1	<1	<1	-	-
Chloroform	µg/l	<1	<1	<1	<1	<1	-	-
2,2-Dichloropropane	µg/l	<1	<1	<1	<1	<1	0.01	50
1,2-Dichloroethane	µg/l	<1	<1	<1	<1	<1	0.01	400
1,1,1-Trichloroethane	µg/l	<1	<1	<1	<1	<1	-	-
1,1-Dichloropropene	µg/l	<1	<1	<1	<1	<1	-	-
Benzene	µg/l	<1	<1	<1	<1	<1	0.01	50
Carbontetrachloride	µg/l	<1	<1	<1	<1	<1	-	-
Dibromomethane	µg/l	<1	<1	<1	<1	<1	0.01	50
1,2-Dichloropropane	µg/l	<1	<1	<1	<1	<1	-	-
Bromodichloromethane	µg/l	<1	<1	<1	<1	<1	-	-
Trichloroethene	µg/l	<1	<1	<1	<1	<1	-	-
cis-1,3-Dichloropropene	µg/l	<1	<1	<1	<1	<1	-	-
trans-1,3-Dichloropropene	µg/l	<1	<1	<1	<1	<1	0.20	30
1,1,2-Trichloroethane	µg/l	<1	<1	<1	<1	<1	-	-
Toluene	µg/l	<1	<1	<1	<1	<1	-	-
1,3-Dichloropropane	µg/l	<1	<1	<1	<1	<1		
Dibromochloromethane	µg/l	<1	<1	<1	<1	<1	-	-
1,2-Dibromoethane	µg/l	<1	<1	<1	<1	<1		
Tetrachloroethene	µg/l	<1	<1	<1	<1	<1	-	-
1,1,1,2 -Tetrachloroethane	µg/l	<1	<1	<1	<1	<1	-	-
Chlorobenzene	µg/l	<1	<1	<1	<1	<1		
Ethylbenzene	µg/l	<1	<1	<1	<1	<1	-	-

LEGEND

µg/l: micrograms per litre
MAC: Maximum Admissible Concentration
Dutch S-Value: Target Value
Dutch I-Value: Intervention Value
-': MAC Guideline Not Available
< = Below current laboratory detection limit

Table 10b. Groundwater Analytical Results - VOCs - PM, Ringaskiddy (Dec 2000)

Trace Organics (VOCs)	Location	BH 1	BH 2	BH 3	BH 4	BH 5	Dutch MACs	
	Units						S-Value	I-Value
p/m Xylenes	µg/l	<1	<1	<1	<1	<1	-	-
Bromoform	µg/l	<1	<1	<1	<1	<1	-	-
Styrene	µg/l	<1	<1	<1	<1	<1	-	-
1,1,2,2-Tetrachloroethane	µg/l	<1	<1	<1	<1	<1	-	-
o - Xylene	µg/l	<1	<1	<1	<1	<1	-	-
1,2,3-Trichloropropane	µg/l	<1	<1	<1	<1	<1	-	-
Isopropylbenzene	µg/l	<1	<1	<1	<1	<1		
Bromobenzene	µg/l	<1	<1	<1	<1	<1	0.2	150
2-Chlorotoluene	µg/l	<1	<1	<1	<1	<1	-	-
Propylbenzene	µg/l	<1	<1	<1	<1	<1	-	-
4-Chlorotoluene	µg/l	<1	<1	<1	<1	<1	-	-
1,2,4-Trimethylbenzene	µg/l	<1	<1	<1	<1	<1	-	-
4-Isopropyltoluene	µg/l	<1	<1	<1	<1	<1	-	-
1,3,5-Trimethylbenzene	µg/l	<1	<1	<1	<1	<1		
1,2-Dichlorobenzene	µg/l	<1	<1	<1	<1	<1	0.2	70
1,4-Dichlorobenzene	µg/l	<1	<1	<1	<1	<1	-	-
sec-Butylbenzene	µg/l	<1	<1	<1	<1	<1	0.5	300
tert-Butylbenzene	µg/l	<1	<1	<1	<1	<1	-	-
1,3-Dichlorobenzene	µg/l	<1	<1	<1	<1	<1	0.01	40
n-Butylbenzene	µg/l	<1	<1	<1	<1	<1	0.2	1000
1,2-Dibromo-3-Chloropropane	µg/l	<1	<1	<1	<1	<1	-	-
1,2,4-Trichlorobenzene	µg/l	<1	<1	<1	<1	<1	-	-
Naphthalene	µg/l	<1	<1	<1	<1	<1	-	-
1,2,3-trichlorobenzene	µg/l	<1	<1	<1	<1	<1	-	-
Hexachlorobutadiene	µg/l	<1	<1	<1	<1	<1	-	0.7

LEGEND
µg/l: micrograms per litre
MAC: Maximum Admissible Concentration
Dutch S-Value: Target Value
Dutch I-Value: Intervention Value
-: MAC Guideline Not Available
< = Below current laboratory detection limit

Table 11. Groundwater Analytical Results - PAHs - PM, Ringaskiddy (Dec 2000)

Parameters	Units	BH 1	BH 2	BH 3	BH 4	BH 5	Dutch MAC Values S-Value	Dutch MAC Values I-Value
Acenaphthene	ng/l	131	<10	135	<10	<10	-	-
Acenaphthylene	ng/l	28	21	285	<10	25	-	-
Benzo(B)fluoranthene	ng/l	<10	<10	<10	<10	<10	-	-
Dibenz(AH)anthracene	ng/l	<10	<10	<10	<10	<10	-	-
Fluorene	ng/l	<10	<10	<10	<10	<10	-	-
Pyrene	ng/l	<10	19	<10	<10	<10	-	-
PAHs included in 'PAH (Sum of 10)' Dutch S and I MAC values for PAHs in soil								
Anthracene	ng/l	20	17	19	11	<10	20	5000
Benzo(a)anthracene	ng/l	<10	<10	<10	<10	<10	2	500
Benzo(a)pyrene	ng/l	<10	<10	<10	<10	<10	1	50
Benzo(ghi)perylene	ng/l	<10	<10	<10	<10	<10	0.2	50
Benzo(k)flouranthene	ng/l	<10	<10	<10	<10	<10	0.2	50
Chrysene	ng/l	<10	<10	<10	<10	<10	2	50
Fluoranthene	ng/l	<10	26	<10	<10	<10	5	1000
Indeno(123-cd)pyrene	ng/l	<10	<10	<10	<10	<10	0.4	50
Naphthalene	ng/l	35	19	36	65	25	100	70000
Phenanthrene	ng/l	13	43	11	14	18	20	5000

Legend
ng/l: nanograms per litre
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated groundwater
I-Level: Dutch guideline for Intervention
"-": MAC not available
< = below laboratory detection limit

Table 12. Groundwater Analytical Results - Metals - PM, Ringaskiddy (Dec 2000)

Sample Identity	Arsenic mg/l	Cadmium mg/l	Chromium mg/l	Copper mg/l	Mercury mg/l	Nickel mg/l	Lead mg/l	Selenium mg/l	Zinc mg/l
BH 1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
BH 2	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
BH 3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
BH 4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
BH 5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
Dutch MAC S Values	0.01	0.0004	0.001	0.03	0.005	0.015	0.015	-	0.065
Dutch MAC I Values	0.06	0.006	0.03	0.075	0.003	0.075	0.075	-	0.80

Legend

mg/l: milligrams per Litre

MAC: Dutch Standard Maximum Admissible Concentration

S Value: Dutch Guidline for normal uncontaminated soil

I Value: Dutch Guideline for Intervention

"-": MAC Guideline not available

n.a. = not analysed

"<" = below detection limit

Table 13. Groundwater Analytical Results - Pesticides - PM, Ringaskiddy (Dec 2000)

Pesticide	Location	BH 1	BH 2	BH 3	BH 4	BH 5	Dutch Values	
	Units						S- Value	I Value
Dichlorvos	µg/l	<1	<1	<1	<1	<1	-	-
Mevinphos	µg/l	<1	<1	<1	<1	<1	-	-
Phorate	µg/l	<1	<1	<1	<1	<1	-	-
Alpha-BHC	µg/l	<1	<1	<1	<1	<1	-	-
Beta-BHC	µg/l	<1	<1	<1	<1	<1	-	-
Gamma-BHC	µg/l	<1	<1	<1	<1	<1	200	
Diazinon	µg/l	<1	<1	<1	<1	<1	-	-
Disulfoton	µg/l	<1	<1	<1	<1	<1	-	-
Delta-BHC	µg/l	<1	<1	<1	<1	<1	-	-
Methyl Parathion	µg/l	<1	<1	<1	<1	<1	-	-
Heptachlor	µg/l	<1	<1	<1	<1	<1	-	-
Fenitrothion	µg/l	<1	<1	<1	<1	<1	-	-
Aldrin	µg/l	<1	<1	<1	<1	<1	-	-
Malathion	µg/l	<1	<1	<1	<1	<1	-	-
Parathion	µg/l	<1	<1	<1	<1	<1	-	-
Heptachlor Epoxide	µg/l	<1	<1	<1	<1	<1	-	-
Endosulfan I	µg/l	<1	<1	<1	<1	<1	-	-
Dieldrin	µg/l	<1	<1	<1	<1	<1	20	-
4,4-DDE	µg/l	<1	<1	<1	<1	<1	-	-
Endrin Ketone	µg/l	<1	<1	<1	<1	<1	-	-
Endosulfan II	µg/l	<1	<1	<1	<1	<1	-	-
4,4-DDD	µg/l	<1	<1	<1	<1	<1	-	-
Ethion	µg/l	<1	<1	<1	<1	<1	-	-
Endrin	µg/l	<1	<1	<1	<1	<1	-	-
Endosulfan Sulphate	µg/l	<1	<1	<1	<1	<1	-	-
4,4-DDT	µg/l	<1	<1	<1	<1	<1	-	-
Methoxychlor	µg/l	<1	<1	<1	<1	<1	-	-
Azinphos Methyl	µg/l	<1	<1	<1	<1	<1	-	-

Legend
µg/l: micrograms per litre
MAC: Maximum Admissable Concentration
S-level: Dutch guideline for normal uncontaminated soil
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Table 14. Groundwater Analytical Results - PCBs - PM, Ringaskiddy (Dec 2000)

Parameters	Location	TP 1	TP 2	TP 3	TP 4	TP 5	Dutch MAC Values	
							S-Value	I-Vales
	Units							
PCB Congener 28	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 52	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 101	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 118	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 153	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 138	µg/l	<1	<1	<1	<1	<1	-	-
PCB Congener 180	µg/l	<1	<1	<1	<1	<1	-	-
PCB total	µg/l	<1	<1	<1	<1	<1	-	-

Legend

µg/kg: micrograms per Litre
MAC: Maximum admissable concentration
S-level: Dutch guideline for normal uncontaminated groundwater
I-Level: Dutch guideline for Intervention
-: MAC not available
< = below laboratory detection limit

Table 15. Groundwater Analytical Results - Inorganics - PM, Ringaskiddy (Dec 2000)

PARAMETERS	UNIT	BH 1	BH 2	BH 3	BH 4	BH 5	POTABLE WATER M.A.C.
pH	units	7.8	6.9	7.6	6.8	6.8	6 - 9
Conductivity	µS/cm	1002	407	892	708	825	1500
Total Hardness	CaCO3 mg/l	342	328	203	154	238	n.a.
Total Alkalinity	CaCO3 mg/l	100	250	270	250	180	n.a.
Aluminium	mg/l	0	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/l	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
Calcium	mg/l	34	90	66	46	68	200
Iron	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	200
Magnesium	mg/l	6	22	8	8	13	50
Manganese	mg/l	0.05	0.05	<0.05	0.05	0.38	50
Phosphorous	mg/l	<0.05	0	0	0	0	-
Sodium	Na mg/l	33	56	68	29	93	150
Potassium	K mg/l	3.1	7.0	3.9	1.8	2.6	12
Nitrate	NO3 mg/l	11.3	3.9	7.4	29.4	3.7	50
Nitrite	NO2 mg/l	<0.05	<0.05	0.1	0.1	<0.05	0.1
Chloride	Cl mg/l	230	145	94	49	132	250
Sulphate	SO4 mg/l	24	105	71	26	90	250
Ammonia	NH4 mg/l	1.4	1.2	1.3	1.9	1.0	0.3
Total Phenols	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.0005

LEGEND
M.A.C. = Maximum Admissible Concentration under Drinking Water Regulation S.I. No. 81 of 1988
"-": MAC not available
< = Less Than
mg/l = milligram per litre