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Environmental Protection Agency
29 AUG 2017

28th August 2017

Mr. Brian Meany
Environmental Licensing Programme,
Office of Environmental Sustainability,
Environmental Protection Agency,
Johnstown Castle Estate,
Co. Wexford.

RE: Finisklin Landfill Reg. No. H0006-01 – Response to notice in accordance with Regulation 7(4) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008

Dear Mr Meany,

Further to the request of the Environmental Protection Agency in regards to the above dated 15th December 2016, Malone O'Regan were retained by Sligo County Council to prepare an Addendum Environmental Risk Assessment Report to address Agency's request.

Please find enclosed two hardcopies of the Addendum Environmental Risk Assessment Report and one CD containing electronic copies of the documentation in the required searchable PDF format.

Yours faithfully,
for **Malone O'Regan**

Claire Clifford
Environmental consultant

QUALITY
ISO 9001:2008
NSAI Certified

August 2017

SLIGO COUNTY COUNCIL

Certificate of Authorisation

Addendum Environmental Risk Assessment

Former Finisklin Landfill

Sligo County Council

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Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	28/08/17	Report	Final	CC	CC	KOR

Certificate of Authorisation

Addendum Environmental Risk Assessment

Former Finisklin Landfill

Sligo County Council

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1 INTRODUCTION

Malone O'Regan (MOR) was appointed by Sligo County Council (SCC) to prepare an addendum report in regards to the Former Finisklin Landfill, Co. Sligo (the Site) as part of the application for a Certificate of Authorisation under the Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations, 2008.

An application for a Certificate of Authorisation for the Site was submitted to the Environmental Protection Agency (EPA) in June 2012. In December 2016, the EPA requested that some supplementary information should be submitted in support of the application in a letter issued to SCC dated the 15th December 2016.

This addendum report documents the additional works completed by MOR in support of the application and should be read in conjunction with the information contained in the original submission back in June 2012.

1.1 Project Objectives

The main project objective was to address in a comprehensive manner all of the queries raised by the EPA in the letter dated 15th December 2016 and specifically:

1. *Given the high risk presented by the closed landfill, present a revised risk assessment taken to Tier 3 and completed in accordance with the Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007).*
2. *Provide any updated monitoring data obtained since the making of the application for a certificate of authorisation insofar as that data is relevant to the Agency's consideration of the application.*
3. *Provide a letter from a qualified person to Sligo County Council*
4. *Submit a Natura Impact Statement.*

1.2 Report Scope and Content

The scope of work undertaken to meet the project objectives included the following:

- Desk based studies including a review of relevant information pertinent to both the overall environmental risk assessment and the ecological assessment and comprised of a review of published environmental information and information previously compiled for the Site. A walkover of the Site was conducted on 1st February 2017 to visually inspect the condition of the Site and assess the suitability of the monitoring locations and in particular to identify the monitoring points for internal gas survey at the offsite properties i.e. any locations where ingress of gas could occur such as cracks in walls.
- Monitoring and sampling of groundwater, leachate, surface water and landfill gas at onsite and offsite locations was carried out over two monitoring events on the 1st to 3rd February 2017 and 20th to 22nd February 2017 respectively. Details on the monitoring are set out in Section 3.
- Ecological surveys were undertaken on the 21st February 2017 and the 20th June 2017 in support of the assessment of potential impacts associated with the Site on the receiving ecological habitats including the adjoining SPA and SAC at Cummeen Strand/ and Drumcliff Bay (Sligo Bay).
- Review the Conceptual Site Model (CSM) and detailed quantitative risk assessment for the Site based on the updated monitoring data taking cognisance of the EPA's Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007).

- Preparation of a Natura Impact Statement (NIS) for the Site.
- Presentation of the findings of the environmental risk assessment in a comprehensive report that includes revised schedule of drawings (attached to this report) and a updated non-technical summary (Appendix A) as requested by the EPA.

1.3 Competent Persons

To ensure the quality of the data and conclusions presented in this report, all work in regards to this addendum report was carried out by appropriately qualified and experienced MOR personnel and overseen by Claire Clifford (PGeo) a person who is qualified, trained and experienced to the standard set out in section 2.3 of Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007) and is listed on the IGI Register of Qualified Geoscientists/Competent Persons. A copy of the letter to Sligo County Council in this regard is attached in Appendix B.

1.4 Limitations

Access restrictions due to the presence of plant, buildings etc restricted the number of locations that could be included within the internal gas survey. Similarly, some of the monitoring wells could not be located or had been damaged and/or were unsuitable for monitoring. While these limitations were identified it is considered that the overall project objective was not compromised and the conclusions and recommendations presented are valid.

1.5 Disclaimer

The conclusions presented in this report are professional opinions based solely on the tasks outlined herein and the information made available to MOR. They are intended for the purpose outlined herein and for the indicated Site and project. The report is for the sole use of the Client (SCC). This report may not be relied upon by any other party without explicit agreement from MOR. Opinions and recommendations presented herein apply to the Site conditions existing at the time of the assessment. They cannot apply to changes at the Site of which MOR is not aware of 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 assessment. All work carried out in preparing this report has utilised and is based on MOR professional knowledge and understanding of the current relevant Irish and European Community standards, codes and legislation.

2 RELEVANT BACKGROUND INFORMATION

2.1 Site Setting

The Site is a closed landfill located on the outskirts of Sligo Town and covers an area of approximately 13 hectares (ha) on the southern shores of the Garavogue River Estuary approximately 1.5km north-west of Sligo City Centre (Figure 2-1).

Figure 2-1 Site Location

The Site is bordered to the north by Sligo Harbour, to the east and northeast by commercial/industrial facilities located on Deepwater Berths Road and the Wastewater Treatment Plant to the northeast of the Site. The Site is bounded to the south by commercial/industrial facilities and to the west by Finisklin Road and northwest by a cul-de-sac known as Far Finisklin. In addition, there are a number of occupied residential properties within 50m of the Site located off Finisklin Road and one located at Finisklin Far on the western boundary which has been demolished and replaced with a new house which was constructed in the interim since the submission of the original submission to the EPA in 2012.

There are currently no onsite users as was the case in 2011, the area surrounding the Site consists of commercial/industrial developments with a number of industrial estates and one-off commercial/industrial units.

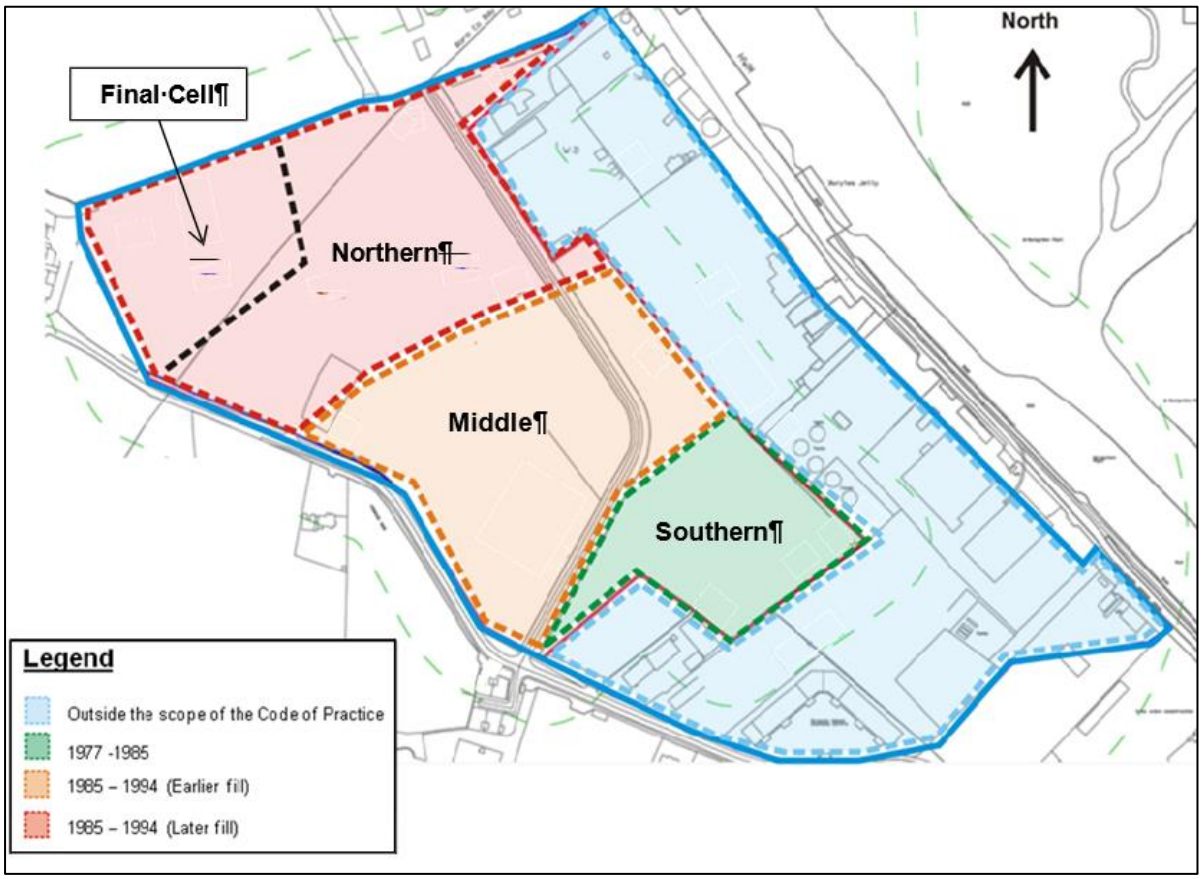
In the current Sligo and Environs Development Plan (Sligo County Council (2010-2016)), the Site has been zoned for mixed use in the western and south-western portion and in the northern portion of the Site has been zoned as open space.

2.2 Site History

The deposition of domestic, commercial and construction and demolition (C&D) wastes and capping material occurred within the Site boundary from 1977 in the southern portion of the Site until 1994 in the northern portion of the Site. The available information indicates that the thickness of the waste body varies from approximately 1.9m to 4.5m including the capping

layer. Based on a review of historical mapping, reports and aerial photographs, it appears that waste materials have also been deposited external to the Site boundary (refer to Figure 2-2).

Figure 2-2 Inferred phasing of filling activities completed at the Site



A large rock bund was constructed to function as the outermost boundary of the Site (into the harbour) and all filling activities were undertaken on the landside of this bund. This porous rock bund was designed and constructed with a seaward opening/entrance (approximately 30m width crest) which allowed the free flow of the tide to and from the cells in order to avoid the build-up of leachate within the unused cell and partially filled cells at that time i.e. a dilute and disperse principle.

Historical gas monitoring undertaken during 1998 and 1999 was carried out in standpipes installed within trial pits in the landfill and in boreholes outside the Site. The data is limited, however it indicated that in wells installed within the Site the ratio of carbon dioxide to methane was representative of higher gas generation in the northern part of the Site and towards the centre of the Site. Gas generation appeared to be much lower towards the edges of the Site and in the older area of landfill at the southern part of the landfill.

This data also indicates that there was no clear evidence of gas migration across the western boundary of the landfill. Although low concentrations of carbon dioxide were encountered in one well outside the northern end of this boundary these concentrations could have occurred due to the underlying bedrock (limestone). Low concentrations of gas were encountered in some wells in the industrial areas to the east of the Site (outside the landfill) but the concentrations and ratio of methane to carbon dioxide are indicative of low levels of gas generation. The source of these low levels could be from the fill materials beneath these areas, although it is possible that there could also be a contribution from the Site given that they are located beside the most recently filled areas.

2.3 Previous Environmental Assessments

MOR was appointed by SCC to undertake an environmental risk assessment of the Site (the former Finisklin Landfill) in accordance with the EPA's published Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA Code of Practice) (EPA, 2007).

The risk assessment was completed in March 2011 in accordance with the EPA Code of Practice and included a comprehensive site investigation (Tier 2) and detailed quantitative risk assessment (Tier 3) including a detailed landfill gas assessment. A further landfill gas assessment was undertaken in May 2012 to further verify the findings of the 2011 risk assessment specifically in regards to reaffirming that there was no immediate risk to offsite properties or occupants associated with landfill gas emissions from the Site. Subsequently, gas monitoring was continued until 2013 and reported to SCC. The monitoring carried out for these assessments included the following:

- Landfill gas - 29 No. events (June 2009 to September 2013, Events M1-M29);
- Internal gas - 32 No. events (2011 to September 2013);
- Groundwater - 2 No. events (June and July 2009);
- Leachate - 2 No. events (June and July 2009); and
- Surface water - 2 No. events (June and July 2009).

A detailed ecological survey and Appropriate Assessment Screening was also completed to evaluate the potential risk to the sensitive habitats associated with the adjoining receiving waters.

These reports were submitted to the EPA in June 2012 in support of the application for a Certificate of Authorisation for the Site.

2.3.1 Tier 3 Risk Assessment and Site Prioritisation

The findings of the previous Tier 3 risk assessment identified that the Site was categorised as High Risk in accordance with the EPA Code of Practice. The Conceptual Site Model (CSM) identified that the valid pollutant linkages include the risk of leachate migration to surface water and associated protected areas and to offsite human receptors from landfill gas emissions. These pollutant linkages are as follows:

- Given that there is no landfill liner and no natural confining layer present there is a pathway between the leachate and the groundwater body beneath. There is also a direct pathway between the leachate and surface water seeps from the landfill. It has been calculated that based on the available assimilative capacity within the receiving water bodies that leachate at the Site is not impacting on these receiving water bodies. This was further supported by the findings of the ecological assessment that concluded it was unlikely that there was any adverse impact on adjoining European Protected Sites (Cummeen Strand and Drumcliff Bay SAC and Cummeen Strand SPA) associated with the Site. The results also confirmed that there was no significant impact on the receiving water bodies associated with leachate arising from the Site. On that basis, it was considered that further assessment was not warranted.
- Both the groundwater body and the surface water seeps clearly show evidence of tidal intrusion largely influenced by its proximity to the tidal waters of the Garavogue Estuary. Other sources of contaminants in addition to the Site were also identified and included the waste located beyond the landfill boundary, the former practice of discharging untreated sewage, diffuse agricultural and point source emissions from surrounding industrial and residential properties.

- It was concluded that the risk posed by the presence of methane and carbon dioxide from the Site was variable. The southern, older parts of the Site were at a lower risk grading to the northern, more recently filled areas that were deemed to be at a moderate to high risk. In addition, the western part of the landfill is underlain by clayey soil thereby limiting the potential for widespread gas migration from the Site in this area. It was determined that there would be a greater risk of gas migration to the south and east as the landfill material continues beyond the landfill boundary in these areas.
- The lack of an engineered cap means that that any gas generated would be venting through the capping layer in a diffuse manner and thus reducing the potential to migrate beyond the boundary however the findings of the detailed gas risk assessment established that there was the potential for gas to migrate beyond the boundary based on the identified Site condition. This was verified with the results from the internal surveys that suggested that landfill gas was migrating across the eastern boundary of the Site, as indicated by elevated concentrations recorded in service ducts and drains in offsite buildings, albeit there was no evidence to suggest any immediate risk to any of these buildings.
- The site prioritisation in accordance with the EPA Code of Practice was revised based on the findings of the risk assessment and the risk classification assigned to the Site was Class A which represents the intrinsic risk that the Site poses to the environment. The linkages of greatest concern included the risk of leachate migration to surface water and protected areas, and landfill gas migration to offsite receptors, all with normalised scores of 100% (high risk). The site prioritisation and plausible pollutant linkages are summarised in Table 2-1 and depicted in Drawing 23.

Table 2-1 Revised Site Prioritisation Summary

SPR	Linkages	Pathway via	SPR	Maximum	Normalised
SPR1	Leachate ⇨Surface	Combined groundwater	0	300	0%
SPR2	Leachate ⇨ SWDTE	Combined groundwater and surface water	0	300	0%
SPR3	Leachate ⇨ Human	Groundwater Pathway	0	240	0%
SPR4	Leachate ⇨ GWDTE	Groundwater Pathway	0	240	0%
SPR5	Leachate ⇨ Aquifer	Groundwater Pathway	90	400	22.5%
SPR6	Leachate ⇨ Public	Groundwater Pathway	0	560	0%
SPR7	Leachate ⇨ Surface	Groundwater Pathway	90	240	37.5%
SPR8	Leachate ⇨ Surface	Surface Water Pathway	60	60	100%
SPR9	Leachate ⇨ SWDTE	Surface Water Pathway	60	60	100%
SPR10	Landfill Gas ⇨ Human	Lateral and Vertical	150	150	100%
SPR11	Landfill Gas ⇨ Human	Lateral and Vertical	0	250	0%
OVERALL RISK SCORE			**HIGH**		

Risk Classification	Range of Risk Scores
HIGH Risk (Class A)	Score greater than or equal to 70% for any individual SPR linkages
MODERATE Risk (Class B)	Score between 40% and 70% for any individual SPR linkages
LOW Risk (Class C)	Score less than 40% for any individual SPR linkages

The linkages of greatest concern included the risk of leachate migration to surface water and protected areas, and landfill gas migration to offsite receptors all of which were allocated a normalised scores of 100% (high risk).

2.3.2 Conceptual Site Model (2012)

Based on the findings of the DQRA completed in 2011 and the addendum assessment in 2012, the revised CSM for the Site identified the following plausible pollutant linkages:

- The human health exposure pathway of offsite migration of landfill gas and emissions into offsite buildings remains valid
- Migration of leachate from the Site into the adjoining surface water body and
- Migration of leachate from the Site into the underlying aquifer and discharge to the adjoining surface water body.

The findings of these assessments concluded that there are a number of significant contributory sources that likely impact on the water quality in the adjoining Garavogue Estuary and that the linkage of migration of leachate from the landfill would not warrant further consideration. Therefore, the only pollutant linkage that would require further consideration was the offsite migration of landfill gas.

3 METHODOLOGY

The methodology and approach for undertaking the supplementary monitoring and ecological surveys (Tier 2) are set out in the following sections. All work was undertaken by appropriately qualified and competent persons and overseen by a qualified person in accordance with the EPA Code of Practice.

3.1 Desk Based Studies

Desk based studies including a review of relevant information pertinent to both the overall environmental risk assessment and the ecological assessment and comprised of a review of published environmental information and information previously compiled for the Site.

Some of the key data sources consulted included the following:

- Geological Survey of Ireland (GSI) data bases (GSI, 2017);
- Environmental Protection Agency databases including Envision and Catchments website (EPA, 2017);
- Sligo and Environs Development Plan (Sligo County Council (2010-2016))
- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (National Parks and Wildlife Service , 2017);
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions (NBDC, 2017);
- The Bird Watch Ireland website was consulted and Sligo Harbour (Site 0C492) monitoring data was acquired and reviewed with regard to The Irish Wetland Bird Survey (I-WeBS) (Bird Watch Ireland , 2017);
- Ecological data for Sligo harbour, including sediment classification, was reviewed from recent work in association with the proposed Sligo Airport Runway Reconfiguration project (planning application ref. no. PL 08/632);
- The EPA Envision website was consulted to obtain details about watercourses in the vicinity of the Site (EPA, 2017)*; and,*
- Review of all reports previous reports compiled as part of the of the application submitted in 2012 including the environmental risk assessment (MOR, 2011) including the Appropriate Assessment report.

3.2 Landfill Gas Monitoring

Monitoring was undertaken at the Site by experienced MOR Consultants over two events on the 3rd and 22nd of February 2017 in accordance with recommended best practice guidelines (Environmental Protection Agency, 2003). The scope of monitoring undertaken is outlined Table 3-1 and methodology is outlined below. All monitoring well locations are shown on Drawing 2 and the offsite properties where internal gas surveys were completed are shown on Drawing 3.

Table 3-1 Landfill Gas Monitoring

Monitoring Schedule	1st monitoring sampling event	2nd monitoring sampling event	Monitoring Locations	Comment
Landfill Gas Monitoring – offsite monitoring wells	01/02/2017 and 02/02/2017	21/02/2017	BH1, BH2, BH3, BH4, BH5, BH6, BH7, BH8, BH9, BH10, BH11, BH14, BH20 and BH23	BH13- Not possible to get valve attached BH21- Damaged BH22, BH24 and BH25-not located
Landfill Gas Monitoring – Internal survey at offsite properties	03/02/2017	22/02/2017	Clearway, Cold Chon, Calor Gas and Waste Water Treatment Plant	-

- Landfill gas was surveyed using a Geo tech GA2000 at the four (4No) groundwater wells and ten (10No) gas/leachate monitoring wells within and outside the Site. Each of the external monitoring locations were sealed before sampling in order to provide an accurate measurement of landfill gas concentrations at that particular time. The GA2000 measures methane, carbon dioxide, oxygen, and carbon monoxide, hydrogen sulphide concentrations and has data logging capabilities. It can also measure gas flow. This analyser was used both in the external and internal gas surveys.
- The monitoring event included internal gas surveys of a number of adjoining properties, on 2No. occasions:
    - Clearway;
    - Calor Gas;
    - Cold Chon; and
    - Waste Water Treatment Plant.
- The internal gas surveys were undertaken using an EcoTec TDL500 Laser Methane Detector (LMD) and a Geotech GA2000 landfill gas analyser. The LMD, measures VOCs equivalent to methane in parts per million (ppm). This is a much more sensitive meter when compared to the GA2000 which measures only in terms of percentages (% v/v). The use of the LMD is very important for the purpose of internal gas surveys as it can identify the ingress of low levels of methane into buildings e.g. along cracks in the foundations.
- Ambient gas readings were taken in each surveyed room and readings at key areas/features for gas entry and/or accumulation:
    - Around skirting boards;
    - Any cracks in the floor;
    - Confined spaces including cupboards;
    - Service entries;
    - Under manhole covers;
    - Drains; and,
    - Pipes entering rooms through the floor or wall.

3.3 Groundwater, Surface Water and Leachate Monitoring

Monitoring was carried out at the Site including groundwater, surface water and leachate over two (2No.) monitoring events. Details on the scope of the monitoring completed are

summarised inTable 3-2 and the methodology is outlined below. All sampling locations are shown on Drawing 19.

The monitoring events were conducted and samples collected by appropriately qualified and experienced MOR Consultants during both monitoring events in accordance with MOR ISO procedures and industry best practice standards (i.e. ISO 5667). Samples were collected during both high tide and low tides from the monitoring wells to determine if there was any tidal influence on water and leachate quality.

Table 3-2 Groundwater Surface Water and Leachate Monitoring

Monitoring Schedule	1st monitoring sampling event	2nd monitoring sampling event	Monitoring Locations	Comment
Groundwater Monitoring	01/02/2017 and 02/02/2017	20/02/2017 and 21/02/2017	BH1, BH2, BH3 and BH4	Samples taken at High and Low tide
Surface Water Monitoring	02/02/2017 and 03/02/2017	21/02/2017	Surface water ponds onsite: SW3, SW5, SW7, Seepages from the Site: SW1 Garavogue River SW8 & SW9 Garavogue Estuary: SW2A	-
Leachate Monitoring	02/02/2017	20/02/2017 and 21/02/2017	BH5, BH6, BH8, BH10, BH14 and BH20	BH9-Dry BH7, BH11 and BH13 - Blocked

3.3.1 Groundwater Monitoring

Groundwater monitoring and sampling was undertaken at the four (4No.) groundwater monitoring wells at the Site. Static groundwater levels were measured at each monitoring well using a water level meter prior to purging. The groundwater level was recorded relative to a fixed reference point as each well has been surveyed to Ordnance Datum. Prior to sampling a well, three well volumes of water were purged from each well using an inertial pump with dedicated tubing and fitted with a dedicated foot valve, to prevent cross-contamination between wells. All equipment including water level meters and field parameter probes was decontaminated between sampling locations.

Field measured water quality parameters using field calibrated equipment, together with observations on the physical appearance of water were recorded at the time of sampling. Field measurements were recorded for pH, temperature, dissolved oxygen and electrical conductivity.

All samples were decanted into labelled containers supplied by Exova Jones Environmental Laboratory (Exova Jones), a UKAS and ISO 17025 accredited laboratory. The samples were kept cool, in darkness and sent to Exova Jones for analysis. In order to maintain sample integrity, a Chain of Custody document was completed to track sample possession from time of sample collection to time of analysis at Exova Jones.

3.3.2 Leachate Monitoring

Leachate levels were measured at each monitoring well prior to sampling using a water level meter. Samples were collected using a disposable bailer for each sampling location/

monitoring well. All equipment including water level meters and field parameter probes was decontaminated between sampling locations.

Field measured water quality parameters using field calibrated equipment, together with observations on the physical appearance of water were recorded at the time of sampling. Field measurements were recorded for pH, temperature, dissolved oxygen and electrical conductivity.

All samples were decanted into labelled containers supplied by Exova Jones Environmental Laboratory (Exova Jones), a UKAS and ISO 17025 accredited laboratory. The samples were kept cool, in darkness and sent to Exova Jones for analysis. In order to maintain sample integrity, a Chain of Custody document was completed to track sample possession from time of sample collection to time of analysis at Exova Jones.

3.3.3 Surface Water Monitoring

Surface water monitoring was conducted at seven locations (SW1, SW2A, SW3, SW5, SW7, SW8 and SW9). SW1 sample was collected from a small seep (outfall) discharging from the northern boundary into the estuary from the toe of the retaining sea wall. SW2 was not located at the time of sampling. Three samples were collected from onsite surface water ponds (SW3, SW5 and SW7).

In order to address the concerns raised by the EPA, surface water samples were collected from the Garavogue Estuary (SW2A) adjoining the Site and two monitoring points located at the Garavogue River along Deep Water Berths Road (SW8 and SW9).

All equipment including water level meters and field parameter probes was decontaminated between sampling locations.

Field measured water quality parameters using field calibrated equipment, together with observations on the physical appearance of water were recorded at the time of sampling. Field measurements were recorded for pH, temperature, dissolved oxygen and electrical conductivity.

All samples were decanted into labelled containers supplied by Exova Jones Environmental Laboratory (Exova Jones), a UKAS and ISO 17025 accredited laboratory. The samples were kept cool, in darkness and sent to Exova Jones for analysis. In order to maintain sample integrity, a Chain of Custody document was completed to track sample possession from time of sample collection to time of analysis at Exova Jones.

3.3.4 Laboratory Analysis

Groundwater, leachate and surface water samples were analysed in the laboratory for a broad range of parameters taking cognisance of Table C.2 of the EPA Landfill Monitoring Manual (2003). The schedule of laboratory analysis is set out in Table 3-3.

Table 3-3 Laboratory Analysis Schedule

PARAMETERS ANALYSED	SAMPLE TYPE		
	Groundwater Samples	Leachate Samples	Surface Water Samples
FIELD Measured PARAMETERS			
Temperature	*	*	*
Dissolved Oxygen	*	*	*
Electrical Conductivity	*	*	*
Oxidation Reduction Potential	*	*	*

pH	*	*	*
LABORATORY Analysed PARAMETERS			
Sulphate, Chloride, Fluoride	*	*	*
Ammoniacal Nitrogen, Total Oxidised Nitrogen	*	*	*
Molybdate Reactive Phosphorous (MRP)	*	*	*
Total Dissolved Solids (TDS),	*		*
Total Suspended Solids (TSS)			*
Total Alkalinity as CaCO3	*		*
Total Organic Carbon (TOC)	*		*
Total Cyanide	*		*
Chemical Oxygen Demand (COD), Biochemical Oxygen		*	*
Microbiological (Total & Faecal Coliforms)	*		
Metals	*	*	*
Pesticides (Atrazine & Simazine)	*	*	*
Semi-Volatile Organic Compounds VOCs (including. PAHs, phenols and phthalates)	*	*	*
Volatile Organic Compounds	*	*	*
Petroleum Hydrocarbons (TPH-CWG, BTEX, MTBE)	*	*	*
Organotin Compounds			*

3.4 Assessment Criteria

Field measured parameters and laboratory analytical results for groundwater samples collected were compared, where applicable, to the following groundwater generic assessment criteria (referred to hereafter as GAC):

- Statutory Instrument S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended 2012 (S.I. No. 149 of 2012) as amended 2016 (S.I. No.366 of 2016).

In the absence of Groundwater Regulation Values for specific parameters, the following assessment criteria were used for indicative purposes.

- The Interim Guideline Values (IGVs) for Groundwater from the Environmental Protection Agency (EPA) (2003), 'Towards setting guideline values for the protection of groundwater; Interim Report'.
- European Communities (Drinking Water) (No. 2) Regulation 2007 (S.I. No. 122 of 2014).

Leachate results were compared against published minimum and maximum observed ranges for acetogenic and methanogenic leachates (EPA (2000) "Landfill Manuals-Landfill Site Design" for guidance purposes.

Surface water samples were compared, where applicable, to the following surface water quality standards (referred to hereafter as EQS):

- Surface Water Regulations 2009 (SI No. 272 of 2009) as amended (S.I. No. 372 of 2012 and S.I. No. 386 of 2015.

Landfill gas results were compared against published standards values, where applicable, to the following criteria:

- EPA 1997 Thresholds (Environmental Protection Agency (EPA) 1997: Landfill Manuals - Landfill Operational Practices. EPA, Ireland); and
- DOE Exposure Limits (Department of the Environment (1994): Protection of New Buildings and Occupants from Landfill Gas. DOE, Ireland).

In addition, the landfill gas results were assessed using the criteria set out in (Wilson et. al, 2007) taking cognisance of the CIRIA C665.

3.5 Ecological Survey

Ecological field surveys were carried out by a suitably qualified and experienced ecologist at the Site on 21st February 2017 and 20th June 2017 taking account of the findings of the previous ecological surveys and detailed desk-based studies. The surveys included a habitat survey and birds survey. Therefore, the survey area included the Site and the also the foreshore area adjoining the Site that were covered by the previous assessment in 2011 (BES, 2012). The ecological surveys comprised of habitat survey, birds survey and a marine mammal survey and are described below.

3.5.1 Habitat Survey

The habitat survey comprised a detailed walkover and inspection of potential habitats in the survey area to identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation.

3.5.2 Birds Survey

In order assess the importance of the areas of the SPA/SAC adjacent to the Site for birds, especially those for which the SPA is designated and to evaluate the findings of the 2011 bird survey (BES, 2012), a targeted bird count was undertaken on the 20th June 2017.

The key objective was to establish whether any species or populations of conservation importance made regular use of the Site or adjacent areas, or the airspace above the Site. The survey consisted of a vantage point survey from the foreshore of the area of the Sligo Harbour/ Garavogue Estuary. The survey lasted 3 hours and encompassed high tide. The vantage point selected provided a full view of the area of the Bay adjoining the Site. On completion of the vantage point survey, a walked transect along the estuary to the north east of the Site was also completed.

3.5.3 Marine Mammal Survey

A survey for marine mammals was undertaken on the 20th of June 2017 from the foreshore which was identified to provide a good vantage point across the Sligo Harbour/ Garavogue Estuary.

4 DISCUSSION OF RESULTS

4.1 Supplementary Monitoring and Surveying Results

The results for the supplementary monitoring and historical data for the Site together with relevant risk based assessment criteria are attached in Table 1 to Table 8.

The findings of the ecological assessment are detailed in the following sections.

A risk-based evaluation of the updated monitoring and ecological survey results together with relevant desk-based information was carried out taking account of the CSM for the Site and the identified source-pathway-receptor linkages associated with landfill gas (SPR10) and leachate (SPR5, SPR7, SPR 8 and SPR9).

4.2 Landfill Gas

Landfill gas monitoring results including historical data are presented in Tables 4-8.

4.2.1 Onsite Monitoring Wells

Glencar Formation

Monitoring results were consistent with the majority of previous methane and carbon dioxide levels for the monitoring wells BH1 – BH4 installed within the Glencar Formation. Recorded levels were low with peak methane level of 0.9% v/v recorded (BH4 event M32) and a maximum carbon dioxide level of 0.8%v/v (BH2 event M32). Flow rates were very low and did not exceed 1.0l/hr. These results are indicative of low level impacts associated with leachate entering the underlying aquifer which is consistent with previous findings.

Southern Fill Area

Recorded levels of peak and stable methane of up to 53.7% v/v (BH7- M31) were recorded during monitoring events M30-M33 and carbon dioxide levels up to 20.0%v/v (BH7- M31) which were broadly consistent with previous monitoring events. Carbon dioxide levels in BH7 were slightly lower on average than during earlier sampling events with a peak of 21.7% v/v during M22. The flow rates recorded (0.6-1.6l/hr) for February 2017 were marginally higher than previously reported for this portion of the landfill (0.1l/hr) and are within the range predicted for this portion of the landfill (MOR, 2011). Calculated GSVs (Gas Screening Value) (Wilson et. al., 2009) were broadly consistent with previous results and were less than 0.7l/hr with the exception of a single result for BH14 (0.7l/hr). This southern portion would now be approaching the residual stages of gas production for a landfill, however as there are likely contributions of gas associated with degradation of the low-level hydrocarbons identified in the infill material. Consistent with the previous risk assessment findings, gas from this portion of the Site is considered to present a low to moderate risk.

Middle Area Filled 1985 to 1994 (earlier fill)

Recorded methane and carbon dioxide levels recorded during monitoring events M30-M33 at BH6 and BH11 were low with maximum peak methane at 8.1%v/v (BH6 – M33) and maximum carbon dioxide at 3.1%v/v (BH6 – M31), BH 13 was damaged and not suitable for monitoring. These levels are notably lower than previously recorded levels. Flow rates were low and did not exceed 0.8l/hr over the four monitoring events (M30-M33). The GSVs were typically <0.07l/hr with a single value of 0.1l/hr (BH6 – MW33). These results are broadly consistent with previous risk assessment and the overall evaluation that this portion of the Site presents a moderate to high risk remains valid.

Northern Area Filled up to 1994

The recorded results indicated moderate levels of methane up to 68.5%v/v (BH5 – M32) with the exception of the well (BH10) located closer to the earlier landfilled portion where the maximum recorded was 0.5%v/v. Likewise, carbon dioxide levels were higher for the more recently landfilled portion of this area with a maximum of 32.9%v/v (BH9 – M31) recorded. Similar to previous monitoring events, flow rates in these wells were generally very low and did not exceed 1.1l/hr with the exception of a single value of 7.2.l/hr recorded at BH10. Based on these results the calculated GSV of <0.7l/hr would be broadly consistent with the previous findings and it is considered that this portion of the Site presents a potentially high risk of gas generation.

4.2.2 Off-Site Monitoring Wells

Areas of Fill Beyond the Eastern and Southern Site Boundary

Recoded methane and carbon dioxide levels recorded for BH20 (note - BH21 was damaged and not suitable for monitoring) to the northeast of the boundary were low with peak methane (0.1%v/v) and carbon dioxide (1.0-1.6%v/v) similar to previously recorded results. The Flow rates were also low (0.4-0.6l/hr) and consistent with previous flow rates which have varied slightly over time indicating changes in the landfill conditions. Recorded methane results for BH23 to the south of the Site boundary indicated peak methane of 24.3%v/v and maximum carbon dioxide level of 4.1%v/v with low flow rates of up to 2.1l/hr recorded. Based on these results the gas generated in this area would present a low risk. However, as previously determined, gas detected at these offsite locations could be the result of gas generation from the fill material below these areas rather than offsite migration from the Site.

Areas of Fill Beyond Western Site Boundary

The boreholes beyond the western Site boundary (BH24 and BH25) were not located during the monitoring events.

4.2.3 Offsite Internal Gas Monitoring

The internal monitoring results for the 2017 monitoring event are presented in Tables 5 to 8 and are discussed below:

Calor Gas

Low levels of Methane (0.1% v/v) were detected at all locations within the Calor Gas facility using the GA2000. Detected levels did not exceed 0.1% v/v which is normally considered to be the action level for methane inside the buildings. Carbon dioxide was not detected during the 2017 monitoring event.

Methane was detected using the FID at a number of locations, with the highest recorded level of 2.2ppm detected at two 2No. locations in a pipe and a manhole beside hut.

Methane results for the 2017 monitoring event were very low and broadly consistent with results from previous monitoring events.

Clearway

Low levels of Methane (0.1% v/v) were detected at all locations within the Clearway facility during the first monitoring event on the 3rd February 2017 using the GA2000. Carbon dioxide was not detected during the first monitoring event.

Methane was detected during the second monitoring event on the 22nd February 2017 at concentrations of 4.3% v/v at the manhole beside the tool shed and at 5.9% v/v at the manhole in front of G1. Carbon dioxide was detected at the same locations 2.4% v/v and 2.5% v/v respectively during the second monitoring event.

Methane was detected using the FID at all locations during the first monitoring event with the highest level of 71.1ppm detected at the manhole in front of G1. During the second sampling methane was recorded at two 2No. locations 258ppm or 0.0258% v/v at the storage shed 1 and 16.5ppm (0.00165% v/v) at the crack in concrete (Back wall).

Cold Chon

Low levels of Methane (0.1% v/v) were detected at all locations within the Cold Chon facility using the GA2000. Detected levels did not exceed 0.1% v/v at the first monitoring event on the 3rd of February 2017. Lower levels of methane (0.01% v/v) were detected at all locations during the second monitoring event on the 22nd February 2017. Carbon dioxide was not detected during the 2017 monitoring events.

Methane was detected using the FID at a number of locations, with the highest level of 5.1ppm detected at one 1No. location at the skirting board in the manager's office toilet during the first sampling event. During the second sampling event only one 1No. methane value was detected using the FID (6pppm) in an exposed pipe.

Methane and carbon dioxide results for the 2017 monitoring event were generally consistent with results from previous monitoring events.

Waste Water Treatment Plant

During the first monitoring event 3rd February 2017, low levels of Methane (0.1% v/v) were detected at all locations within the waste water treatment plant (WWTP) facility using the GA2000. Detected levels did not exceed 0.1% v/v which is normally considered to be the action level for methane inside the buildings. Methane was not detected during the second monitoring event 22nd February 2017. Carbon dioxide was not detected during the 2017 monitoring events.

Methane was detected using the FID at all locations, with the highest level of 2.8ppm detected at the smaller office under the desk during the first sampling event. During the second sampling methane was not recorded at any location.

4.2.4 Review of Gas Risk Assessment

Overall, based on the findings of the 2017 gas monitoring sampling events, the following conclusions can be made:

- The gas monitoring results are consistent with the findings of previous gas monitoring events and any slight variations, would be expected given the nature of the waste materials with a landfill of this age.
- The risk posed by the presence of methane and carbon dioxide from the Site is variable. The southern parts of the landfill are at lower risk due to the age of the landfill grading to the northern parts, more recently filled areas which represents a moderate to higher risk associated with gas at this boundary.
- The results of the internal landfill gas surveys confirm that gas has been migrating offsite and entering properties via service ducts and drains where the highest levels were recorded within properties adjoining the northeast of the Site. There were no detections of gas within any of the offsite buildings and based on recorded results and there is no immediate risk to offsite properties along the northern end of Deepwater Berths Road due to the identified landfill gas concentrations.
- A potential risk to offsite properties to the northwest of the Site associated with offsite migration however this is considered low risk due to the geological setting of the Site.

4.3 Leachate Assessment

Leachate results were compared against published minimum and maximum observed ranges for acetogenic and methanogenic leachates (EPA (2000) for guidance purposes (Refer to Table 2). All parameters were either below or within the published ranges for acetogenic and methanogenic leachate composition. The only exceptions were chloride at BH20 (5,560mg/l) which is attributed to tidal influences and mercury at BH5 (8ug/l) and BH7 (7ug/l) compared to the acetogenic (<0.1ug/l to 1.5ug/l) and methanogenic(<0.1ug/l to 0.8ug/l). In general, the results for key leachate parameters BOD, COD, ammonia and MRP (molybdate reactive phosphorous) and metals are below the acetogenic and methanogenic ranges and generally have decreased compared to the 2009 data. The exception to this was at BH14 which is located at the south-eastern boundary of the Site where an increase in ammonia concentrations has been noted. Trace levels of petroleum hydrocarbons and compounds identified in the semi-volatile organic compounds analysis are interpreted to be associated with the decomposition of residual organic materials (e.g. food wastes) in the landfill material rather than a petroleum hydrocarbon source. As previously identified the leachate at BH14 is likely influenced by the offsite waste materials and are very much localised to these areas.

Overall, the concentrations of key indicator parameters including ammonia, MRP and BOD have declined since 2009 and were generally below the published ranges for acetogenic and methanogenic leachate composition. This can be attributed to the age of the landfill whereby leachate generation would be declining as well as dilution due to rainfall infiltration and tidal inundation.

Accordingly, leachate as a source of potential contaminants would be expected to continue to decline further over time.

4.4 Groundwater Assessment

Groundwater analytical results are presented in Table 1. In general, results were generally below the relevant groundwater GAC with the exception of ammonia and dissolved arsenic at BH2 (12ug/l) and BH3 (16.8ug/l and 16ug/l) sampled at low tide that exceeded the GAC of 7.7ug/l, elevated levels of chloride are indicative of saline intrusion. Importantly with the exception of ammonia, the reported concentrations of key indicator parameters including MRP and metals have declined or remain broadly similar to previous results which can be attributed to the fact that due to the age of the waste leachate generation is declining. Consequently, the concentration of the contaminants in the groundwater will continue to be expected to decline over time. The elevated concentrations of ammonia identified could be sourced from a combination of onsite and offsite sources.

4.5 Surface Water Quality Assessment

Reported analytical results for surface water samples (refer to Table 3) collected from ponds at the Site (SW3, SW5 and SW7) were below the freshwater EQS with the exception of ammonia at SW3 (0.05mg/l) and SW5(0.09mg/l). Given the recorded concentrations, this ammonia is likely naturally occurring and attributed to natural processes within the ponds (e.g. decaying vegetation) rather than any influence associated with a hydraulic connection with underlying waste materials.

Reported results for samples collected at the Garavogue River adjoining the Deep Water Berths Road (SW8 and SW9) upstream of the Site and the Garavogue Estuary adjoining the Site indicated that the surface water was impacted with ammonia (0.39mg/l to 0.75mg/l). All other parameters including BOD, MRP and metals were below the relevant EQS values. It is important to note that there is no EQS for ammonia in transitional or coastal waters, accordingly, the EQS for ammonia is used for indicative purposes only.

Reported results for the surface water sample collected from the Garavogue Estuary adjoining the Site and a discharge point from the wastewater treatment plant (SW2A) indicated that water has been impacted with ammonia (0.64mg/l to 3.42mg/l) compared with the EQS of 0.065mg/l for waters of good status. In addition, the results for the seepages observed from the toe of the landfill into the Garavogue Estuary (SW1) was below the EQS with the exception of ammonia (0.42mg/l to 0.44mg/l), this concentration is notably lower than the ammonia concentration in the leachate at the Site for which an average concentration of 5mg/l was reported; indicating dilution of leachate discharging from the Site due to tidal inundation.

An assessment of the dilution capacity within the Garavogue Estuary in the 2011 risk assessment concluded that based on a conservative evaluation excluding the influence of tidal flux significant dilution occurs in the Estuary which has been verified as part of this assessment taking account of the updated monitoring data. Considering a worst-case scenario based on maximum leachate concentrations at the Site that could potentially migrate offsite, it has been calculated that there would be a negligible increase in the region of 5% of MRP and BOD in the downstream receiving water (**Error! Reference source not found.**). The actual measured oncentrations of MRP (0.02mg/l and0.026mg/l) and BOD (<1mg/l) are below the relevant EQS.

Table 4-1 Summary OF Dilution Assessment

Monitoring Location	Ammonia (mg/l N)	BOD (mg/l)	MRP
Upstream (Garavogue River): Average Concentration Upstream SW8/9	0.398mg/l	3.75mg/l	0.02mg/l
Leachate Discharge from Site: Maximum Concentration onsite for 2017.	14mg/l	35mg/l	0.07mg/l
Downstream (Garavogue River / Estuary): Calculated concentration (% increase)	0.414mg/l (4% increase)	3.79mg/l (1% increase)	0.02mg/l (<1% increase)

The resulting concentration of ammonia, based on worst-case scenarios was calculated to range from 0.066mg/l to 0.76mg/l ammonia compared to actual measured concentrations of 0.64mg/l and 3.42mg/l in the receiving water (SW2A).

This verifies that while there are recorded fluctuations in the receiving surface water quality, there are likely other contributory sources in the vicinity of the Site contributing to the recorded ammonia concentrations in the Garavogue Estuary including potentially waste beneath offsite properties, the WWTP and offsite industrial facilities. A recent EPA inspection report for the WWTP (dated 3rd February 2017) highlighted that the EPA identified an unregistered outfall from the WWTP in addition to the outfalls where emissions are monitored. During this assessment, in addition to the seepages from the Site, a number of outfalls were noted along Deepwater Berths Road and the foreshore near the Site.

It is worth noting there is no EQS for saline or brackish water. This may be due to the fact that as the concentration of un-ionised ammonia, which is the fraction that is toxic to aquatic fauna and for which there is no readily available analytical method, decreases with increasing salinity thus reducing the potential toxicological impacts of ammonia in saline or brackish waters. Taking account of this fact, together with the considerable dilution within the receiving water it is considered that there is likely no unacceptable impact on the receiving water quality and the dependant sensitive habitats. Various studies of Sligo Harbour / Garavogue Estuary by a number of stakeholders for different purposes indicate that the water quality in the Sligo Harbour / Garavogue Estuary is good. Some of the key findings and studies include:

- Water sampling completed at various locations along the length of the River Garavogue and Estuary as part of the operation of the WWTP indicates that water quality downstream of the WWTP meets with the relevant EQS (Irish Water, 2016);

- Shellfish toxicity report (Irish Water, 2016) identified that there were no toxic impacts on assessed aquatic organisms;
- The Marine Institute detailed assessment of shellfish samples in Sligo Harbour concluded that the overall status of Sligo Harbour was good. (Marine Environment & Health Series, No. 38, 2011);
- Water Framework Directive (WFD) monitoring programme. The WFD status of the coastal water body, within which the outer part of the shellfish area is situated is classified as good. The transitional water body within which the inner part of the shellfish area is situated as well as the Garavogue River itself that discharges to the shellfish area are both classified as 'good' and considered satisfactory (WFD, 2015); and,
- Water Quality in Ireland (Environmental Protection Agency, 2010-2012)– EPA document designates the Garavogue Estuary, Sligo Harbour and Sligo Bay as 'unpolluted'. Biological indicators are reported as 'good' for the Garavogue Estuary, and as 'high' for Sligo Harbour and Sligo Bay.

In summary, based on all of the available water quality information, it is considered that there is no unacceptable impact on the receiving water quality associated with the leachate arising from the Site.

4.6 Ecological Assessment

This section of the report assesses potential ecological impacts, if any, of the closed former Finisklin Landfill Site. The ecological assessment is based on desktop studies that included a review of updated analytical results and field studies.

Given that the Site is located directly adjacent to both the Cummeen Strand / Drumcliff Bay SAC (000627) and Cummeen Strand SPA (004035) Figure 4-1. Natura 2000 sites, further consideration has been given to this area to assess potential impacts associated with the Site (Details of these sites are provided below). The key variables in determining whether or not a particular Natura 2000 site is likely to be negatively affected are: the physical distance to the Natura 2000 site; the sensitivities of the ecological receptors; and, the potential for in-combination effects.

Figure 4-1 Natura Sites adjacent to Site Boundary

The SAC and SPA are designated for the following Annex I & II habitats and species:

Qualifying Annex I Habitats for Cummeen Strand / Drumcliff Bay SAC

- *Estuaries*
- *Mudflats and Sandflats not covered by seawater at low tide;*
- *Embryonic shifting dunes;*
- *Shifting dunes along the shoreline with Ammophila arenaria (white dunes);*
- *Fixed coastal dunes with herbaceous vegetation (grey dunes);*
- *Juniperus communis formations on heaths or calcareous grasslands;*
- *Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites); and,*
- *Petrifying springs with tufa formation (Cratoneurion).*

Qualifying Annex II Species for the Cummeen Strand / Drumcliff Bay SAC

- Harbour Seal *(Phoca vitulina);*
- Narrow-mouthed Whorl Snail *(Vertigo angustior);*
- Sea Lamprey *(Petromyzon marinus); and,*
- River Lamprey *(Lampetra fluviatilis).*

Annex I Species for the Cummeen Strand SPA

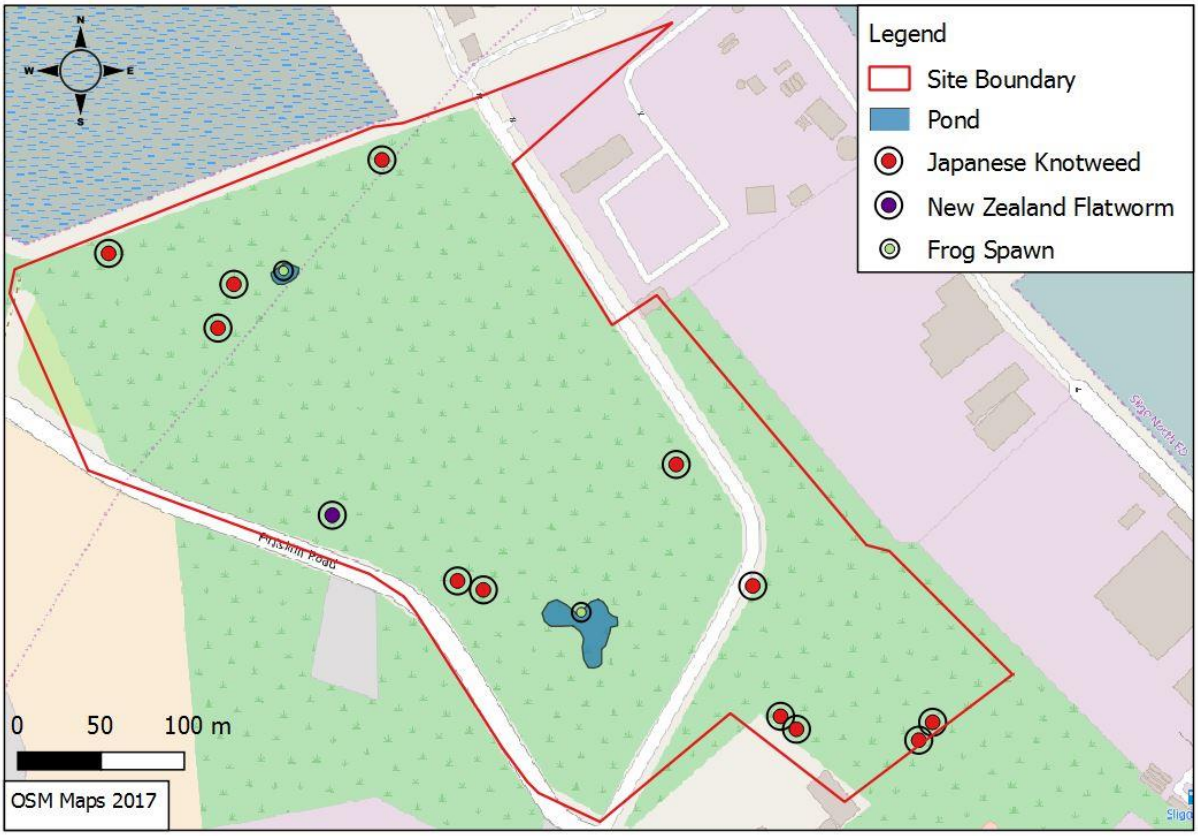
- Light-bellied Brent Goose (*Branta bernicla hrota*);
- Oystercatcher (Haematopus ostralegus);
- Redshank *(Tringa tetanus); and,*
- Wetland and Waterbirds.

4.6.1 Ecological Survey

Habitats within the Site

The Site is now well vegetated with a mix of rank, weedy vegetation, wet grassland and scrub (mostly willow). There are a number of low lying areas which were holding standing water at the time of the survey (See Figure XX below). During the Site walkover common frog (Rana temporaria) spawn was noted within both of these water bodies. Common frogs are protected under Schedule V of the Wildlife Act. A number stands of Japanese knotweed (*Fallopia japonica*) were identified on the Site Figure 4-2. In addition, New Zealand flatworm (*Arthurdendyus triangulatus*) was also noted on the Site. These are both controlled species.

Figure 4-2 Key Habitats and Ecological Features at the Site



The edge of the Site is stepped towards the rock armour. The rock armour is continuous along the margin of the Site extending around the waste water treatment facility.

Intertidal Area

The Site assessment undertaken in 2017 found that the Site conditions remain broadly the same as those encountered during the 2011 survey and that there has been no significant change to the intertidal area adjacent to the Site.

Habitats and Species Offsite

Birds

The vantage point surveys undertaken in 2011 (BES, 2012) and vantage point survey undertaken in 2017 did not identify any of the target bird species within the areas closest to the Site.

Although no species of birds for which the SPA is designated were observed on the Site or within the area of the bay close to the Site, these species were recorded within areas of the bay. Large numbers of feeding wading birds including light-bellies Brent goose, oystercatchers and redshank were noted along the central channel and scattered on the open flats, most notably on the large expanses of intertidal sandflats towards Coney Island.

From the surveys it is considered likely that the reason why so few birds were recorded within the study area was because the majority of birds were feeding out in the central part of the harbour where extensive intertidal areas were still exposed after the areas of the estuary within close proximity to the Site were fully covered. Furthermore, the central area of the harbour would probably offer more diverse feeding habitats and is also safer from potential disturbance and predators.

Common Seal

There is potential for seals to enter / forage within the section of the estuary directly adjacent to the Site. However the marine mammal survey completed on the 20th of June 2017 did not identify any suitable habitat or evidence of Common Seal activity within close proximity to the Site. The survey also did not identify any suitable haul out areas onsite or within close proximity to the Site. Furthermore, the conservation objectives for the Cummeen Strand / Drumcliff Bay SAC (NWPS, 2013) does not identify any breeding or haul out sites for common seal within Sligo harbour. The document does however identify a number of breeding and resting sites located within Drumcliff Bay with the nearest suitable breeding and resting sites located c. 5.25km and 6.5km north west of the Site respectively (Refer to Appendix E). Drumcliff bay is however at its nearest point over 3.65km away from the Site, however the bay is separated and therefore well screened from the Site and Sligo harbour by a large headland / peninsula. In addition, the NBDC (NBDC, 2017) does not hold any records of seal within this area.

It was also noted during the surveys at the Site, that there is an elevated ambient noise level within the area resulting from existing human related activities, mostly notably from the WWTP, the road and other industrial units within the area. It is therefore considered that the area of the estuary within close proximity of the Site is suboptimal for seals.

The field studies conducted in 2017 confirmed the findings of past studies as no evidence was identified of any significant impacts from the Site on species of birds or seal for which the SAC and SPA are designated or on any other habitats.

4.7 Ecological Assessment Review

Based on the findings of the surface water quality assessment, including the fact that there is considerable dilution within the Garavogue Estuary, no significant impacts on the receiving water environment were identified associated with leachate arising from the Site. Furthermore, ammonia does not bio-accumulate (UKMPA, 2001), and therefore impacts on species further up the food chain such as those species for which the SAC and SPA are designated are not considered likely to occur.

The findings of the survey verify those of the previous survey as they confirmed that the sediments and associated macro-invertebrate fauna of the area adjoining the Site are typical of an Irish estuarine ecosystem. Also there has been no significant change in the species

composition between 2011 and 2017. It was also noted in the 2012 study (BES, 2012) that the sediments and macro-invertebrate fauna immediately below the Site may potentially have higher levels of some of the constituents of leachate than would otherwise be expected (as sediments can be long-term reservoirs of trace metals, pesticides etc.). It was also noted that theoretically, potentially harmful substances could be taken up by birds (top of estuarine food chain) and bioaccumulate in their tissue. However, it is considered unlikely that contaminants derived from landfill leachate are causing a significant environmental threat, and especially a threat to birds, for the following reasons:

- Contaminants reaching the estuary from the Site are subject to high dilution and dispersion by tidal waters.
- The baseline data from various monitoring studies on water quality and shellfish all indicate that the environmental quality of Sligo Harbour is generally good.
- For an individual bird to accumulate significant quantities of contaminants it would presumably need to be feeding regularly on the infauna in the immediate area of the Site (assuming there are contaminants in the various macro-invertebrate species in the first place). However, this is not the case as the sediments below the Site are only exposed for about half the period of low tide and do not appear to be a favoured feeding area (the very extensive intertidal flats of the central part of the harbour provide the main feeding area). Furthermore, Sligo Harbour is only part of the Sligo Bay wetland complex and the wintering wetland birds of Sligo Harbour move readily between the other two bays (i.e. Ballysadare and Drumcliff). And as noted above, the main exceedance at the Site was noted for ammonia, which does not bio-accumulate.
- While long-term historic baseline data on bird populations are not available for the Finisklin area of Sligo Harbour, recent data 2014/15 I-WeBS survey recorded the highest number for Redshank within the last 10 years and that Sligo Harbour continues to support important concentrations of wetland bird species.

Accordingly, based on the findings of the ecological assessment taking cognisance of the updated surface water quality assessment for the Site it is reasonable to consider that there is no evidence to suggest that there has been any significant impact on the aquatic habitats within the SAC / SPA adjoining the Site.

5 TIER 3 RISK ASSESSMENT REVIEW

5.1 Tier 3 Evaluation of Risk

Based on the revised CSM and the identified source–pathway–receptor pollutant linkages, an evaluation of the potential risk associated with each of the valid linkages. This Tier 3 risk assessment review incorporates, where available, the updated site-specific dataset in order to evaluate the findings of the previous detailed quantitative risk assessment.

5.1.1 Landfill Gas Migration

It has been verified from the supplementary data compiled for this assessment that the risk posed by the presence of methane and carbon dioxide from the Site is variable. The southern, older parts of the Site present a lower risk grading to a moderate-high risk towards the northern, more recently landfilled portion of the Site.

Remedial action is warranted to address the risk of offsite migration of gas from the northern portion of the Site across the northeastern boundary. However, there has been no evidence recorded to suggest an immediate risk to any of these buildings located along the northern end of Deepwater Berths Road.

The western portion of the Site is underlain by clayey soil which limits the potential for widespread offsite gas migration towards the west. There are also a limited number of isolated receptors along this boundary and the risk of gas migrating beyond this boundary is considered low. However, as a precautionary measure, remedial action is warranted to address the potential risks.

There remains a potential risk of gas migration to the south and east as the landfill material extends beyond the Site boundary which enables both migration of gas and is also a likely contributor of landfill gas emissions. The results from the internal survey at offsite properties verify that landfill gas emissions continue to migrate offsite along preferential pathways such as service ducts and drains.

The gas flow rates recorded during the recent monitoring events continue to be at relatively low levels. Therefore, an active landfill gas system is not required and a passive venting system is considered to be the most appropriate for the Site.

5.1.2 Leachate Migration

Given that there is no landfill liner or natural confining layer present there is a pathway between the leachate and the groundwater body beneath the Site and groundwater impacts attributed to landfill leachate remain. However, based on the age of the landfilled material and the reported results, the identified impacts are expected to continue decline over time.

Leachate is migrating from the Site into the adjoining Garavogue Estuary and the SAC/SPA however taking account of the findings of the updated monitoring data and surface water assessment together with the ecological assessment it is considered that there is no significant impact on the receiving water quality and aquatic habitats within the SAC/SPA adjoining the Site.

Accordingly, any potential impacts on the receiving environment associated with leachate are not considered further and remedial action is not warranted.

5.2 Revised Conceptual Site Model

Based on the findings of the findings of the Tier 3 risk evaluation the only remaining pollutant linkage that warrants further consideration and remedial action is:

- Human health exposure pathway of offsite migration of landfill gas and emission into offsite building (SPR10).

The pollutant linkages associated with offsite migration of leachate from the Site do not require further consideration.

6 CONCLUSIONS

Based on the results and information gathered during the 2017 monitoring sampling events that included collection of samples over two monitoring events at both high and low tides with an additional 16No. groundwater samples, 23No. leachate samples, two (2No.) leachate seepage samples, six (6No) surface water samples from the receiving waters and six (6No.) samples from onsite surface water ponds, two landfill gas monitoring events, two offsite gas surveys, two ecological surveys and assessment and interpretation of the results as part of the Tier 3 risk assessment in accordance with the EPA Code of Practice, it is reasonable to conclude the following:

- The Conceptual Site Model for the Site and the findings of the environmental assessment remain valid.
- The presence of leachate at the Site and the potential impact associated with the pathway of migration to groundwater was expected to decline overtime, however offsite sources are also likely impacting on groundwater beneath the Site.
- It was verified with the compilation of additional samples that the potential impact associated with leachate migrating via seeps to the adjoining surface waters would not have any impact on the overall water quality of the Garavogue Estuary. Accordingly, there is no unacceptable risk to the adjoining receiving waters of the Garavogue Estuary.
- There is no adverse impact on the sensitive ecological habitats within the adjoining Natura 2000 site associated with the potential pathway of leachate migration offsite.
- Landfill gas monitoring results indicate that landfill gas levels are broadly consistent since monitoring commenced in 2009, however as would be expected given the variable nature of the fill and the complex setting of the Site some variations do occur.
- The findings of the quantitative gas risk assessment were verified and it was confirmed that gas continues to be migrating beyond the northeastern Site boundary. While it was verified that there was no immediate risk to any of the offsite properties associated with gas arising from the Site remedial action is warranted.
- It is considered that the potential risk of offsite migration of gas beyond the northwestern boundary remains very low. Regardless, as a precautionary measure remedial measures are considered to be warranted.
- The gas flow rates recorded during the recent monitoring events continue to be at relatively low levels. Therefore, a passive venting system such as the Virtual Curtain system remains to be the most appropriate for the Site.

7 REMEDIATION AND RESTORATION STRATEGY

Based on the findings of the review of the Tier 3 risk assessment which verified the CSM for the Site and the fact that the key pollutant linkages remaining that warrant remediation is SPR10 (Landfill Gas – Human Presence Offsite). The scope of the remediation and restoration are set out below.

All remediation works will be supervised onsite by appropriately qualified and competent persons on behalf of Sligo Co. Co.

7.1 Landfill Gas Passive Vent Measures

A review of the remediation strategy for passive venting of the landfill gasses along the northern portion of the eastern Site boundary to prevent possible migration toward the offsite buildings along Deepwater Berths Road indicated that the Virtual Curtain system remains the most viable remedial option for this area based on logistical, programme and cost considerations as well as sustainability criteria including quantity of in-situ waste and capping material that would need to be removed. Taking account of these factors, the findings of this review indicated that a Virtual Curtain system would be a more feasible approach for the northern section of the western Site boundary rather than the previously proposed venting well system.

The Virtual Curtain system will be installed along 165m of the northeast Site boundary and along 85m length of the northwest boundary Refer to Drawing 4.

7.2 Validation Gas Monitoring

Following the installation of the remedial measures along both the north, eastern and western Site boundaries three monthly monitoring events comprising of both internal and landfill gas monitoring will be undertaken to confirm the effectiveness of the remedial measures. Quarterly gas monitoring will be continued for one-year post installation.

7.3 Landfill Restoration

In accordance with the land zoning and local area development plan for the Site, the northern portion of the Site will be developed as a local amenity area with particular emphasis on nature conservation, ecological enhancement and education in accordance with the guidance set out in the EPA Landfill Manuals: Restoration and Aftercare (EPA, 1999) The landscape design for the Site takes account of the environmental setting of the Site, the proposed landfill gas remediation strategy as well as identified ecological constraints (e.g. invasive species: Japanese Knotweed). Importantly, as the overall landfill gas remediation strategy takes account of the fact that gas passively vents to the atmosphere via the landfill ground surface where capping material is of variable/high permeability or absent, the surface cover will not be altered significantly and no additional soil will be imported as part of the landscape works. The proposed landscape design and rationale is appended to this report (Appendix D). The overall design ethos for the landscape design was to enhance the existing amenity and make it available for the community with an emphasis on education and ecological enhancement.

7.4 Construction Environmental Management

7.4.1 Ecological Management and Mitigation

Natura Impact Statement

A Natura Impact Statement (NIS) was prepared for the required schedule of remediation works on the basis that the EPA determined in the Appropriate Assessment Screening dated 15th December 2016 that a NIS was required for the Site. The NIS is appended to this report

(Appendix E). The key finding of the NIS is that there will be no deleterious impact on the SAC and SPA adjoining the Site associated with the remedial works including the installation of Virtual Curtain system. All remedial works will be subject to the strict implementation of a Construction Environmental Management Plan (CEMP) for the works.

Ecological Management

In addition, to the findings of the NIS, other key ecological protection measures will be incorporated into the CEMP to prevent any adverse impact on the receiving SAC/SPA habitats.

Key elements incorporated into the CEMP will include:

- Prevention of runoff containing contaminants and sediment to the adjoining surface water of the Garavogue Estuary;
- Measures to prevent spread of invasive species identified at the Site including Japanese knotweed and New Zealand flatworm.
- Measures to prevent any impact on the common frog which has been identified in ponds on the Site to ensure there are no impacts on the species.
- Measures to prevent impacts on nesting birds including minimising vegetation clearance works, however the works will take place outside of the nesting season (i.e. 1st March to 31st September).

An ecological clerk of works will be onsite at key stages of the remediation works to ensure that all preventative measures are correctly implemented and amended as required.

7.4.2 Water Quality Monitoring

Water quality monitoring in the adjoining Garavogue Estuary will be undertaken during the construction phases of the remediation works (i.e. Virtual Curtain and landscape work) to verify that there are no impacts on the receiving water environment in accordance with the recommendations of the NIS. Monitoring will be carried out monthly for the duration of the remediation site works.

7.4.3 Waste Management

Waste management procedures set out in the CEMP will ensure all surplus materials generated during the installation of the gas vent infrastructure of the landscape works will be managed appropriately onsite and removed offsite in accordance with all legislative requirements.

7.5 Remediation Programme

SCC is committed to commissioning and undertaking the outlined remedial works during 2017 subject to receipt of the necessary approval from the EPA.

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TABLES

Table 1: Groundwater Analytical Results

Sample ID		Groundwater Quality Standards			BH1				BH1H		BH2				BH2H		BH3				BH3H		BH4				BH4H	
Laboratory Report No.		**Groundwater Regulations (S.I. No. 9 of 2010, SI No. 149 of 2012, SI No. 366 of 2016) [1]**	*EPA Interim Guideline Value (IGV) for Groundwater [2]*	**Drinking Water Standards (S.I. 278 of 2007 & S.I. 122 of 2014[3])**	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17-4344
Sample Date					25/06/2009	16/07/2009	01/02/2017	20/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017
Field Parameters	**Unit**																											
Temperature	ºC	~	25	~	11.9	13.1	11.11	11.2	11.06	11.85	12.2	13	10.22	11.1	11.63	11.24	12.8	11.9	10.55	11.1	11.5	11.38	13.5	14.1	10.91	10.8	11.72	11.75
Dissolved Oxygen	mg/l				-	-	2.14	6.44	1.82	1.62	-	-	7.46	7.16	1.33	2.56	-		7.64	7.75	1.44	6.19			1.52	4.67	1.49	1.72
Dissolved Oxygen (DO)	%	~	NAC	~	-	55.7	19.9	59.14	17.23	14.98	-	40.6	68	66.4	12.77	23.46	-	4	71.08	71.4	13.9	56.68	-	35.4	14.19	43.06	14.43	15.85
Electrical Conductivity (EC)	µS/cm	800 / 1,875 #	1,000	2,500	**822**	**934**	680.87	763.34	780.31	**852.88**	***2,859***	***2,520***	420.83	***1341.6***	***1331.6***	***1354.4***	***5,410***	***4,710***	***2,237***	713.83	***2,383***	***22894.00***	***1,745***	***1,662***	**899**	**845.69**	**941**	**907.28**
Oxidation Reduction Potential (ORP)	mV	~	~	~	95	-27	32.6	-48.3	-6.9	110	-133	103	-75.7	-68.7	-123.1	-94.5	-85	-125	-276	-73.2	-140.1	-74.6	-109	111	110.7	-75.1	-89.1	-83.2
pH	pH units	~	6.5-9.5	6.5-9.5	6.78	7.47	6.78	7.1	6.81	6.64	7.02	7.21	6.96	7.18	6.99	6.9	7.29	7.35	7.43	7.4	7.43	7.55	6.8	6.92	6.79	6.99	6.87	6.76
Colour	N/A	~	NAC	ATC and NAC	Slightly cloudy brown/ grey	Slightly cloudy/grey	Cloudy then Clear, S.S.	Brown tint, Few S.S.	Clear, S.S.	Clear, Few S.S.	Cloudy brown/ grey	-	Cloudy, S.S.	Clear, Few S.S.	Cloudy, S.S.	Clear, Some S.S.	Cloudy brown	Cloudy yellow	Brown, Some S.S.	Clear, Few S.S.	Cloudy brown, S.S.	Brown, S.S.	Slightly cloudy grey	Clear	Clear	Clear, S.S.	Clear, some S.S.	Clear, Few S.S.
Odour / Other observations	N/A	~	~	ATC and NAC	None	None	No odour, NEC	No odour, NEC	No odour, NEC	No odour, NEC	None	-	No odour, NEC	No odour, NEC	No odour, NEC	Slight odour, NEC	Silty	None	No odour, NEC	No odour, NEC	No odour, NEC	No odour, NEC	None	None	No odour, NEC	No odour, NEC	No odour, NEC	Odour, NEC
Laboratory Parameters																												
Inorganics																												
Sulphate	mg/l	187.5	200	250	39.61	40.39	11.5	12.7	11.8	12	86.29	94.71	13.3	11.9	15.7	11.6	0.09	57.26	20.7	<0.5	<0.5	<0.5	1.91	1.16	<0.5	<0.5	3	<0.5
Chloride	mg/l	24 / 187.5 #	30	250	***40.5***	***42.8***	***53.1***	***83.3***	***69.6***	***78.4***	***469.7***	***457.1***	***115.9***	***112.6***	***127.3***	**128.2**	***777.30***	***788.80***	***369.4***	***306.4***	***314.2***	***330.9***	***114.70***	***122.20***	***59.00***	***55.7***	***73***	***58.6***
Fluoride	mg/l	~	1	0.8	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	0.4	0.4	0.3	0.6	0.3	0.60	0.50	*1.6*	0.7	0.7	*0.8*	<0.3	<0.3	<0.3	<0.3	0.3	<0.3
Molybdate Reactive Phosphuros (MRP)	µg/l PO4	11.4	~	~	7	**57**	<60	<60	<60	<60	**31**	**290**	<60	<60	<60	<60	**84**	**405**	**80**	<60	<60	<60	**32**	**330**	<60	<60	<60	<60
Ammoniacal Nitrogen as N	mg/l	0.065 / 0.175 ##	0.12 *	0.23 *	<0.1	**0.40**	**6.65**	**8.57**	**10.51**	**8.89**	**1.58**	**22.10**	**30.76**	**34.19**	**37.13**	**38.38**	**15.03**	**75.90**	**34.32**	**64.29**	**65.01**	**38.03**	**5.54**	**31.10**	**23.3**	**23.17**	**23.09**	**22.58**
Indicators																												
Total Organic Carbon (TOC)	mg/l	~	NAC	NAC	<2	<2	<2	7	<2	5	<2	<2	<2	17	<2	15	<2	12	7	29	7	23	<2	<2	<2	19	<2	11
Total Cyanide	µg/l	~	10	50	<40	<40	10.00	<10	<10	<10	<40	<40	10	<10	<10	<10	<40	<40	<10	<10	<10	<10	<40	<40	<10	<10	<10	<10
Total Alkalinity as $CaCO_3$	mg/l	~	NAC	~	416	268	518	578	554	578	1,364	800	728	856	880	882	1,920	1,685	3,572	1540	1,594	1636	716	608	610	626	614	606
Total Oxidised Nitrogen as N	mg/l	~	NAC	~	0.36	0.43	0.80	0.40	0.5	0.50	<0.05	<0.05	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	<0.2	<0.2	<0.2	<0.2	0.06	<0.05	<0.2	<0.2	<0.2	<0.2
Total Dissolved Solids (TDS)	mg/l	~	1,000	~	407	408	587	693	580	634	*1,531*	*1,571*	898	954	*1,513*	*1005*	*2,871*	*2,745*	*2,562*	*1926*	*1,818*	*1985*	*1,690*	742	630	631	662	621
Microbiological																												
Faecal Coliforms	cfu/100ml	~	0	0	*>1,000*	*>1,000*	0	0	0	*1*	*>1,000*	*>1,000*	0	0	0	0	*>1,000*	0	0	0	0	*2*	*>1,000*	0	0	0	0	0
Total Coliforms	cfu/100ml	~	0	0	*>1,000*	*>1,000*	*1*	*28*	*20*	*5*	*>1,000*	*>1,000*	*8*	*9*	0	0	*>1,000*	*>1,000*	*1*	*>100*	*25*	*11*	*>1,000*	*>1,000*	0	0	0	*13*
Metals (Total)																												
Dissolved Arsenic	ug/l	7.5	10	10	-	-	<2.5	4.40	<2.5	<2.5	-	-	3.5	**12**	5.9	2.7	-	-	**16.8**	**16**	6	3.8	-	-	3	6.70	<2.5	<2.5
Dissolved Boron	ug/l	~	1,000	1,000	-	-	121	147	166	146	-	-	663	728	733	811	-	-	*1852*	*2092*	*1920*	*2095*	-	-	337	338	349	339
Dissolved Cadmium	ug/l	~	5	5	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l	~	200	~	-	-	153.10	163.80	172.8	165.50	-	-	110.9	114.9	122.9	116.0	-	-	50.5	43	45.8	47.9	-	-	152.9	141	143.4	141.90
Dissolved Chromium	ug/l	37.5	30	50	-	-	<1.5	<1.5	<1.5	<1.5	-	-	<1.5	<1.5	<1.5	<1.5	-	-	<1.5	<1.5	<1.5	<1.5	-	-	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l	~	30	2000	-	-	<7	<7	<7	<7	-	-	<7	<7	<7	<7	-	-	27	<7	<7	9.0	-	-	<7	<7	<7	<7
Total Dissolved Iron	ug/l	~	200	200	-	-	<20	<20	<20	<20	-	-	270	<20	<20	<20	-	-	51	59	52	56.0	-	-	<20	<20	115	<20
Dissolved Lead	ug/l	7.5	10	10	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5
Dissolved Magnesium	mg/l	~	50	~	-	-	17.30	21.50	22	21.00	-	-	43.8	44.3	47.2	46.4	-	-	*67.5*	*96*	*109.4*	*86.5*	-	-	30	27.70	30	28.30
Dissolved Manganese	ug/l	~	50	50	-	-	*812*	*1442*	*1243*	*1278*	-	-	*333*	*313*	*265*	*310*	-	-	*167*	*170*	*141*	*397*	-	-	*438*	*438*	*448*	*429*
Dissolved Mercury	ug/l	0.75	1	1	-	-	<1	<1	<1	<1	-	-	<1	<1	<1	<1	-	-	<1	<1	<1	<1	-	-	<1	<1	<1	<1
Dissolved Nickel	ug/l	~	20	20	-	-	5	7	7	7	-	-	3	<2	6	<2	-	-	11	7	5	7	-	-	<2	<2	<2	<2
Dissolved Potassium	mg/l	~	5	~	-	-	*7.50*	*9.40*	*11.8*	*9.30*	-	-	*34.3*	*35.5*	*39.9*	*38.1*	-	-	*66.8*	*128*	*128.4*	*94.0*	-	-	*18.1*	*16.20*	*17.9*	*16.60*
Dissolved Sodium	mg/l	~	150	200	-	-	49.20	58	62.4	55.30	-	-	*183.9*	*165.5*	*190.4*	*179.6*	-	-	*652.6*	*510*	*470.2*	*517.0*	-	-	65.1	50.70	76.7	55.30
Dissolved Zinc	ug/l	75	100	~	-	-	<3	<3	<3	<3	-	-	<3	<3	<3	<3	-	-	15	5	4	31	-	-	<3	<3	<3	<3
Arsenic	µg/l	7.5"	10	10	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	3.5	*13.5*	*43.6*	*26.1*	*14.7*	*24.1*	7.7	8	*59.1*	6.7	7.5	*22.3*	4	9.3	5.2	7.0	3.2	7.0
Boron	µg/l	~	1,000	1,000	42	70	<12	145	158	143	*1,223*	*1,353*	677	703	641	786	*2,279*	*2,471*	*1657*	*2,063*	*1793*	*1,990*	473	535	264	324	288	332
Cadmium	µg/l	~	5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5
Calcium	mg/l	~	200	~	137.80	127.70	145.70	175.20	170.1	186.50	75.36	83.26	126.3	127	152.5	131.70	41.78	58.6	*1053*	85.60	103.4	*285.70*	144.7	125.4	149.7	151.00	148.2	156.50
Chromium	µg/l	37.5"	30	50	2.0	<1.5	2	<1.5	<1.5	<1.5	1.8	4.0	2	<1.5	4.8	<1.5	2.7	4.5	*45.3*	4	4.5	10	1.8	5.7	<1.5	<1.5	<1.5	<1.5
Copper	µg/l	~	30	2000	<7	9	<7	<7	<7	<7	<7	8	16	<7	9	9	<7	*33*	*173*	<7	<7	29	<7	<7	<7	<7	<7	<7
Iron	µg/l	~	200	200	31	*273*	*3480*	*899*	*1393*	*1369*	127	*9,278*	*45190*	*27920*	*22410*	*27940*	116	*11,630*	97530	*6814*	*12400*	*24570*	152	*21,240*	*19580*	*18470*	*11980*	*17790*
Lead	µg/l	7.5"	10	10	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	7	<5	<5	<5	*90*	<5	5	<5	5	<5	<5	<5	<5	<5
Magnesium	mg/l	~	50	~	10.83	11.64	17.30	23.30	20.5	23.60	*60.14*	49.59	43.3	48.5	45.6	*53.40*	*136.2*	*101.6*	*84.8*	*111.40*	*109.7*	*110.90*	43.29	37.03	28.1	30.10	30.3	30.90
Manganese	µg/l	~	50	50	17	*100*	*862*	*1417*	*1211*	*1255*	*278*	*462*	*404*	*318*	*366*	*317*	*131*	*533*	*2189*	*243*	*261*	*806*	*504*	*617*	*439*	*420*	*439*	*417*
Mercury	µg/l	0.75"	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	µg/l	~	20	20	3	6	8	7	7	7	6	10	9	<2	*20*	<2	16	9	*212*	12	20	*37*	5	<2	<2	<2	3	<2
Potassium	mg/l	~	5	~	*5.40*	4.66	*7.20*	*10.30*	*11*	*9.80*	*58.11*	*44.53*	*30.8*	*37.7*	*37.8*	*41.60*	*183.2*	*119.1*	*61*	*121.20*	*129.5*	*104.90*	*30.58*	*23.55*	*16.9*	*17.50*	*17.5*	*17.40*
Sodium	mg/l	~	150	200	31.85	31.66	53.00	60.50	56.1	59.20	*477.80*	*388*	*171.9*	*174.5*	*185.7*	*202.40*	*756.4*	*633.4*	*667.9*	*458.10*	*475.1*	*524.70*	108.9	85.17	60.3	54.10	76.3	56.90
Zinc	µg/l	75"	100	~	4	12	6	<3	<3	<3	5	28	42	6	33	5	6	18	*583*	25	35	*129*	5	9	4	5	4	3
Pesticides																												
Atrazine	µg/l	0.075	1	~	<1	<1	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-
Simazine	µg/l	0.075	1	~	<1	<1	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-
Organochlorine Pesticides																												
Aldrin	ug/l	~	0.01	0.03	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Alpha-HCH (BHC)	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Beta-HCH (BHC)	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Delta-HCH (BHC)	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Dieldrin	ug/l	~	0.01	0.03	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Endosulphan I	ug/l	~	0.001	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Endosulphan II	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Endosulphan sulphate	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Endrin	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Gamma-HCH (BHC)	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Heptachlor	ug/l	~	~	0.03	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	ug/l	~	~	0.03	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
o,p'-Methoxychlor	ug/l	~	~	0.1	-	-	<0.01	<0.05	<0.03	<0.01	-	-	<0.01	<0.05	<0.03	<0.01	-	-	<0.03	<0.05	<0.03	<0.01	-	-	<0.03	<0.05	<0.03	<0.01
p,p'-DDE	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
p,p'-DDT	ug/l	~	~	0.1	-	-	<0.01	<0.05	<0.03	<0.02	-	-	<0.01	<0.05	<0.03	<0.02	-	-	<0.03	<0.05	<0.03	<0.02	-	-	<0.03	<0.05	<0.03	<0.02
p,p'-Methoxychlor	ug/l	~	~	0.1	-	-	<0.01	<0.05	<0.03	<0.02	-	-	<0.01	<0.05	<0.03	<0.02	-	-	<0.03	<0.05	<0.03	<0.02	-	-	<0.03	<0.05	<0.03	<0.02
p,p'-TDE	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Organophosphorus Pesticides																												
Azinphos methyl	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Dichlorvos	ug/l	~	0.001	~	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Disulfoton	ug/l	~	~	0.1	-	-	<0.02	<0.01	<0.01	<0.01	-	-	<0.02	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Ethion	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Ethyl Parathion (Parathion)	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Fenitrothion	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Malathion	ug/l	~	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Methyl Parathion	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Mevinphos	ug/l	~	~	0.1	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01

Table 1: Groundwater Analytical Results

Sample ID		Groundwater Quality Standards			BH1				BH1H		BH2				BH2H		BH3				BH3H		BH4				BH4H	
Laboratory Report No.		**Groundwater Regulations (S.I. No. 9 of 2010, SI No. 149 of 2012, SI No. 366 of 2016)** [1]	*EPA Interim Guideline Value (IGV) for Groundwater* [2]	**Drinking Water Standards (S.I. 278 of 2007 & S.I. 122 of 2014)** [3]	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17-4344
Sample Date					25/06/2009	16/07/2009	01/02/2017	20/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017
TPH CWG																												
Aliphatics																												
>C5-C6	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>C6-C8	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>C8-C10	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>C10-C12	ug/l	~	0.01	~	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5
>C12-C16	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>C16-C21	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>C21-C35	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
Total aliphatics C5-35	ug/l				-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
Aromatics																												
>C5-EC7	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>EC7-EC8	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>EC8-EC10	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>EC10-EC12	ug/l	~	0.01	~	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5	-	-	<5	<5	<5	<5
>EC12-EC16	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>EC16-EC21	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
>EC21-EC35	ug/l	~	0.01	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
Total aromatics C5-35	ug/l	~	~	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
Total aliphatics and aromatics(C5-35)	ug/l	~	10	~	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	-	<10	<10	<10	<10
Semi-Volatile organic compounds (SVOCs)																												
Phenols																												
2-Chlorophenol	µg/ l	~	200	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
2-Methylphenol	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
2,4,5-Trichlorophenol	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/ l	~	200	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Chloro-3-methylphenol	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Nitrophenol	µg/ l	~	~	~	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	µg/ l	~	2	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Phenol	µg/ l	~	0.5 ◊	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
PAHs																												
2-Chloronaphthalene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
2-Methylnaphthalene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Naphthalene	µg/ l	~	1	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Acenaphthylene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Acenaphthene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Fluorene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Phenanthrene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Anthracene	µg/ l	~	10,000	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Fluoranthene	µg/ l	~	1	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Pyrene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Chrysene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Benzo(bjk)fluoranthene	µg/ l	0.075 [4]	0.55 [7]	0.1 [4]	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Benzo(a)pyrene	µg/ l	0.0075	0.01	0.01	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Indeno(123cd)pyrene	µg/ l	0.075 [4]	0.05	0.1 [4]	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Dibenzo(ah)anthracene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Benzo(ghi)perylene	µg/ l	0.075 [4]	0.05	0.1 [4]	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Phthalates																												
Bis(2-ethylhexyl) phthalate	µg/ l	~	8	~	<10	<10	<5	<5	<5	<5	<10	<10	<5	<5	<5	<5	<10	<10	<5	<5	<5	<5	<10	<10	<5	<5	<5	<5
Butylbenzyl phthalate	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Di-n-butyl phthalate	µg/ l	~	2	~	<10	<10	<1.5	<1.5	<1.5	<1.5	<10	<10	<1.5	<1.5	<1.5	<1.5	<10	<10	<1.5	<1.5	<1.5	<1.5	<10	<10	<1.5	<1.5	<1.5	<1.5
Di-n-Octyl phthalate	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Diethyl phthalate	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Dimethyl phthalate	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Total Phthalates	µg/ l		~	5	<60	<60					<60	<60					<60	<60					<60	<60				
Additional SVOCs																												
SVOC TICs (trace organics)	µg/l	~	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/ l	~	10	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/ l	~	0.4	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
1,4-Dichlorobenzene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
2-Nitroaniline	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
2,4-Dinitrotoluene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
3-Nitroaniline	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Bromophenylphenylether	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Chloroaniline	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Chlorophenylphenylether	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
4-Nitroaniline	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Azobenzene	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Carbazole	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/ l	~	0.03	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Hexachlorobutadiene	µg/ l	~	0.1	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Hexachlorocyclopentadiene	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Hexachloroethane	µg/ l	~	~	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1
Isophorone	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
N-nitrosodi-n-propylamine	µg/ l	~	~	~	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	µg/ l	~	10	~	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1	<10	<10	<1	<1	<1	<1

Table 1: Groundwater Analytical Results

Sample ID		Groundwater Quality Standards			BH1				BH1H		BH2				BH2H		BH3				BH3H		BH4				BH4H	
Laboratory Report No.		**Groundwater Regulations (S.I. No. 9 of 2010, SI No. 149 of 2012, SI No. 366 of 2016) [1]**	*EPA Interim Guideline Value (IGV) for Groundwater [2]*	**Drinking Water Standards (S.I. 278 of 2007 & S.I 122 of 2014)[3]**	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3335	17-4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17/4344	09/1801	09/2082	17/3501	17/4399	17/3507	17-4344
Sample Date					25/06/2009	16/07/2009	01/02/2017	20/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017	25/06/2009	16/07/2009	01/02/2017	21/02/2017	02/02/2017	20/02/2017
Volatile organic compounds (VOCs)																												
VOCs TICs (trace organics)	µg/l	~	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	µg/l	10	30	~	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1
Chloromethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	µg/l	0.375	~	0.5	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1
Bromomethane	µg/l	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Trichlorofluoromethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene	µg/l	~	30	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Dichloromethane	µg/l	~	10	~	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5
trans-1-2-Dichloroethene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	µg/l	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chloroform	µg/l	~	~	100 [5]	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2
1,1,1-Trichloroethane	µg/l	~	500	~	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2
1,1-Dichloropropene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride *	µg/l	~	2	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dichloroethane	µg/l	2.25	3	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	µg/l	0.75	1	1	<3	<3	<0.5	<0.5	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5
Trichloroethene	µg/l	7.5	70	10 [6]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibromomethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Bromodichloromethane	µg/l	75 [5]	~	100 [5]	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2
cis-1-3-Dichloropropene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	µg/l	525	10	~	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5
trans-1-3-Dichloropropene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,2-Trichloroethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachloroethene	µg/l	7.5 [6]	40	10 [6]	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibromochloromethane	µg/l	75 [5]	~	100 [5]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chlorobenzene	µg/l	~	1	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,1,2-Tetrachloroethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/l	~	10	~	<3	<3	<1	<1	<1	<1	<3	<3	<1	<1	<1	<1	<3	<3	<1	<1	<1	<1	<3	<3	<1	<1	<1	<1
p/m-Xylene	µg/l	~	10 **	~	<5	<5	<2	<2	<2	<2	<5	<5	<2	<2	<2	<2	<5	<5	<2	<2	<2	<2	<5	<5	<2	<2	<2	<2
o-Xylene	µg/l	~	10 **	~	<3	<3	<1	<1	<1	<1	<3	<3	<1	<1	<1	<1	<3	<3	<1	<1	<1	2	<3	<3	<1	<1	<1	<1
Styrene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bromoform	µg/l	75 [5]	~	100 [5]	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	µg/l	~	~	~	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Bromobenzene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Propylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
2-Chlorotoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2,4-Trimethylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
sec-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
4-Isopropyltoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,4-Dichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
n-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	µg/l	~	10	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,4-Trichlorobenzene	µg/l	~	0.4	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Hexachlorobutadiene	µg/l	~	0.1	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Naphthalene	µg/l	~	1	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Notes:
Bold denotes value exceeds groundwater regulations.
Italics denotes value exceeds IGV where no groundwater regulation is available.
Underlined denotes value exceeds drinking water standards.
ND denotes not detected.
NEC denotes no evidence of contamination
N/A denotes not applicable.
SS denotes Suspended Solids.
NAC denotes no abnormal change.
- denotes parameter not analysed/ recorded.
~ denotes groundwater quality standard unavailable.
'' denotes groundwater regulations are for dissolved metals, used groundwater regulation for total metals for comparison purposes only.
◊ denotes standard relates to phenols.
# denotes lower value - assessment for the presence of saline/other instrusion; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.
denotes lower value - assessment of adverse impacts of chemical inputs from groundwater on associated surface water bodies; higher value - assessment of the general quality of groundwater in terms of whether its ability to support human uses has been significantly impaired by pollution.
* denotes standards converted from ammonium (NH4) to ammonia as N (=14/18).
** denotes standard is for total xylenes.
1: European Communities Environmental Objectives (Groundwater) Regulations 2010; S.I. No. 9 of 2010. Amendment SI no 149 of 2012, Amendment SI No. 366 of 2016.
2: Environmental Protection Agency (EPA), 2003. Towards Setting Guideline Values for the Protection of Groundwater in Ireland - Interim Report. EPA, Ireland.
3: SI No. 278 of 2007; European communities (Drinking Water) (No. 2) Regulation 2007. SI No. 122 of 2014; European Union (Drinking Water) Regulations 2014
4: Denotes regulation value is for "Total Polycyclic Aromatic Hydrocarbons", sum of 4 (Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(123cd)pyrene & Benzo(ghi)perylene).
5: Denotes regulation value is for "Total Trihalomethanes".
6: Denotes regulation value is for "Total Tetrachloroethene and Trichloroethene".
7: Denotes groundwater quality standard is the sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene.

Table 2: Leachate Analytical Results

Sample ID		**EPA Landfill Manual - Leachate Management [1]**				**BH5**		**BH5H**		**BH6**				**BH6H**		**BH8**		**BH8H**		**BH10**				**BH10H**		**BH11**		**BH13**		**BH14**					**BH14H**		**BH20**	**BH20H**
Laboratory Report No.		**Acetogenic Leachates (Table 7.1)**		*Methanogenic Leachates (Table 7.2)*		17/3439	17-4391	17/3440	17/4336	09/1801	09/2082	17/3443	17/4391	17/3445	17/4336	17/3443	17/4391	17/3445	17/4336	09/1801	09/2082	17/3439	17/4391	17/3440	17/4336	09/1801	09/2082	09/1801	09/2082	09/1801	09/2082	09/2082	17/3439	17/4391	17/3445	17/4336	17/3443	17/4336
Sample Date		**Minimum**	**Maximum**	**Minimum**	**Maximum**	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	03/02/17	20/02/17	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	25/06/09	16/07/09	25/06/09	15/07/09	03/02/17	21/02/17	02/02/17	20/02/17	02/02/17	20/02/17
Field Parameters	**Unit**																																			
Temperature	ºC	~	~	~	~	9.83	12.3	10.04	10.08	13.7	12.8	9.54	9.85	10.83	9.54	9.8	9.19	10.03	9.79	15.4	14.5	9.47	9.33	10.26	10.03	14.2	16.3	15.8	15.8	12.8	12.8	9.89	10.55	11.03	11.03	9.18	10.41
Dissolved Oxygen	mg/l	~	~	~	~	9.63	3.53	7.82	2.94	-	-	11.06	3.9	10.5	8.94	10.96	11.44	10.11	11.34	-	-	10.28	3.67	8.62	4.03	-	-	-	-	-	-	6.64	2.34	1.55	3.81	4.34	5
Dissolved Oxygen (DO)	%	~	~	~	~	83.5	33.17	72.53	26.07	-	12.7	93.06	34.6	99.23	82.3	101.1	99.86	93.66	104.34	-	5.1	35.55	32.19	80.31	35.6	-	30.1	-	25.2	-	18.4	37.95	21.17	14.76	34.44	41.14	46.73
Oxidation Reduction Potential (ORP)	mV	~	~	~	~	4.8	54	-59.5	-10.2	-108	-112	-26.9	-84	-99.4	-34.24	8.6	-8.1	-92.1	7.55	-122	136	-40.7	-73.4	-88.9	-56.7	-94	-55	-108	-141	-129	-132	-75	-435.4	-150.5	-131.4	37.5	-27.3
Electrical Conductivity (EC)	µS/cm	5,800	52,000	5,990	19,300	558.14	1310.10	643.96	743.31	2634.00	2310.00	796.83	829.97	893.91	796.82	617.50	635.00	444.62	648.00	1861.00	2566.00	382.56	718.53	623.75	720.57	789.00	591.00	2726.00	2512.00	1076.00	1139.00	770.83	693.14	848.21	518.34	***8171.60***	***9973.00***
pH	pH units	5.12	7.8	6.8	8.2	**6.61**	**6.64**	***6.87***	**6.37**	***6.94***	***7.12***	***7.07***	***7.31***	***7.34***	***7.15***	***6.89***	***7.39***	***6.87***	***6.89***	***7.33***	***7.11***	***6.95***	***7.23***	***7.39***	***6.99***	***7.27***	***7.29***	***6.85***	*9.96*	***7.13***	***6.82***	***7.12***	***7.24***	***7.21***	***7.12***	***6.97***	***6.9***
Colour	N/A	~	~	~	~	Dark, cloudy	Clear	Clear	Cloudy	Dark black	Dark black (top 10cm - clear)	Cloudy	Cloudy	Clear	Dark, cloudy	Clear	Clear	Clear	Cloudy	Dark cloudy brown	Dark grey black	Dark, cloudy	Clear	Brown	Dark cloudy	Dark cloudy brown	0-50cm clear >50cm orange brown particles	Dark brown	Cloudy dark grey	Dark brown/ black	Orange brown colour	Dark, black, cloudy	Dark, gery, cloudy	Black	Dark,grey, cloudy	Yellow	Brown and cloudy
Odour / Other observations	N/A	~	~	~	~	S.S., leachate odour	S.S., leachate odour	S.S., strong odour, no sheen	S.S., Leachate odour, slight sheen	Chemical odour, slight sheen	-	S.S. no odour	S.S. leachate Odour	High S.S., slight odour, no sheen	SS, No odour	S.S., no odour	S.S., no odour	S.S., slight odour, no sheen	No odour, NEC	None	Slight sheen	No odour	S.S., no odour	S.S., no odour	S.S, no odour	Slight sheen	None	None	Silty	Slight sheen	Metallic Odour	S.S., strong leachate odour	Leachate odour	Black slime on bailer, strong leachate odour, lots of S.S.	Leachate odour, S.S., organic matter	Few ss, no odour, NEC	SS, no odour, NEC
Laboratory Parameters																																				
Sulphate	mg/l	<5	1560	<5	322	***17.20***	***104.20***	***50.90***	***71.60***	***114.91***	***82.70***	***17.7***	***19.1***	***21.3***	***6.9***	***83.3***	***78.8***	***57.3***	***71.6***	**-**	**-**	***131.20***	***170.20***	***109.90***	***155.00***	***41.09***	***62.57***	-	-	***6.54***	1.05	<0.5	***5.40***	<0.5	<0.5	***664.4***	***782.5***
Chloride	mg/l	659	4670	570	4710	50.80	94.00	46.10	53.70	101.90	82.30	25.7	24.8	24.4	25.6	64	64.5	55.8	53.7	-	-	34.40	35.30	33.10	35.90	19.60	14.40	-	-	25.90	21.40	30.50	26.50	30.7	29.8	***4334.8***	5560
Fluoride	mg/l	~	~	~	~	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	-	-	0.50	0.30	0.50	0.40	<0.3	<0.3	-	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total Oxidised Nitrogen as N	mg/l	~	~	~	~	<0.02	<0.2	<0.02	<0.2	<0.05	<0.05	<0.2	<0.2	0.7	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.02	<0.2	0.40	<0.2	0.18	0.31	-	-	<0.05	<0.05	<0.02	<0.2	<0.2	<0.2	0.20	<0.2
Molybdate Reactive Phosphuros (MRP)	µg/l PO4	1,840	69380	921	57410	<60	-	<60	-	110	672	<60	<60	NA	<60	<60	<60	<60	<60	-	-	70	<60	<60	-	47	416	-	-	29	*1,032*	<60	<60	<60	<60	<60	<60
Total Cyanide	µg/l	~	~	~	~	-	-	-	-	<40	<40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<40	<40	-	-	<40	<40	-	-	-	-	-	-
Ammoniacal Nitrogen as N	mg/l	194	3610	283	2040	3.67	9.4	6.85	0.16	17.40	62.40	8.45	0.21	8.25	7.95	0.08	8.23	0.08	0.16	-	-	0.33	0.57	0.67	0.4	1.30	0.50	-	-	0.10	8.70	13.69	13.02	13.58	13.42	0.5	1.02
BOD (Settled)	mg/l	2000	68000	97	1770	18	NA	26	N/A	*126*	42	20	12	22	4	4	-	7	-	-	-	4	3	5	2	-	6	97	-	19	48	30	<1	35	12	3	2
COD (Settled)	mg/l	2740	152000	622	8000	87	-	128	16	*2,670*	73	48	29	46	37	28	-	38	16	-	-	37	7	39	19	-	14	*2,540*	-	180	25	94	21	103	41	210	153
BOD/COD ratio		-	-	-	-	0.2	-	0.2	-	0.05	0.58	0.42	0.41	0.48	0.1	0.1	-	0.2	-	-	-	0.1	0.43	0.1	0.1	-	0.43	0.04	-	0.1	1.92	0.32	-	0.34	0.3	0.01	0.01
Metals (Total)																																				
Arsenic	µg/l	<1	148	<1	485	***11***	***30.1***	***85.5***	***22.2***	***4.9***	***8.5***	***3.8***	***8.1***	***2.6***	***19.1***	***4.3***	<2.5	***7.6***	<2.5	-	-	***20.8***	***10***	<2.5	***19***	<2.5	***2.9***	-	-	<2.5	***30.0***	***18.6***	***4.5***	***21.8***	***85.3***	***6.3***	<2.5
Boron	µg/l	~	~	~	~	23	<12	<12	49	480	461	128	83	119	177	43	36	<12	57	-	-	98	80	95	110	85	98	-	-	77	<12	52	91	92	326	274	383
Cadmium	µg/l	<10	100	<10	80	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	6.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	mg/l	270	6240	23	501	*116.3*	*239.4*	*172.7*	*191.9*	*267.50*	*251.00*	*232.2*	***278.7***	*266.9*	***308.4***	*130.1*	*162*	*163.6*	*146.7*	-	-	*227.1*	*232.3*	*148*	*261.2*	*138.60*	*108.00*	-	-	*167.40*	*178.10*	*192.3*	*174.5*	*235.6*	***313.6***	***623.6***	***528.5***
Chromium	µg/l	30	300	<30	560	*3.5*	*12.4*	*10.6*	*9.1*	*2.7*	*18.9*	*2.1*	*6.7*	*6.5*	*10.9*	*6*	*7.7*	*13.5*	*<1.5*	-	-	*18.1*	*8.8*	*<1.5*	*15.8*	*<1.5*	*2.8*	-	-	*3*	**36.3**	*6.7*	*5.7*	*7.6*	***30.9***	*3.5*	*<1.5*
Copper	µg/l	20	1,100	<20	620	***25***	***91***	***146***	***73***	*<7*	***43***	*7*	***26***	*16*	***54***	***35***	*14*	***114***	*<7*	-	-	***41***	*17*	*<7*	***33***	*8*	***26***	-	-	*<7*	***35***	***72***	***25***	***95***	***223***	*9*	*<7*
Iron	µg/l	48300	2300000	1600	160000	***75240***	***143800***	**533800**	***126200***	*2,284*	*19,920*	*9687*	*38060*	*17300*	***102300***	*5574*	*4975*	*13090*	996	-	-	*45060*	*27340*	*3441*	*45220*	*239*	*5,539*	-	-	433	***129,500***	***151100***	*31020*	**163400**	**375800**	*19680*	*5147*
Lead	µg/l	<40	650	<40	1900	29	***131***	***85***	***121***	6	***84***	9	30	16	***45***	16	<5	36	<5	-	-	***52***	20	<5	***45***	<5	9	-	-	5	***60***	***58***	***51***	***55***	***253***	6	<5
Magnesium	mg/l	25	820	40	1580	6.1	19.6	8.9	12.4	***71.40***	***61.62***	24.7	***26.9***	***28.1***	***28.3***	12.1	15.9	15.5	13.4	-	-	23.2	***25.5***	17	***28.1***	10.47	7.28	-	-	9.84	10.32	13.6	16.8	15.5	22.6	***335.1***	***414.1***
Manganese	µg/l	1400	164000	40	3590	*493*	*1082*	*1137*	*695*	*1,061*	***1,754***	*565*	*653*	*609*	*699*	*129*	*223*	*213*	*72*	-	-	*1179*	*973*	*518*	*1183*	***1,477***	*344*	-	-	*1,140*	***1,693***	***3406***	*1074*	***4249***	***7022***	*376*	*292*
Mercury	µg/l	<0.1	1.5	<0.1	0.8	<1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	7	<1	<1	-	-	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	µg/l	<30	1870	<30	600	29	***70***	***218***	***56***	8	***26***	5	13	8	20	17	15	***38***	8	-	-	***62***	25	4	***46***	9	4	-	-	4	8	28	12	30	***78***	14	5
Potassium	mg/l	350	3100	100	1580	6.1	12.9	9.5	9.4	66.09	47.76	10.6	10.9	12.5	12.2	4.3	4.1	7.1	5.1	-	-	6.5	4.1	5.3	6.6	4.28	2.33	-	-	10.34	8.92	8.7	10.4	10	12.2	40.7	64.8
Sodium	mg/l	474	2400	474	3650	18.7	48	21.3	22.9	113.50	74.11	13.5	14.7	15.6	15.9	23.3	32.6	28.6	26.6	-	-	19.8	21.3	18.5	22	16.40	10.24	-	-	19.41	14.41	17.2	20.4	19.9	22	***2345***	*2627*
Zinc	µg/l	90	140000	30	6700	*85*	***327***	***320***	***261***	6	***362***	28	***105***	*47*	***148***	*73*	*50*	***211***	*40*	-	-	***421***	***207***	10	***379***	17	*54*	-	-	4	***101***	***172***	***95***	***251***	***587***	27	6
Pesticides																																				
Atrazine	µg/l	~	~	~	~	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	-	-	-
Simazine	µg/l	~	~	~	~	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	<1	<1	-	-	-	-	-	-
Organochlorine Pesticides																																				
Aldrin	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Alpha-HCH (BHC)	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beta-HCH (BHC)	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Delta-HCH (BHC)	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	ug/l	~	~	~	~	0.06	NA	0.07	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan I	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan II	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan sulphate	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-HCH (BHC)	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-Methoxychlor	ug/l	~	~	~	~	<0.10	NA	<0.10	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDE	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDT	ug/l	~	~	~	~	<0.10	NA	<0.10	<0.01	-	-	<0.05	<0.01	<0.01	<0.02	NA	NA	NA	NA	-	-	<0.05	<0.01	<0.05	<0.01	-	-	-	-	-	-	<0.05	<0.01	<0.01	<0.02	<0.05	<0.01
p,p'-Methoxychlor	ug/l	~	~	~	~	<0.10	NA	<0.10	<0.01	-	-	<0.05	<0.01	<0.01	<0.02	NA	NA	NA	NA	-	-	<0.05	<0.01	<0.05	<0.01	-	-	-	-	-	-	<0.05	<0.01	<0.01	<0.02	<0.05	<0.01
p,p'-TDE	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Organophosphorus Pesticides																																				
Azinphos methyl	ug/l	~	~	~	~	<0.06	NA	<0.06	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl Parathion (Parathion)	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Parathion	ug/l	~	~	~	~	<0.02	NA	<0.04	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	ug/l	~	~	~	~	<0.02	NA	<0.02	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	-	-	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 2: Leachate Analytical Results

Sample ID		EPA Landfill Manual - Leachate Management [1]				BH5		BH5H		BH6				BH6H		BH8		BH8H		BH10				BH10H		BH11		BH13		BH14				BH14H		BH20	BH20H
Laboratory Report No.		**Acetogenic Leachates (Table 7.1)**		*Methanogenic Leachates (Table 7.2)*		17/3439	17-4391	17/3440	17/4336	09/1801	09/2082	17/3443	17/4391	17/3445	17/4336	17/3443	17/4391	17/3445	17/4336	09/1801	09/2082	17/3439	17/4391	17/3440	17/4336	09/1801	09/2082	09/1801	09/2082	09/1801	09/2082	09/2082	17/3439	17/4391	17/3445	17/4336	17/3443	17/4336
Sample Date		**Minimum**	**Maximum**	**Minimum**	**Maximum**	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	03/02/17	20/02/17	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	25/06/09	16/07/09	25/06/09	15/07/09	03/02/17	21/02/17	02/02/17	20/02/17	02/02/17	20/02/17
TPH CWG																																					
Aliphatics																																					
>C5-C6	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	19	<10	<10	<10	<10	<10
>C6-C8	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>C8-C10	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	12	<10	19	<10	<10	<10
>C10-C12	ug/l	~	~	~	~	<5	NA	<5	<5	-	-	<5	<5	<5	<5	NA	NA	<5	NA	-	-	<5	<5	<5	<5	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5
>C12-C16	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>C16-C21	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>C21-C35	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
Total aliphatics C5-35	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	31	<10	19	<10	<10	<10
Aromatics																																					
>C5-EC7	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>EC7-EC8	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>EC8-EC10	ug/l	~	~	~	~	<10	<10	<10	<10	-	-	<10	<10	<10	<10	NA	<10	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>EC10-EC12	ug/l	~	~	~	~	<5	NA	<5	<5	-	-	<5	<5	<5	<5	NA	NA	<5	NA	-	-	<5	<5	<5	<5	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5
>EC12-EC16	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>EC16-EC21	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
>EC21-EC35	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
Total aromatics C5-35	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics(C5-35)	ug/l	~	~	~	~	<10	NA	<10	<10	-	-	<10	<10	<10	<10	NA	NA	<10	NA	-	-	<10	<10	<10	<10	-	-	-	-	-	-	31	<10	19	<10	<10	<10
Phenols																																					
2-Chlorophenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
2-Methylphenol	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Nitrophenol	µg/ l	~	~	~	~	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	<10	NA	-	-	<10	<10	<10	<10	<10	<10	-	-	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Phenol	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
PAHs																																					
2-Chloronaphthalene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Naphthalene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Acenaphthylene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Fluorene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	2.4	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	2.2	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	1.2	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(bjk)fluoranthene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	2	<1	<1	<1	<1	<1
Benzo(a)pyrene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Indeno(123cd)pyrene	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Dibenzo(ah)anthracene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(ghi)perylene	µg/ l	~	~	~	~	<0.5	NA	-	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phthalates																																					
Bis(2-ethylhexyl) phthalate	µg/ l	~	~	~	~	<5	NA	-	<5	<10	<10	<5	<5	<5	<5	<5	NA	<5	NA	-	-	<5	<5	<5	<5	<10	<10	-	-	<10	<10	<5	<5	<5	<5	<5	<5
Butylbenzyl phthalate	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	µg/ l	~	~	~	~	<1.5	NA	-	<1.5	<10	<10	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	NA	-	-	<1.5	<1.5	<1.5	<1.5	<10	<10	-	-	<10	<10	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Di-n-Octyl phthalate	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Diethyl phthalate	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Dimethyl phthalate	µg/ l	~	~	~	~	<1	NA	-	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Total Phthalate	µg/ l	~	~	~	~	-	-	-		<60	<60	-	-	-	-	-	-	-	-	-	-					<60	<60	-	-	<60	<60						
Additional SVOCs																																					
SVOC TICs (trace organics)	µg/l	~	~	~	~	Hexathiane, cyclic octaatomic sulfur	NA	ND	ND	ND	ND	ND	ND	Benzenesulfonamide, N-butyl	ND	ND	NA	Benzenesulfonamide, N-butyl	NA	-	-	ND	ND	ND	ND	ND	ND	-	-	ND	ND	Palmitoleic acid, Cyclic octaatomic sulfur, Cholesterol	ND	Benzenesulfonamide, N-butyl-	ND	ND	ND
1,2-Dichlorobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
2-Nitroaniline	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
3-Nitroaniline	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Chloroaniline	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
4-Nitroaniline	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Carbazole	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Hexachloroethane	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Isophorone	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-nitrosodi-n-propylamine	µg/ l	~	~	~	~	<0.5	NA	<0.5	<0.5	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	-	-	<0.5	<0.5	<0.5	<0.5	<10	<10	-	-	<10	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	µg/ l	~	~	~	~	<1	NA	<1	<1	<10	<10	<1	<1	<1	<1	<1	NA	<1	NA	-	-	<1	<1	<1	<1	<10	<10	-	-	<10	<10	<1	<1	<1	<1	<1	<1
Benzenesulfonamide, N-butyl-	ug/l	~	~	~	~	-	-	-	-	-	-	-	-	154	-	-	-	118	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	134	-	-	-
Hexathiane	ug/l	~	~	~	~	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palmitoleic acid	ug/l	~	~	~	~	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	636	-	-	-	-	-
Cyclic octaatomic sulfur	ug/l	~	~	~	~	3572	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	714	-	-	-	-	-
Cholesterol	ug/l	~	~	~	~	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	869	-	-	-	-	-

Table 2: Leachate Analytical Results

Sample ID		**EPA Landfill Manual - Leachate Management** [1]				**BH5**		**BH5H**		**BH6**				**BH6H**		**BH8**		**BH8H**		**BH10**				**BH10H**		**BH11**		**BH13**		**BH14**				**BH14H**		**BH20**	**BH20H**
Laboratory Report No.		**Acetogenic Leachates (Table 7.1)**		*Methanogenic Leachates (Table 7.2)*		17/3439	17-4391	17/3440	17/4336	09/1801	09/2082	17/3443	17/4391	17/3445	17/4336	17/3443	17/4391	17/3445	17/4336	09/1801	09/2082	17/3439	17/4391	17/3440	17/4336	09/1801	09/2082	09/1801	09/2082	09/1801	09/2082	09/2082	17/3439	17/4391	17/3445	17/4336	17/3443	17/4336
Sample Date		**Minimum**	**Maximum**	**Minimum**	**Maximum**	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	03/02/17	20/02/17	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	03/02/17	21/02/17	02/02/17	20/02/17	25/06/09	16/07/09	25/06/09	16/07/09	25/06/09	15/07/09	03/02/17	21/02/17	02/02/17	20/02/17	02/02/17	20/02/17
VOCs		~	~	~	~																														
VOCs TICs (trace organics)	µg/l	~	~	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	-	-	ND	ND	ND		ND		ND	ND
Dichlorodifluoromethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	µg/l	~	~	~	~	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<2	<2	-	-	<2	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloromethane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	µg/l	~	~	~	~	<0.1	<0.1	<0.1	<0.1	<2	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<2	<2	-	-	<2	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromomethane	µg/l	~	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Trichlorofluoromethane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Dichloromethane	µg/l	~	~	~	~	<5	<5	<5	<5	<3	<3	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<5	<5	<5	<3	<3	-	-	<3	<3	<5	<5	<5	<5	<5	<5
trans-1-2-Dichloroethene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	µg/l	~	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Chloroform	µg/l	~	~	~	~	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<3	<3	-	-	<3	<3	<2	<2	<2	<2	<2	<2
1,1,1-Trichloroethane	µg/l	~	~	~	~	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<3	<3	-	-	<3	<3	<2	<2	<2	<2	<2	<2
1,1-Dichloropropene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dichloroethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	µg/l	~	~	~	~	<0.5	<0.5	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<3	<3	-	-	<3	<3	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Dibromomethane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Bromodichloromethane	µg/l	~	~	~	~	<2	<2	<2	<2	<3	<3	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<3	<3	-	-	<3	<3	<2	<2	<2	<2	<2	<2
cis-1-3-Dichloropropene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	µg/l	~	~	~	~	<5	<5	<5	6	<3	<3	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<5	<5	<5	<3	<3	-	-	<3	<3	<5	<5	<5	<5	<5	<5
trans-1-3-Dichloropropene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,1,2-Trichloroethene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachloroethene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Dibromochloromethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Chlorobenzene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,1,1,2-Tetrachloroethane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/l	~	~	~	~	<1	<1	<1	<1	<3	<3	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<3	<3	-	-	<3	<3	<1	<1	<1	<1	<1	<1
p/m-Xylene	µg/l	~	~	~	~	<2	<2	<2	4	<5	<5	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<5	<5	-	-	<5	<5	<2	<2	3	<2	<2	<2
o-Xylene	µg/l	~	~	~	~	<1	<1	<1	1	<3	<3	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<3	<3	-	-	<3	<3	<1	<1	<1	<1	<1	<1
Styrene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Bromoform	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	µg/l	~	~	~	~	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	-	-	<4	<4	<4	<4	<4	<4	-	-	<4	<4	<4	<4	<4	<4	<4	<4
Bromobenzene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Propylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
2-Chlorotoluene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,2,4-Trimethylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
sec-Butylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
4-Isopropyltoluene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichlorobenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,4-Dichlorobenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
n-Butylbenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2,4-Trichlorobenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Hexachlorobutadiene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3
Naphthalene	µg/l	~	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichlorobenzene	µg/l	~	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	-	-	<3	<3	<3	<3	<3	<3	<3	<3

Notes:

Italics indicates composition of Methanogenic Leachates (Table 7.2) as per EPA Landfill Manual - Leachate Management.

Bold indicates composition of Acetogenic Leachates (Table 7.1) as per EPA Landfill Manual - Leachate Management.

NEC denotes No evidence of contamination.

ND denotes not detected.

NA denotes Not Applicable.

SS denotes Suspended Solids

~ denotes EPA leachate Acetogenic/Methanogenic standard unavailable.

- denotes parameter not analysed/ recorded.

1: Environmental Protection Agency (EPA), 2000. Landfill Manuals, Landfill Site Design. EPA, Ireland.

Table 3: Surface Water Analytical Results

Sample ID		Surface Water Quality Standards			SW1			SW2	SW2A		SW3			SW4	SW5		SW7		SW8		SW9	
Laboratory Report No.		**Surface Water Regulations 2009 (SI No. 272 of 2009) as amended (S.I. No. 372 of 2012 and S.I. No. 386 of 2015)[1]**			09/2082	17/3441	17/4396	09/2082	17/3441	17/4396	09/2082	17/3441	17/4388	09/2082	17/3437	17/4388	17/3437	17/4388	17/3437	17/4397	17/3441	17/4397
Sample Date		**Annual Mean**	**95%ile**	**MAC**	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	02/02/2017	21/02/2017	02/02/2017	21/02/2017	03/02/2017	22/02/2017	03/02/2017	22/02/2017
Field Parameters	**Unit**																					
Temperature	ºC	~	~	≤ 1.5 rise in mixing zone	17.2	9.52	10.37	15.8	9.95	10.76	22.8	10.55	11.2	22.7	9.91	10.88	9.7	10.55	7.03	10.88	5.95	11.1
Dissolved Oxygen	mg/l	~	~	~	-	7.55	9.01	-	10.66	10.46	-	12.03	11.2		12.7	12.27	3.49	9.26	10.07	8.94	10.35	8.99
Dissolved Oxygen (DO)	%	~	>70-<130 (0psu) >80-<120 (35psu)	~	20.8	**80.78**	**95.35**	19.2	**107.22**	**109.55**	**104.9**	**113.13**	**102**	**84.5**	**117.4**	**111.55**	32.14	67.34	**89.54**	**93.57**	**91.02**	**94.59**
Electrical Conductivity (EC)	µS/cm	~	~	~	18,620	28,051	28,516	19,490	24,282	26,393	979	669	205	429	341	398	558	366	8,754	52,690	11	25,871
Oxidation Reduction Potential (ORP)	mV	~	~	~	-44	1.3	19.9	122	-37.5	21.1	-32	18.2	-33.1	21	-6.4	48.6	58.7	-31.5	38.6	27.5	25.6	27.8
pH	pH units	~	~	~	7.11	7.11	7.79	7.04	7.45	7.7	9.79	7.85	7.65	8.56	8.33	7.64	7.35	7.3	7.82	7.88	7.97	7.88
Colour		~	~	~	Clear with black particles	Orange staining at point of ocean diffusion, few S.S.	Grey brown, S.S.	Clear with sand grains	Clear	Grey/ brown, S.S.	Clear	Clear, Some S.S.	Brown tint, Some S.S.	Slightly yellow	Clear, S.S.	Brown, S.S.	Clear, S.S.	Brown tint, Some S.S.	Clear	Clear, Few S.S.	Clear	Clear, S.S.
Odour		~	~	~	None	No odour , NEC	No odour, NEC	None	No odour , NEC	Estuarine odour, NEC	None	No odour, NEC	No odour , NEC	None	No odour, NEC	No odour, NEC	Leachate odour	No odour , NEC	No odour , NEC	No odour , NEC	No odour , NEC	No odour , NEC
Other observations	N/A	~	~	~	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen	No sheen		No sheen	No sheen	No sheen	No sheen	No sheen	No sheen
Laboratory Parameters																						
Sulphate	mg/l	~	~	~	811.15	2401.60	2238.90	822.62	2552.20	2109.50	253.8	72.7	76.1	17.04	24	23.5	11.1	9.5	644.9	1788	719.2	1902.5
Chloride	mg/l	~	~	~	6,790.3	15,086.7	14,222.4	6,876.8	16,056.8	13,679.0	67.2	61.8	28.1	17.4	39	37.4	28.3	25.8	4785	11292.2	5360.3	12390.2
Fluoride	mg/l	1.5	~	~	**5.7**	1.1	0.9	0.6	1.1	0.9	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	0.7	0.4	0.8
Total Oxidised Nitrogen as N	mg/l	~	~	~	<0.05	<0.2	<0.2	<0.05	<0.2	<0.2	<0.05	<0.2	<0.2	<0.05	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Molybdate Reactive Phosphuros (MRP)	mg/l P	≤0.060 (0-17psu) ≤0.040 (35psu)	~	~	**0.044**	<0.020	<0.020	**0.134**	0.026	<0.020	0.009	<0.020	<0.020	0.019	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Dissolved Solids (TDS)	mg/l	~	~	~	12,692	29,377	26,177	12,596	26,101	26,889	277	669	410	571	315	369	584	497	8458	23390	9839	9023
Total Suspended Solids (TSS)	mg/l	~	~	~	148	129	1655	158	145	1346	<10	11	<10	<10	22	140	38	41	23	140	46	117
Total Alkalinity as CaCO3	mg/l	~	~	~	848	156	350	812	144	302	33.2	218	256	320	206	278	424	452	114	142	116	146
Total Organic Carbon (TOC)	mg/l	~	~	~	<2	2	3	<2	3	3	3	6	9	19	8	10	2	8	8	5	7	4
Total Cyanide	µg/l	10	~	~	<40	<10	<10	<40	<10	<10	<40	<10	<0.01	<40	<10	<10	<10	<10	<10	<10	<10	<10
Chemical Oxygen Demand (COD)	mg/l	~	~	~	167	961	436	163	1360	621	16	24	<7	45	28	36	28	<7	163	527	29	234
Biochemical Oxygen Demand (BOD)	mg/l	~	≤4	~	**14**	<1	<1	**11**	<1	<1	**5**	2	3	**10**	<10	**5**	<10	2	<10	2	2	1
Ammonia (NH4+NH3) as N	mg/l	≤0.040(High Status) ≤0.065 (Good Status)[2]	≤0.090 (High Status) ≤0.140 (Good Status)[2]	~	**82.1**	**0.42**	**0.44**	**51.8**	**0.64**	**3.42**	**0.3**	<0.03	**0.05**	**0.3**	0.04	**0.09**	0.05	0.06	0.05	**0.75**	**0.4**	**0.39**
Metals																						
Dissolved Arsenic	ug/l	20	~	~	-	<2.5	<2.5	-	<2.5	<2.5	-	<2.5	<2.5	-	<2.5	<2.5	<2.5	4.9	<2.5	<2.5	<2.5	<2.5
Dissolved Boron	ug/l	~	~	~	-	2,992	2,949	-	3,249	2,823	-	56	48	-	<12	<12	82	94	985	2,340	1113	2,492
Dissolved Cadmium	ug/l	0.2	~	≤0.45 (class 1) 0.45 (class 2) 9.6 (class 3) 0.9 (class 4) 1.5 (class 5)**	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l	~	~	~	-	453.4	368.2	-	403.4	327.5	-	96.3	107.9	-	93.6	100.3	161.1	152.1	115.8	294.2	125.4	293.7
Total Dissolved Chromium	ug/l	0.6	~	~	-	<1.5	<1.5	-	<1.5	<1.5	-	<1.5	<1.5	-	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l	5	~	~	-	<7	<7	-	<7	<7	-	<7	<7	-	<7	<7	<7	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l	~	~	~	-	<20	<20	-	<20	<20	-	<20	<20	-	<20	<20	54	33	76	<20	79	<20
Dissolved Lead	ug/l	1.3	~	14	-	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l	~	~	~	-	1191	1033	-	1196	967.3	-	10.5	10.7	-	5.2	5.8	16.8	17.9	299.7	882.7	357.2	988
Dissolved Manganese	ug/l	~	~	~	-	63	<2	-	<2	<2	-	<2	<2	-	<2	<2	574	411	3	<2	3	<2
Dissolved Mercury	ug/l	~	~	0.07	-	**1**	<1	-	<1	<1	-	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l	8.6	~	34	-	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	2	<2	<2	<2
Dissolved Potassium	mg/l	~	~	~	-	399.8	342.9	-	372.8	306.4	-	3.6	2.9	-	1.8	2.4	5	4.5	89.2	270.6	115.1	270.1
Dissolved Sodium	mg/l	~	~	~	-	9,584	7,778	-	9,922	8,060	-	17	15.4	-	17	15.5	16.4	14.7	2,708	6,326	3,348	7,641
Dissolved Zinc	ug/l	40^	~	~	-	<3	<3	-	4	<3	-	<3	<3	-	<3	<3	<3	<3	3	<3	<3	<3
Arsenic	µg/l	20"	~	~	<2.5	<2.5	**34.1**	<2.5	<2.5	**21.3**	<2.5	<2.5	<2.5	3.3	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Boron	µg/l	~	~	~	2,107	3206	3090	2,052	2964	2877	260	54	47	81	15	35	77	90	971	2432	1143	2497
Cadmium	µg/l	0.2"	~	≤0.45 (class 1) 0.45 (class 2) 9.6 (class 3) 0.9 (class 4) 1.5 (class 5)**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	mg/l	~	~	~	215.6	409.1	589.8	226	413.2	595.1	67.97	92.9	116.2	60.21	89.8	113.8	157.1	163.8	113.6	284.9	120.1	295.3
Chromium	µg/l	0.6"	~	~	<1.5	<1.5	**34.5**	<1.5	<1.5	**21.7**	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Copper	µg/l	5"	~	~	<7	<7	**30**	<7	<7	**17**	**8**	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Iron	µg/l	~	~	~	625	2702	56620	648	234	34920	60	20	22	1,066	226	4597	7847	6827	199	121	220	87
Lead	µg/l	1.3"	~	14	<5	<5	34	<5	<5	**17**	<5	<5	<5	**5**	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium	mg/l	~	~	~	179	1135	1040	163.3	1125	935	3.8	9.9	11.3	3.6	5	6.5	15.9	19.3	302.7	793.9	377	833.2
Manganese	µg/l	~	~	~	309	70	406	343	4	278	8	<2	3	82	44	3732	584	483	6	2	6	<2
Mercury	µg/l	~	~	0.07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	µg/l	8.6"	~	34	<2	<2	**23**	<2	<2	**15**	3	<2	<2	5	<2	3	<2	<2	<2	<2	<2	<2
Potassium	mg/l	~	~	~	299.6	357.9	328.7	306	380.3	294.2	16.56	3.4	2.9	6.98	1.7	4.9	4.6	5.2	85.6	248.1	121.7	260.4
Sodium	mg/l	~	~	~	2,160	9,800	8,063	2,188	10,250	8,277	45.01	16	15.3	10.53	16.4	16.7	15.3	15.3	2,912	6,768	3,473	7,306
Zinc	µg/l	40^^	~	~	13	3	**154**	11	5	**100**	13	<3	<3	14	5	38	4	3	<3	3	<3	<3
Pesticides																						
Atrazine	µg/l	0.6	~	2	<1	-	-	<1	-	-	<1	-	-	<1	-	-	-	-	-	-	-	-
Simazine	µg/l	1	~	4	<1	-	-	<1	-	-	<1	-	-	<1	-	-	-	-	-	-	-	-
Organochlorine Pesticides																						
Aldrin	ug/l	Σ=0.005	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Alpha-HCH (BHC)	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beta-HCH (BHC)	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Delta-HCH (BHC)	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	ug/l	Σ=0.005	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan I	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan II	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan sulphate	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	ug/l	Σ=0.005	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-HCH (BHC)	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-Methoxychlor	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.30	-	<0.01	<0.05	-	<0.03	<0.10	<0.03	<0.01	<0.03	<0.03	<0.01	<0.03
p,p'-DDE	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDT	ug/l	0.01	~	~	-	<0.05	<0.01	-	<0.05	<0.30	-	<0.05	<0.05	-	<0.03	<0.10	<0.03	<0.02	<0.03	<0.03	<0.05	<0.03
p,p'-Methoxychlor	ug/l	~	~	~	-	<0.05	<0.01	-	<0.05	<0.30	-	<0.05	<0.05	-	<0.03	<0.10	<0.03	<0.02	<0.03	<0.03	<0.05	<0.03
p,p'-TDE	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Organophosphorus Pesticides																						
Azinphos methyl	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	ug/l	0.00006	~	0.00007	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl Parathion (Parathion)	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Parathion	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	ug/l	~	~	~	-	<0.01	<0.01	-	<0.01	<0.10	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 3: Surface Water Analytical Results

Sample ID		Surface Water Quality Standards			SW1			SW2	SW2A		SW3			SW4	SW5		SW7		SW8		SW9	
Laboratory Report No.		**Surface Water Regulations 2009 (SI No. 272 of 2009) as amended (S.I. No. 372 of 2012 and S.I. No. 386 of 2015)[1]**			09/2082	17/3441	17/4396	09/2082	17/3441	17/4396	09/2082	17/3441	17/4388	09/2082	17/3437	17/4388	17/3437	17/4388	17/3437	17/4397	17/3441	17/4397
Sample Date		**Annual Mean**	**95%ile**	**MAC**	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	02/02/2017	21/02/2017	02/02/2017	21/02/2017	03/02/2017	22/02/2017	03/02/2017	22/02/2017
TPH CWG																						
Aliphatics																						
>C5-C6	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>C6-C8	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>C8-C10	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>C10-C12	ug/l	~	~	~	-	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5
>C12-C16	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>C16-C21	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>C21-C35	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics C5-35	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics																						
>C5-EC7	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>EC7-EC8	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>EC8-EC10	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>EC10-EC12	ug/l	~	~	~	-	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5
>EC12-EC16	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>EC16-EC21	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
>EC21-EC35	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
Total aromatics C5-35	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics(C5-35)	ug/l	~	~	~	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10
Phenols																						
2-Chlorophenol	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
2-Methylphenol	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Nitrophenol	µg/l	~	~	~	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	µg/l	0.4	~	1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Phenol	µg/l	8	~	46	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
PAHs																						
2-Chloronaphthalene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	µg/l	2	~	130	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Fluorene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	µg/l	0.1	~	0.4	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	µg/l	0.1	~	1	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(bjk)fluoranthene	µg/l	0.03 *	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	µg/l	0.05	~	0.1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Indeno(123cd)pyrene	µg/l	0.002	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzo(ah)anthracene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(ghi)perylene	µg/l	0.002	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phthalates																						
Bis(2-ethylhexyl) phthalate	µg/l	1.3	~	~	<10	<5	<5	<10	<5	<5	<10	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5
Butylbenzyl phthalate	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	µg/l	~	~	~	<10	<1.5	<1.5	<10	<1.5	<1.5	<10	<1.5	<1.5	<10	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Di-n-Octyl phthalate	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Diethyl phthalate	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Dimethyl phthalate	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Total Phthalate	µg/l				<60			<60			<60			<60								
Additional SVOCs																						
SVOC TICs (trace organics)	µg/l	~	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	µg/l	0.4	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
2-Nitroaniline	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
3-Nitroaniline	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloroaniline	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
4-Nitroaniline	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Carbazole	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/l	0.01	~	0.05	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/l	0.1	~	0.6	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Hexachloroethane	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-nitrosodi-n-propylamine	µg/l	~	~	~	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	µg/l	~	~	~	<10	<1	<1	<10	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1

Table 3: Surface Water Analytical Results

Sample ID		Surface Water Quality Standards			SW1			SW2	SW2A		SW3			SW4	SW5		SW7		SW8		SW9	
Laboratory Report No.		**Surface Water Regulations 2009 (SI No. 272 of 2009) as amended (S.I. No. 372 of 2012 and S.I. No. 386 of 2015)[1]**			09/2082	17/3441	17/4396	09/2082	17/3441	17/4396	09/2082	17/3441	17/4388	09/2082	17/3437	17/4388	17/3437	17/4388	17/3437	17/4397	17/3441	17/4397
Sample Date		**Annual Mean**	**95%ile**	**MAC**	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	03/02/2017	21/02/2017	15/07/2009	02/02/2017	21/02/2017	02/02/2017	21/02/2017	03/02/2017	22/02/2017	03/02/2017	22/02/2017
VOCs																						
VOCs TICs (trace organics)	µg/l	~	~	~	ND	ND	-	ND	ND	-	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methyl Tertiary Butyl Ether	µg/l	~	~	~	<2	<0.1	<0.1	<2	<0.1	<0.1	<2	<0.1	<0.1	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloromethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Vinyl Chloride	µg/l	~	~	~	<2	<0.1	<0.1	<2	<0.1	<0.1	<2	<0.1	<0.1	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bromomethane	µg/l	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Trichlorofluoromethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Dichloromethane	µg/l	20	~	~	<3	<5	<5	<3	<5	<5	<3	<5	<5	<3	<5	<5	<5	<5	<5	<5	<5	<5
trans-1-2-Dichloroethene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1-Dichloroethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
cis-1-2-Dichloroethene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
2,2-Dichloropropane	µg/l	~	~	~	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chloroform	µg/l	~	~	~	<3	<2	<2	<3	<2	<2	<3	<2	<4	<3	<2	<2	<2	<2	<2	<2	<2	<2
1,1,1-Trichloroethane	µg/l	~	~	~	<3	<2	<2	<3	<2	<2	<3	<2	<2	<3	<2	<2	<2	<2	<2	<2	<2	<2
1,1-Dichloropropene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	µg/l	12	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dichloroethane	µg/l	10	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Benzene	µg/l	8	~	50	<3	<0.5	<0.5	<3	<0.5	<0.5	<3	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	µg/l	10	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibromomethane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Bromodichloromethane	µg/l	~	~	~	<3	<2	<2	<3	<2	<2	<3	<2	<2	<3	<2	<2	<2	<2	<2	<2	<2	<2
cis-1-3-Dichloropropene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	µg/l	10	~	~	<3	<5	<5	<3	<5	<5	<3	<5	<5	<3	<5	<5	<5	<5	<5	<5	<5	<5
trans-1-3-Dichloropropene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,2-Trichloroethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Tetrachloroethene	µg/l	10	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dibromochloromethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dibromoethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chlorobenzene	µg/l	25	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,1,2-Tetrachloroethane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/l	~	~	~	<3	<1	<1	<3	<1	<1	<3	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<1
p/m-Xylene	µg/l	10	~	~	<5	<2	<2	<5	<2	<2	<5	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	µg/l	10	~	~	<3	<1	<1	<3	<1	<1	<3	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bromoform	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,1,2,2-Tetrachloroethane	µg/l	~	~	~	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Bromobenzene	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Propylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
2-Chlorotoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3,5-Trimethylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
4-Chlorotoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
tert-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2,4-Trimethylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
sec-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
4-Isopropyltoluene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,3-Dichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,4-Dichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
n-Butylbenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dichlorobenzene	µg/l	~	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
1,2-Dibromo-3-chloropropane	µg/l	~	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,4-Trichlorobenzene	µg/l	0.4	~	~	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Hexachlorobutadiene	µg/l	0.1	~	0.6	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Naphthalene	µg/l	1.2	~	~	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichlorobenzene	µg/l	~	~	0.4	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Organotin Compounds																						
Dibutyltin	µg/l	~	~	~	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tributyltin	µg/l	0.0002	~	0.0015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Triphenyltin	µg/l	~	~	~	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes:

Bold denotes result value exceeds one or more of the surface water quality standards.
NEC denotes no evidence of contamination.
ND denotes not detected.
MAC denotes maximum allowable concentration.
NA denotes not applicable.
SS denotes Suspended Solids.
psu denotes Practical Salinity Units. The PSU defines salinity in terms of a conductivity ratio of a sample to that of a solution of 32.4356 g of KCL at 15°C in l kg of solution. A sample of seawater at 15°C with a conductivity equal to this KCL solution has a salinity of exactly 35 practical salinity units.
* denotes standard relates to the sum of Benzo(b)fluoranthene & Benzo(k)fluoranthene.
" denotes surface water regulations are for dissolved metals, used surface water regulations for total metals for comparison purposes only.
~ denotes no surface water quality standard available.
^ In the case of Zn, the standard shall be 8 µg/l for water hardness measured in mg/l CaCO3 is less than or equal to 10 mg/l CaCO3, 50 µg/l for water hardness greater than 10 mg/l CaCO3 and less than or equal to 100 mg/l CaCO3 and 100 µg/l elsewhere.
^ " In the case of Zn, the standard shall be 8 µg/l for water hardness measured in mg/l CaCO3 is less than or equal to 10 mg/l CaCO3, 50 µg/l for water hardness greater than 10 mg/l CaCO3 and less than or equal to 100 mg/l CaCO3 and 100 µg/l elsewhere / denotes surface water regulations are for dissolved metals, used surface water regulations for total metals for comparison purposes only.
**For Cadmium and its compounds the EQS values vary dependent upon the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/1, Class 2: 40 to < 50 mg CaCO3/1,Class 3: 50 to <100 mg CaCO3/1, Class 4: 100 to <200 mg CaCO3/1 and Class 5: 200 mg CaCO3/1).
1: Surface Water Regulations SI No. 272/2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009. Amended SI No 327/2012 and amended S.I. No. 386 of 2015 European Communities Environmental Objectives (Surface Waters) Regulations 2012. Amended SI No. 386 of 2015
2: Guideline for a river water body or lake, for comparison purposes used Good Status water quality (EPA, 2010-2015 Water quality)

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH1	M1	29/06/2009	0.0	0.0	0.0	0.0	19.7	80.2	0.0	0.0	-	1014	-0.21	3.95	1.62	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	0.0	20.4	-	0.0	0.0	-	1007	-	4.19	1.38	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	0.0	20.8	-	0.0	0.0	-	1010	-	4.04	1.53	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	***1.4***	0.0	0.0	20.2	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.1	0.1	1.5	0.1	20.8	79.0	0.0	0.0	0.0	1013	-	4.02	1.55	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.1	0.6	2.0	*0.7*	20.2	79.0	0.0	0.0	-0.1	1015	0.36	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.5	***1.6***	9.0	*1.1*	20.2	78.2	0.0	0.0	0.0	1013	0.33	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	*0.8*	20.6	78.6	0.0	0.0	0.0	1010	0.29	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	0.1	20.6	79.3	0.0	0.0	0.0	1010	0.26	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***7.3***	***20.8***	>>>	***4.4***	18.7	69.6	0.0	0.0	-0.1	999	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	0.2	20.8	79.0	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	-0.1	1005	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.1	0.0	0.1	20.5	79.4	0.0	0.0	0.0	1023	-	3.92	1.65	01:41 / 14:02	08:17 / 20:36
	M14a	16/03/2010	0.0	0.0	0.0	0.1	20.7	79.2	0.0	0.0	0.0	1013	-	4.36	1.21	12:04:00	06:23 / 18:40
	M14b	16/03/2010	0.0	0.2	0.0	0.1	20.8	79.1	0.0	0.0	-0.1	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.1	21.5	78.5	0.0	0.0	0.0	1022	-	3.69	1.89	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.0	1008	-	4.31	1.26	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.0	0.0	0.1	21.1	78.7	0.0	2.0	-	1014	0.84	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	0.0	0.0	0.0	0.1	20.4	79.5	0.0	0.0	0.0	1023	0.44	4.51	1.06	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.4	0.0	0.1	21.3	78.6	0.0	0.0	0.0	1020	0.46	4.66	0.92	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.0	0.0	0.0	0.1	21.0	78.9	0.0	0.0	0.0	1015	0.24	4.89	0.69	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	0.0	21.1	78.9	0.0	0.0	0.1	1011	0.70	4.83	0.75	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.9	***12.5***	18.0	*0.8*	20.2	78.1	0.0	0.0	0.0	1013	-1.12	4.02	1.55	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.8	0.0	0.1	21.3	78.6	0.0	0.0	0.5	1009	-0.64	5.99	-0.42	05:56/18:31	12:23:00
	M24	23/01/2012	0.1	***1.6***	2.0	0.2	21.4	78.3	0.0	0.0	0.0	1019	-0.55	4.14	1.44	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.3	0.0	0.2	21.5	78.3	0.0	0.0	-0.1	1033	-0.50	3.81	1.76	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.1	0.5	2.0	0.3	21.4	78.2	0.0	0.0	0.0	1025	-0.42	4.13	1.44	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.2	21.5	78.3	0.0	0.0	0.0	986	-0.03	4.10	1.47	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.5	0.0	0.0	20.8	79.2	0.0	0.0	0.0	1006	-0.06	3.98	1.59	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.0	0.1	0.0	0.2	21.2	78.7	0.0	0.0	0.0	1025	-0.14	3.84	1.73	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.4	2.0	0.5	20.9	78.5	0.0	0.0	0.7	993	-0.56	3.79	1.78	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.2	1.0	0.1	20.8	79.0	0.0	0.0	1.0	969	-0.69	4.69	0.88	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.1	0.1	1.0	0.1	21.1	78.7	0.0	0.0	0.3	1010	-0.24	4.57	1.00	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.1	0.1	1.0	0.1	21.1	79.0	0.0	0.0	0.3	1005	-0.25	4.25	1.32	08:11/20:37	01:17/14:10
BH2	M1	29/06/2009	0.0	0.0	0.0	0.0	19.9	80.0	0.0	7.0	-	1014	-0.27	4.58	1.76	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	0.0	20.6	-	0.0	0.0	-	1007	-	5.06	1.28	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	0.0	20.8	-	0.0	0.0	-	1010	-	4.93	1.41	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	0.0	0.0	0.0	20.2	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.1	0.1	2.0	0.3	21.6	78.0	0.0	0.0	0.0	1013	-	4.91	1.43	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.0	0.0	0.0	0.0	20.5	79.5	0.0	0.0	-0.1	1015	0.32	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.0	0.3	0.0	0.0	20.5	79.5	0.0	0.0	0.0	1014	0.35	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	0.0	20.8	79.2	0.0	0.0	0.0	1009	0.26	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	0.0	21.0	79.0	0.0	0.0	0.0	1010	0.34	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.0	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	0.1	21.4	78.5	0.0	0.0	0.0	985	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.0	1005	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.0	1023	-	4.88	1.46	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.0	0.0	0.1	20.9	79.0	0.0	0.0	0.0	1013	-	5.12	1.22	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.1	21.0	78.9	0.0	0.0	0.0	1024	-	4.76	1.58	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.1	***1.3***	1.0	0.1	21.1	78.7	0.0	1.0	0.0	1008	-	5.04	1.30	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.1	0.2	0.0	0.1	21.1	78.7	1.0	0.0	-	1014	-3.59	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	0.0	0.1	0.0	0.1	20.5	79.4	0.0	0.0	0.0	1023	0.65	5.31	1.03	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.3	0.7	0.5	0.3	21.2	78.4	0.0	0.0	-0.2	1020	0.52	5.40	0.94	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.2	0.4	3.0	0.2	20.7	78.9	0.0	0.0	-0.1	1015	0.70	5.56	0.78	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.1	0.1	0.1	*1.0*	21.0	78.8	0.0	0.0	0.1	1011	0.65	5.48	0.86	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.0	0.0	0.0	20.9	79.1	0.0	0.0	0.1	1013	-0.02	4.77	1.57	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.1	0.0	0.0	21.5	78.5	0.0	0.0	0.0	1009	0.58	4.19	2.15	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.1	0.0	0.0	21.5	78.5	0.0	0.0	0.0	1019	-0.60	4.83	1.51	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.0	21.5	78.5	0.0	0.0	0.0	1033	-0.63	4.51	1.83	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.0	0.0	0.0	21.7	78.3	0.0	0.0	0.0	1025	-0.41	4.96	1.38	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.0	21.4	78.6	0.0	0.0	0.0	986	-0.04	4.95	1.39	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.0	0.0	0.0	21.2	78.8	0.0	0.0	0.1	1006	-0.11	4.83	1.51	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.0	***1.2***	>>>	0.0	21.4	78.6	0.0	0.0	0.2	1025	-0.54	4.26	2.08	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.4	1.0	0.0	21.2	78.7	0.0	0.0	0.6	993	-0.56	4.55	1.79	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.1	2.0	0.1	20.8	79.0	0.0	0.0	0.9	968	-0.8	4.58	1.76	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.4	0.4	1.0	*0.8*	21.0	78.9	0.0	0.0	0.5	1009	-0.34	4.88	1.46	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.3	0.3	1.0	0.1	21.1	79.1	0.0	0.0	0.4	1005	-0.25	4.68	1.66	08:11/20:37	01:17/14:10
BH3	M1	29/06/2009	0.0	0.0	0.0	0.0	20.0	79.9	1.0	0.0	-	1014	-0.27	4.39	1.95	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	0.1	20.2	-	0.0	0.0	-	1007	-	4.42	1.50	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	0.0	20.8	-	0.0	0.0	-	1010	-	4.39	1.53	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	0.0	0.0	0.0	20.9	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.2	0.7	3.0	0.5	21.2	78.1	0.0	0.0	0.0	1013	-0.11	4.38	1.54	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.0	0.0	0.0	0.0	20.6	79.6	0.0	0.0	0.0	1015	0.32	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.0	0.0	0.0	0.0	20.6	79.4	0.0	0.0	0.0	1014	0.40	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	0.1	20.3	79.6	0.0	0.0	0.0	1009	0.31	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.0	1010	0.25	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.0	0.0	0.1	21.3	78.6	0.0	0.0	0.2	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	0.2	21.1	78.7	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	21.1	78.8	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.1	0.1	1.0	0.1	20.7	79.2	0.0	0.0	0.0	1023	-	4.27	1.65	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.1	0.0	0.2	20.7	79.1	0.0	0.0	0.0	1013	-	4.35	1.57	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.0	1023	-	4.19	1.73	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	-0.1	1008	-	4.29	1.63	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.0	0.0	0.0	21.2	78.7	1.0	2.0	-	1011	0.20	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***3.0***	***5.0***	58.0	*1.0*	18.1	77.9	0.0	0.0	0.1	1023	0.64	4.70	1.22	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***3.1***	***5.5***	60.0	*0.9*	18.8	77.3	0.0	0.0	-0.1	1020	0.48	4.71	1.22	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***3.4***	***5.3***	67.0	*1.0*	18.2	77.4	0.0	0.0	0.0	1015	0.73	4.75	1.17	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.7	***1.4***	15.0	0.3	20.2	78.8	0.0	0.0	0.1	1011	0.76	4.74	1.18	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.3	0.0	0.1	20.6	79.3	0.0	0.0	0.0	1014	-0.07	-	-	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.0	0.0	0.0	21.5	78.5	0.0	0.0	0.0	1009	-0.54	3.46	2.47	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.0	0.0	0.0	21.6	78.4	0.0	0.0	0.0	1018	-0.53	3.97	1.95	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.0	21.7	78.3	0.0	0.0	0.0	1033	-0.62	3.59	2.33	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.0	0.0	0.0	21.7	78.3	0.0	0.0	0.0	1025	-0.34	4.08	1.84	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.0	21.5	78.5	0.0	0.0	0.0	986	0.06	4.14	1.79	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.0	0.0	0.0	21.0	79.0	0.0	0.0	-0.1	1007	-0.11	4.04	1.89	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.0	0.0	0.0	0.0	21.2	78.8	0.0	0.0	0.0	1026	0.03	3.99	1.94	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.4	1.0	0.0	21.1	78.8	0.0	0.0	0.7	993	-0.56	3.94	1.98	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.3	2.0	0.1	20.8	79.0	0.0	0.0	0.7	908	-0.71	3.95	1.97	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.1	0.1	1.0	0.1	21.1	78.0	0.0	0.0	0.5	1009	-0.01	4.24	1.68	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.1	0.1	1.0	0.1	21.1	78.9	0.0	0.0	0.4	1005	-0.25	4.30	1.62	08:11/20:37	01:17/14:10

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH4	M1	01/02/1900	0.1	0.2	0.2	0.0	20.0	79.8	0.0	1.0	-	1014	-0.29	4.16	1.76	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.6	0.9	12.7	0.0	20.4	-	0.0	0.0	-	1007	-	4.25	1.67	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.1	0.0	0.0	20.7	-	0.0	0.0	-	1010	-	4.21	1.71	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.5	0.5	9.3	0.0	20.0	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.3	***36.0***	4.0	*1.1*	20.9	77.8	0.0	0.0	-0.1	1013	-0.18	4.30	1.62	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***1.3***	***2.8***	25.0	0.4	19.8	78.5	0.0	0.0	0.0	1015	0.26	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***2.3***	***5.0***	41.0	0.5	19.8	77.5	0.0	0.0	-0.1	1014	0.44	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.4	0.0	0.1	20.7	79.2	0.0	0.0	-0.1	1010	0.30	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.2	0.3	4.0	0.1	20.8	78.9	0.0	0.0	0.0	1010	0.36	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.3	0.0	0.1	21.4	78.5	0.0	0.0	0.0	999	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.1	0.1	1.0	0.1	21.1	78.7	0.0	0.0	0.1	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.2	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.9	***1.2***	16.0	0.4	19.9	78.9	0.0	0.0	-0.1	1023	-	NA	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***4.7***	***7.1***	>>>	***1.8***	17.7	75.5	0.0	0.0	0.0	1013	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.6	***2.7***	12.0	0.4	20.5	78.5	0.0	0.0	0.0	1024	-	NA	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***1.5***	***2.6***	29.0	*1.0*	19.9	77.7	0.0	0.0	0.0	1008	-	NA	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	1.0	***1.5***	19.0	*0.7*	20.6	77.7	0.0	2.0	-	1011	0.24	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	1.0	***6.0***	19.0	*0.6*	20.4	78.0	0.0	0.0	0.1	1023	0.65	NA	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***2.3***	***6.9***	43.0	*1.3*	19.6	72.0	0.0	0.0	0.0	1020	0.46	NA	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***4.7***	***7.5***	88.0	***2.4***	17.6	75.5	0.0	0.0	0.0	1015	0.79	NA	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***2.4***	***4.6***	48.0	*1.2*	19.1	77.4	0.0	0.0	0.0	1011	0.93	NA	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.0	0.0	0.0	20.8	79.2	0.0	0.0	0.0	1012	-0.28	NA	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.5	0.0	0.1	21.0	78.9	0.0	0.0	0.0	1008	-0.58	NA	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.1	0.9	2.0	0.4	21.0	78.5	0.0	0.0	0.0	1019	-0.57	NA	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.2	***2.6***	4.0	0.1	21.6	78.1	0.0	0.0	-0.2	1034	-0.40	NA	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.1	0.0	0.3	21.2	78.5	0.0	0.0	0.0	1025	-0.29	NA	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	***1.3***	0.0	0.3	21.2	78.5	0.0	0.0	0.0	985	-0.23	NA	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.3	0.0	***3.5***	17.8	78.7	0.0	0.0	-4.4	1006	-0.07	NA	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.1	0.8	1.0	0.0	21.2	78.7	0.0	0.0	0.0	1025	-0.16	NA	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.4	1.0	0.0	21.1	78.8	0.0	0.0	0.5	993	-0.56	4.14	1.79	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.3	2.0	0.1	20.8	79.0	0.0	0.0	1.0	968	-0.70	4.11	1.81	03:00/15:36	09:30/21:48
	M32	02/02/2017	0.1	0.9	1.0	0.0	21.0	78.9	0.0	0.0	0.6	1009	-0.05	4.60	1.32	08:11/20:37	01:17/14:10
	M33	02/02/2017	0.1	0.1	1.0	0.1	21.1	79.1	0.0	0.0	0.4	1005	-0.25	4.42	1.50	08:11/20:37	01:17/14:10
BH5	M1	29/06/2009	***63.8***	***64.5***	>>>	***29.8***	0.8	5.0	1.0	6.0	-	1014	-0.07	3.95	3.07	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***67.0***	***67.0***	>>>	***31.0***	0.4	-	2.7	0.0	-	1007	-	3.96	3.06	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	***63.0***	***64.0***	>>>	***32.0***	1.1	-	0.0	0.0	-	1010	-	3.97	3.05	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	***55.0***	***55.0***	>>>	***26.0***	2.6	-	0.0	16.0	-	1011	-	4.01	3.01	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***52.1***	***52.2***	>>>	***28.5***	0.3	19.1	1.0	1.0	0.0	1013	1.30	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***67.3***	***67.3***	>>>	***34.3***	0.1	1.4	3.0	2.0	0.0	1015	0.22	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***67.2***	***67.4***	>>>	***31.0***	0.1	1.5	3.0	4.0	0.0 / 0.0*	1014	0.35	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***66.7***	***66.5***	>>>	***31.3***	0.1	1.9	1.0	3.0	0.0	1010	0.25	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***67.2***	***67.8***	>>>	***31.3***	2.6	0.0	0.0	2.0	0.0	1010	0.27	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***50.0***	***50.0***	>>>	***28.0***	0.0	22.0	0.0	2.0	0.4	999	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***44.5***	***44.5***	>>>	***3.2***	27.2	27.9	0.0	3.0	0.1	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	***13.0***	***13.0***	>>>	***7.5***	13.4	66.1	0.0	4.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	***44.7***	***44.7***	>>>	***25.1***	2.7	27.5	0.0	2.0	0.0	1023	-	3.60	3.42	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***58.2***	***58.2***	>>>	***29.4***	0.0	12.4	3.0	0.0	0.0	1013	-	3.56	3.46	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***58.6***	***58.6***	>>>	***28.6***	0.0	12.8	5.0	5.0	0.0	1023	-	3.61	3.41	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***68.7***	***68.7***	>>>	***29.3***	0.0	1.9	3.0	2.0	0.0	1008	-	3.74	3.28	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***69.6***	***70.1***	>>>	***29.1***	0.3	1.0	3.0	5.0	-	1014	0.21	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***65.2***	***65.2***	>>>	***32.8***	0.0	2.0	3.0	4.0	0.1	1023	0.89	3.88	3.14	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***64.5***	***64.6***	>>>	***32.6***	0.1	2.7	3.0	3.0	0.0	1020	0.54	3.88	3.14	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***65.2***	***65.2***	>>>	***32.8***	0.0	2.0	2.0	3.0	0.0	1015	0.67	3.87	3.15	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***61.9***	***62.1***	>>>	***33.0***	1.2	3.9	1.0	2.0	0.1	1011	0.76	3.86	3.16	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***60.9***	***61.0***	>>>	***31.0***	1.8	6.3	0.0	0.0	0.0	1013	-0.05	3.53	3.50	11:10/23:19	05:20/17:37
	M23	19/12/2011	***60.2***	***60.2***	>>>	***30.4***	0.2	9.2	0.0	3.0	0.0	1009	-0.60	3.53	3.50	05:56/18:31	12:23:00
	M24	23/01/2012	***70.5***	***70.5***	>>>	***21.9***	0.5	7.1	0.0	3.0	0.0	1019	-0.49	3.47	3.55	11:40/23:58	05:42/18:10
	M25	13/02/2012	***62.8***	***62.8***	>>>	***29.0***	1.0	7.2	0.0	3.0	0.0	1033	-0.67	3.47	3.56	03:04/15:26	09:31/22:01
	M26	08/03/2012	***54.7***	***54.7***	>>>	***26.9***	2.1	16.3	0.0	4.0	0.1	1025	-0.16	3.61	3.42	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***65.7***	***65.7***	>>>	***28.1***	0.7	5.5	1.0	4.0	0.0	986	0.12	3.58	3.44	11:11/23:27	05:03/17:27
	M28	28/08/2012	***65.6***	***65.6***	>>>	***29.6***	0.6	4.9	1.0	0.0	0.1	1006	0.10	3.54	3.48	10:01/22:36	4:04/16:27
	M29	06/11/2012	***40.8***	***46.6***	>>>	***20.7***	4.7	26.4	0.0	0.0	0.1	1025	-0.09	3.56	3.46	03:44/16:17	10:26/23:14
	M30	01/02/2017	***64.5***	***65.1***	>>>	***16.1***	3.2	15.2	0.0	0.0	0.9	998	-0.40	3.44	3.59	14:42/03:00	08:48/21:12
	M31	02/02/2017	***66.7***	***67.3***	13.0	*1.1*	20.2	78.1	0.0	0.0	0.4	974	-0.45	3.43	3.59	03:00/15:36	09:30/21:48
	M32	21/02/2017	***11.8***	***68.5***	>>>	***9.1***	13.4	65.6	0.0	0.0	0.4	1010	-0.18	3.99	3.03	08:11/20:37	01:17/14:10
	M33	21/02/2017	***54.0***	***67.7***	>>>	***24.6***	3.6	17.5	0.0	0.0	1.0	1006	-0.61	3.99	3.03	08:11/20:37	01:17/14:10
BH6	M1	29/06/2009	***80.7***	***81.2***	>>>	***14.4***	0.7	3.9	1.0	0.0	-	1014	0.02	2.99	1.46	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***64.0***	***65.0***	>>>	***11.0***	1.7	-	0.0	0.0	-	1007	-	3.03	1.42	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.4	0.7	13.9	0.2	20.5	-	0.0	0.0	-	1010	-	2.99	1.46	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.1	0.1	1.5	0.0	20.2	-	0.0	0.0	-	1011	-	3.01	1.44	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***76.6***	***76.6***	>>>	***12.5***	0.3	12.5	0.0	1.0	0.0	1013	-0.27	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***50.5***	***60.8***	>>>	***10.9***	4.6	35.6	0.0	2.0	0.0	1015	0.24	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***51.2***	***60.5***	>>>	***11.2***	4.4	33.2	0.0	1.0	0.0 / 0.0*	1014	-0.20	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***7.4***	***7.4***	>>>	*1.5*	17.8	73.3	0.0	0.0	0.0	1010	0.46	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***5.0***	***5.0***	>>>	***1.8***	17.9	75.3	0.0	0.0	0.0	1010	0.29	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***1.1***	***1.1***	22.0	*0.8*	20.2	77.9	0.0	0.0	0.0	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***1.5***	***1.5***	29.0	0.3	20.9	77.3	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.8	1.0	0.0	0.3	20.5	78.4	0.0	0.0	0.1	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	***1.2***	***1.2***	23.0	0.3	20.2	78.3	0.0	0.0	0.0	1023	-	2.94	1.51	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***8.0***	***8.0***	>>>	*1.4*	17.8	72.8	0.0	0.0	0.1	1013	-	2.93	1.52	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***3.8***	***5.4***	76.0	*0.7*	19.1	76.4	0.0	0.0	0.0	1025	-	2.80	1.65	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***4.3***	***5.0***	86.0	*0.7*	11.3	75.6	0.0	0.0	-0.1	1008	-	2.85	1.60	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***4.4***	***4.9***	69.0	*0.7*	19.3	75.5	0.0	0.0	-	1011	0.15	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***4.6***	***4.6***	91.0	***3.3***	16.2	75.9	0.0	0.0	0.0	1023	0.69	3.16	1.29	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***2.2***	***2.2***	43.0	***4.8***	10.2	82.8	0.0	0.0	0.0	1020	0.55	3.15	1.30	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***55.7***	***55.7***	>>>	***13.5***	0.4	30.4	0.0	1.0	0.0	1015	0.78	3.14	1.31	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***26.8***	***26.8***	>>>	***11.6***	1.6	60.0	0.0	0.0	0.1	1011	0.90	3.15	1.30	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.4	0.7	8.0	***4.2***	14.1	81.3	0.0	0.0	0.0	1013	-0.05	2.64	1.81	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.7	1.0	14.0	***3.2***	15.9	80.2	0.0	0.0	0.0	1008	-0.51	2.36	2.09	05:56/18:31	12:23:00
	M24	23/01/2012	0.8	***1.1***	16.0	***6.0***	5.6	87.6	0.0	0.0	-2.1	1019	-0.42	2.67	1.78	11:40/23:58	05:42/18:10
	M25	13/02/2012	***1.2***	***1.7***	24.0	***4.4***	9.1	85.3	0.0	0.0	-0.1	1034	-0.54	2.38	2.07	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.5	0.8	10.0	***5.3***	6.4	87.8	0.0	0.0	0.0	1025	-0.38	2.72	1.73	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***24.8***	***27.4***	>>>	***7.5***	3.3	64.4	0.0	0.0	0.0	985	-0.36	2.71	1.73	11:11/23:27	05:03/17:27
	M28	28/08/2012	***4.7***	***8.3***	90.0	***4.1***	10.8	80.5	0.0	0.0	0.1	1007	0.08	2.58	1.87	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.3	*0.3*	5.0	***6.6***	5.7	87.4	0.0	1.0	-0.4	1025	-0.11	2.56	1.89	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.3	*0.5*	6.0	***1.5***	19.2	79.0	0.0	0.0	0.8	985	-0.36	2.28	2.17	14:42/03:00	08:48/21:12
	M31	02/02/2017	***5.8***	***6.1***	>>>	***3.1***	16.1	75.0	0.0	0.0	0.6	974	-0.38	2.23	2.21	03:00/15:36	09:30/21:48
	M32	21/02/2017	***3.6***	***6.4***	72.0	*1.1*	18.7	76.6	0.0	0.0	-	1009	-0.34	2.82	1.63	08:11/20:37	01:17/14:10
	M33	21/02/2017	***7.4***	***8.1***	>>>	*1.2*	16.8	74.6	0.0	0.0	0.7	1005	-0.46	2.85	1.60	08:11/20:37	01:17/14:10

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH7	M1	29/06/2009	***52.7***	**81.0**	>>>	***21.4***	1.1	24.6	1.0	3.0	-	1014	0.16	Dry	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***56.0***	**57.0**	>>>	***22.0***	1.0	-	0.0	0.0	-	1007	-	Dry	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	***59.0***	**59.0**	>>>	***23.0***	0.9	-	0.0	17.4	-	1010	-	Dry	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	***59.0***	**59.0**	>>>	***21.0***	0.9	-	0.0	0.0	-	1011	-	Dry	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***59.1***	**61.2**	>>>	***21.2***	0.3	19.7	4.0	0.0	0.0	1013	-0.19	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***51.5***	**51.5**	>>>	***24.0***	0.4	24.0	0.0	0.0	0.0	1015	0.27	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***51.9***	**51.9**	>>>	***24.1***	0.2	23.8	0.0	0.0	0.0 / 0.1*	1014	2.29	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***51.5***	**51.5**	>>>	***24.5***	0.2	23.8	1.0	1.0	0.0	1009	0.33	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***50.4***	**50.4**	>>>	***24.5***	0.0	25.1	1.0	0.0	0.0	1010	0.20	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***51.0***	**51.0**	>>>	***20.4***	0.0	28.6	0.0	0.0	0.2	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***48.6***	**48.6**	>>>	***19.9***	0.0	31.5	0.0	0.0	0.1	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	***22.3***	**22.3**	>>>	***14.0***	4.1	59.7	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	***45.3***	**45.3**	>>>	***18.7***	0.0	36.0	0.0	0.0	0.0	1023	-	NA	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***42.7***	**42.7**	>>>	***18.9***	0.0	38.4	0.0	0.0	0.0	1013	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***44.4***	**44.4**	>>>	***18.8***	0.0	36.8	0.0	1.0	0.0	1023	-	NA	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***49.7***	**49.7**	>>>	***19.3***	0.0	31.0	3.0	0.0	0.0	1008	-	NA	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***50.1***	**50.1**	>>>	***18.8***	0.3	31.0	3.0	2.0	-	1011	0.15	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***44.1***	**44.1**	>>>	***20.2***	0.1	35.6	0.0	0.0	0.1	1023	0.67	NA	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***43.4***	**43.4**	>>>	***20.7***	0.2	35.7	0.0	0.0	0.1	1020	0.54	NA	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***43.3***	**43.3**	>>>	***20.6***	0.2	35.8	0.0	0.0	-0.1	1015	0.83	NA	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***43.6***	**43.6**	>>>	***20.6***	0.3	35.5	0.0	0.0	-0.1	1011	0.97	NA	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***49.6***	**49.5**	>>>	***21.7***	0.3	28.4	0.0	1.0	0.0	1012	-0.05	NA	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	***45.6***	**45.6**	>>>	***10.9***	0.1	43.4	0.0	0.0	0.0	1008	-0.45	NA	NA	05:56/18:31	12:23:00
	M24	23/01/2012	***47.4***	**47.4**	>>>	***15.6***	0.0	37.0	0.0	1.0	0.1	1019	-0.47	NA	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	***24.5***	**24.5**	>>>	***6.0***	8.3	61.2	0.0	0.0	0.0	1034	-0.77	NA	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	***46.7***	**46.8**	>>>	***10.2***	0.0	43.1	0.0	0.0	0.0	1025	-0.22	NA	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***47.6***	**47.7**	>>>	***12.2***	0.0	40.2	0.0	0.0	0.0	985	-0.16	NA	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***52.8***	**53.1**	>>>	**18.0**	0.0	29.3	0.0	1.0	0.1	1006	-0.15	NA	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	***57.6***	**57.6**	>>>	**12.3**	0.0	30.1	0.0	0.0	0.1	1025	0.08	NA	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	***52.5***	**52.5**	>>>	**19.4**	0.0	28.1	0.0	0.0	0.8	985	-0.53	NA	NA	14:48/02:36	08:30/21:12
	M31	02/02/2017	***53.7***	**53.7**	>>>	**20.0**	0.0	26.3	0.0	0.0	0.7	974	-0.31	NA	NA	02:48/15:36	10:00/22:06
	M32	21/02/2017	***49.5***	**49.7**	>>>	**18.9**	0.1	31.4	1.0	0.0	0.6	1009	-0.05	NA	NA	08:11/20:37	01:17/14:10
	M33	21/02/2017	***46.5***	**46.7**	>>>	**18.0**	1.3	34.0	0.0	0.0	0.8	1005	-0.51	NA	NA	08:11/20:37	01:17/14:10
BH8	M1	29/06/2009	***76.0***	***76.1***	>>>	***21.3***	0.5	2.2	0.0	3.0	-	1014	-0.02	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***80.0***	***80.0***	>>>	***14.0***	0.3	-	0.0	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	***71.0***	***72.0***	>>>	***21.0***	1.4	-	2.2	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	***74.0***	***74.0***	>>>	***21.0***	0.6	-	11.7	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***76.3***	***85.8***	>>>	***22.8***	0.3	0.6	17.0	0.0	0.0	1013	-0.16	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***72.0***	***72.1***	>>>	***23.7***	0.1	4.3	0.0	0.0	0.0	1015	0.33	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***72.3***	***72.4***	>>>	***23.7***	0.2	3.7	1.0	1.0	-0.1 / 0.2*	1014	0.46	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***73.0***	***73.0***	>>>	***24.1***	0.0	2.9	5.0	1.0	0.1	1010	0.23	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***73.8***	***74.6***	>>>	***23.6***	1.5	1.1	0.0	0.0	0.11	1010	0.14	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***76.2***	***76.7***	>>>	***18.2***	0.4	52.0	1.0	0.0	0.3	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***67.0***	***67.0***	>>>	***18.9***	1.1	13.1	2.0	1.0	0.0	985	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.2	0.2	3.0	0.3	20.7	78.8	0.0	0.0	0.1	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13a	04/03/2010	0.0	0.0	0.0	0.1	20.3	79.6	0.0	0.0	-0.1	1023	-	Dry	NA	01:41 / 14:02	08:17 / 20:36
	M13b	04/03/2010	***2.8***	***2.8***	53.0	*0.8*	18.3	78.1	0.0	0.0	0.0	1024	-	NA	NA	01:41 / 14:02	08:17 / 20:36
	M14a	16/03/2010	***55.7***	***55.7***	>>>	***17.8***	0.1	26.4	4.0	0.0	0.1	1015	-	Dry	NA	12:04:00	06:23 / 18:40
	M14b	16/03/2010	***54.9***	***54.9***	>>>	***17.9***	0.2	27.0	2.0	0.0	0.1	1014	-	NA	NA	12:04:00	06:23 / 18:40
	M14c	16/03/2010	***56.3***	***56.3***	>>>	***18.3***	0.0	25.4	0.0	0.0	0.1	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***50.6***	***50.7***	>>>	***16.8***	1.7	30.9	0.0	2.0	0	1023	-	Dry	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***63.2***	***63.2***	>>>	***17.3***	2.0	17.4	5.0	1.0	0.1	1008	-	Dry	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***66.0***	***66.3***	>>>	***17.3***	1.8	14.8	3.0	3.0	-	1014	5.72	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***69.2***	***69.3***	>>>	***21.0***	0.0	9.8	1.0	2.0	0.1	1023	0.46	Dry	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***69.2***	***69.2***	>>>	***21.0***	0.5	9.3	0.0	1.0	0.1	1020	0.32	Dry	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***69.3***	***69.5***	>>>	***21.4***	0.0	9.3	3.0	2.0	0.0	1015	0.66	Dry	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***69.6***	***69.6***	>>>	***21.5***	0.2	9.0	0.0	1.0	0.2	1011	0.77	Dry	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***81.5***	***81.7***	>>>	***7.6***	0.6	10.3	0.0	0.0	0.3	1013	-0.09	Dry	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	***79.6***	***79.7***	>>>	***5.2***	0.0	15.2	0.0	0.0	0.0	1009	-0.55	Dry	NA	05:56/18:31	12:23:00
	M24	23/01/2012	***63.6***	***63.6***	>>>	***3.7***	0.0	32.7	0.0	0.0	0.1	1018	-0.36	Dry	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	***58.5***	***59.7***	>>>	***3.6***	0.4	37.5	0.0	1.0	0.0	1033	-0.60	Dry	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	***60.3***	***60.3***	>>>	*1.5*	1.2	37.0	0.0	0.0	0.0	1025	-0.30	Dry	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***87.8***	***87.8***	>>>	***3.3***	0.0	8.9	0.0	1.0	0.0	986	-0.10	Dry	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***3.7***	***3.7***	73.0	***6.1***	0.0	90.2	0.0	1.0	0.1	1006	-0.19	Dry	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.1	0.1	2.0	*1.4*	11.1	87.4	0.0	0.0	0.1	1025	-0.28	1.84	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	***1.1***	***30.1***	22.0	***1.6***	13.3	84.0	0.0	0.0	0.6	988	-0.24	1.09	NA	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.1	1.0	0.0	20.3	79.1	0.0	0.0	0.6	974	-0.37	1.74	NA	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.1	0.1	1.0	0.2	20.7	79.0	0.0	0.0	0.4	1010	-0.25	1.76	NA	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.1	0.1	1.0	0.1	20.8	79.0	0.0	0.0	0.7	1005	-0.45	1.80	NA	08:11/20:37	01:17/14:10
BH9	M1	29/06/2009	***63.5***	***65.5***	>>>	***32.2***	0.6	3.5	3.0	7.0	-	1014	-0.07	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***63.0***	***63.0***	>>>	***32.0***	1.3	-	5.9	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	***65.0***	***66.0***	>>>	***32.0***	0.4	-	9.3	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	***63.0***	***63.0***	>>>	***33.0***	1.1	-	3.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***75.3***	***75.3***	>>>	***32.3***	0.5	0.0	13.0	0.0	0.0	1013	-	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***67.6***	***67.6***	>>>	***34.3***	0.2	0.0	1.0	0.0	0.0	1015	-0.01	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***64.2***	***64.2***	>>>	***34.2***	0.2	1.3	2.0	0.0	0.0	1014	0.21	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***65.5***	***65.5***	>>>	***34.8***	0.1	0.0	1.0	1.0	0.0	1010	0.24	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***65.7***	***65.7***	>>>	***35.0***	0.0	0.0	3.0	1.0	0.0	1010	0.02	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***67.5***	***67.5***	>>>	***31.8***	0.2	0.8	0.0	0.0	0.0	999	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***61.4***	***61.4***	>>>	***32.5***	0.0	6.0	2.0	1.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.3	***39.7***	5.0	*0.8*	20.2	78.7	0.0	0.0	0.0	1005	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.1	0.0	0.1	20.0	79.9	0.0	0.0	0.0	1023	-	Dry	NA	01:41 / 14:02	08:17 / 20:36
	M14a	16/03/2010	***56.3***	***56.3***	>>>	***29.9***	0.0	13.8	1.0	0.0	-0.1	1013	-	Dry	NA	12:04:00	06:23 / 18:40
	M14b	16/03/2010	***57.1***	***57.1***	>>>	***30.5***	0.0	12.3	0.0	0.0	0.3	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***54.9***	***54.9***	>>>	***29.7***	0.0	15.4	0.0	2.0	0.0	1024	-	Dry	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***67.0***	***67.1***	>>>	***30.9***	0.0	2.1	4.0	0.0	0.1	1008	-	Dry	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***68.0***	***68.1***	>>>	***31.1***	0.3	0.6	4.0	2.0	-	1014	0.33	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***59.7***	***59.7***	>>>	***31.9***	0.0	8.4	6.0	3.0	0.1	1023	0.90	Dry	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***58.8***	***58.8***	>>>	***31.1***	0.2	8.9	0.0	1.0	0.0	1020	0.48	Dry	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***58.6***	***58.6***	>>>	***32.4***	0.0	8.9	0.0	1.0	0.0	1015	0.33	Dry	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***57.2***	***57.2***	>>>	***32.2***	0.6	9.8	0.0	0.0	-0.1	1011	0.72	Dry	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***63.8***	***63.8***	>>>	***33.6***	0.5	2.1	0.0	0.0	0.0	1013	-0.14	Dry	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	***66.0***	***66.0***	>>>	***31.4***	0.0	2.6	3.0	1.0	0.0	1009	-0.71	Dry	NA	05:56/18:31	12:23:00
	M24	23/01/2012	***67.7***	***67.7***	>>>	***31.0***	0.0	1.3	0.0	2.0	0.1	1019	-0.49	Dry	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	***68.2***	***68.2***	>>>	***30.6***	0.0	1.2	1.0	1.0	0.1	1033	-0.57	Dry	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	***58.2***	***58.2***	>>>	***26.9***	0.0	14.9	0.0	2.0	0.0	1025	-0.40	Dry	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***66.8***	***66.8***	>>>	***32.2***	0.0	1.0	3.0	2.0	0.0	986	-0.03	Dry	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***64.4***	***64.4***	>>>	***35.1***	0.0	0.7	10.0	1.0	0.0	1006	-0.14	Dry	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	***57.5***	***57.5***	>>>	***32.6***	0.0	10.0	0.0	0.0	0.1	1025	-0.12	2.00	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	***57.4***	***57.6***	>>>	***27.0***	3.0	12.5	7.0	0.0	1.1	990	-0.65	1.92	NA	02:06/14:42	08:48/21:12
	M31	02/02/2017	***67.1***	***67.2***	>>>	***32.9***	0.0	0.0	1.0	0.0	0.7	974	-0.45	1.92	NA	03:00/15:36	09:30/21:48
	M32	21/02/2017	***68.3***	***68.3***	>>>	***32.0***	0.8	0.0	11.0	0.0	0.2	1010	-0.18	Dry	NA	08:11/20:37	01:17/14:10
	M33	21/02/2017	***64.2***	***67.7***	>>>	*1.3*	9.1	9.1	4.0	0.0	1.0	1006	-0.61	Dry	NA	08:11/20:37	01:17/14:10

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH10	M1	29/06/2009	0.1	0.2	0.0	0.0	19.4	80.5	1.0	0.0	-	1014	-0.21	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	0.0	20.7	-	0.0	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	0.0	20.7	-	0.0	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	***2.8***	0.0	0.0	20.7	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.0	0.0	0.0	0.1	21.1	78.8	0.0	0.0	0.0	1013	0.00	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.0	0.3	0.0	0.1	20.5	79.5	0.0	0.0	0.0	1015	0.22	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.0	0.0	0.0	0.0	20.1	79.4	0.0	0.0	0.0	1014	1.93	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	0.1	20.6	79.3	0.0	0.0	0.0	1009	0.24	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	0.0	20.9	79.1	0.0	0.0	0.0	1010	0.22	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.3	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	0.1	21.4	78.5	0.0	0.0	0.0	985	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	20.7	79.2	0.0	0.0	-0.1	1005	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.9	79.0	0.0	0.0	0.5	1023	-	2.51	3.24	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.1	1013	-	2.41	3.33	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.1	1024	-	2.42	3.33	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.1	0.1	1.0	0.1	21.1	78.7	0.0	0.0	0.5	1008	-	2.35	3.40	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.1	0.1	1.0	0.1	21.1	78.7	1.0	0.0	-	1014	-2.95	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	0.2	0.2	4.0	*1.3*	18.4	80.1	0.0	8.0	0.4	1023	1.42	2.49	3.25	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.0	*1.2*	19.4	79.4	0.0	4.0	0.8	1020	1.62	2.49	3.25	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.1	2.0	*0.8*	19.7	79.4	0.0	2.0	0.0	1015	1.17	2.48	3.26	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	21.1	78.9	0.0	0.0	-0.1	1011	0.75	2.48	3.27	10:45 / 23:08	04:53 / 17:06
	M22	11/11/2011	***31.6***	***31.6***	>>>	***5.6***	0.2	62.6	0.0	0.1	1002	-0.36	2.16	3.59	11:10/23:19	05:20/17:37
	M23	19/12/2011	***16.6***	***16.6***	>>>	***3.1***	8.7	71.6	0.0	6.0	-3.4	1009	-0.54	2.02	3.73	05:56/18:31	12:23:00
	M24	23/01/2012	***9.8***	***9.8***	>>>	***2.6***	11.6	76.0	0.0	6.0	-2.6	1019	-4.19	2.01	3.73	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.4	***1.2***	8.0	0.3	20.8	78.5	0.0	0.0	0.1	1033	-0.74	1.97	3.77	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.4	0.7	8.0	0.5	20.6	78.5	0.0	0.0	0.0	1025	-0.28	2.07	3.68	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.1	0.0	0.4	20.9	78.7	0.0	0.0	-0.1	986	-0.34	1.91	3.83	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.0	0.0	*1.2*	20.0	78.8	0.0	0.0	-2.2	1006	-2.91	1.91	3.83	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.1	0.1	1.0	*1.3*	20.5	78.1	0.0	0.0	0.1	1025	-0.26	NA	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.5	1.0	***1.6***	19.2	79.1	0.0	0.0	7.2	985	-0.36	1.39	4.35	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.1	1.0	0.0	20.9	79.0	0.0	0.0	5.7	974	-0.37	1.30	4.44	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.1	0.1	1.0	0.1	21.0	78.8	0.0	0.0	0.5	1010	-0.33	1.80	3.94	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.1	0.1	1.0	0.1	20.8	79.0	0.0	0.0	0.7	1005	-0.45	1.82	3.92	08:11/20:37	01:17/14:10
BH11	M1	29/06/2009	0.0	0.0	0.0	0.2	19.4	80.3	0.0	0.0	-	1014	0.07	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	0.3	18.8	-	0.0	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	0.0	20.8	-	0.0	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	0.0	0.0	0.0	20.6	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.1	0.7	2.0	*1.2*	20.9	77.8	0.0	0.0	-0.1	1013	-0.13	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.1	0.8	1.0	*0.9*	19.0	80.0	0.0	0.0	0.0	1015	0.19	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.2	0.2	3.0	*1.1*	18.8	79.9	0.0	0.0	0.0	1014	0.39	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	***1.8***	16.0	82.2	0.0	0.0	0.0	1009	0.29	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	*1.2*	17.7	81.1	0.0	0.0	0.0	1010	4.63	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.0	0.0	0.1	21.2	78.7	0.0	0.0	0.1	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	0.1	21.0	78.9	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.1	0.0	0.1	21.1	78.8	0.0	0.0	-0.1	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.4	79.5	0.0	0.0	0.0	1023	-	NA	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.4	0.0	0.2	20.7	79.1	0.0	0.0	-0.1	1013	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.2	21.2	78.6	0.0	0.0	0.0	1023	-	NA	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.0	0.0	0.0	0.2	21.1	78.7	0.0	0.0	0.0	1008	-	NA	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.0	0.0	0.2	21.1	78.7	1.0	0.0	-	1014	-4.11	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	0.0	0.0	0.0	***5.8***	1.4	92.8	0.0	0.0	0.0	1023	0.83	NA	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.1	***6.2***	2.2	91.6	0.0	0.0	0.1	1020	0.51	NA	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.1	***1.1***	1.0	***6.4***	2.2	91.3	0.0	0.0	0.0	1015	0.68	NA	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	***4.2***	9.8	86.0	0.0	0.0	0.0	1011	0.74	NA	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.0	0.0	*0.7*	20.1	79.2	0.0	0.0	0.0	1013	0.17	NA	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.2	0.0	*0.3*	21.1	78.6	0.0	0.0	0.0	1009	-0.66	NA	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.7	0.0	*0.1*	21.4	78.5	0.0	0.0	0.0	1018	-0.55	NA	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.2	21.5	78.3	0.0	0.0	0.0	1033	-0.54	NA	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.4	0.0	0.1	21.5	78.4	0.0	0.0	0.0	1025	-0.50	NA	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.2	0.0	0.1	21.5	78.4	0.0	0.0	0.0	986	0.24	NA	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.3	0.0	0.1	21.0	78.9	0.0	0.0	-0.3	1006	-0.86	NA	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.1	0.1	1.0	*0.6*	20.8	78.5	0.0	0.0	0.1	1025	-0.15	NA	NA	03:44/16:17	10:26/23:14
	M30	01/02/2017	0.1	0.1	1.0	*0.0*	21.0	78.9	0.0	0.0	0.7	985	-0.53	NA	NA	14:42/03:00	08:48/21:12
	M31	02/02/2017	0.1	0.1	1.0	0.1	21.0	78.8	0.0	0.0	0.5	974	-0.31	NA	NA	03:00/15:36	09:30/21:48
	M32	21/02/2017	0.1	0.1	1.0	0.1	21.2	78.6	0.0	0.0	0.4	1010	-0.24	NA	NA	08:11/20:37	01:17/14:10
	M33	21/02/2017	0.1	0.3	0.7	0.1	20.8	79.0	0.0	0.0	0.7	1006	-0.50	NA	NA	08:11/20:37	01:17/14:10
BH13	M1	29/06/2009	0.0	0.0	0.0	***10.7***	7.6	81.7	1.0	0.0	-	1014	0.02	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	0.0	0.0	0.0	***8.2***	9.8	-	0.0	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	0.0	0.0	0.0	***11.0***	7.8	-	0.0	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.0	0.0	0.0	***9.6***	8.9	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	0.3	0.3	6.0	***3.7***	13.5	82.3	0.0	0.0	-0.1	1013	-0.17	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	0.0	0.0	0.0	***11.3***	7.4	80.9	0.0	0.0	0.0	1015	0.02	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	0.0	0.0	0.0	***11.1***	7.3	81.6	0.0	0.0	-0.3	1014	0.39	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	0.0	0.0	0.0	***10.6***	9.5	79.9	0.0	0.0	0.0	1009	0.26	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	0.0	0.0	0.0	***10.5***	9.7	79.8	0.0	0.0	0.0	1010	0.21	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	0.0	0.0	0.0	***3.3***	16.1	80.6	0.0	0.0	0.1	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	0.0	0.0	0.0	***3.7***	15.8	80.5	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	***3.8***	15.1	81.1	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	***3.9***	14.2	81.9	0.0	0.0	0.0	1023	-	1.42	3.65	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.0	0.0	***4.3***	15.1	80.6	0.0	0.0	0.1	1013	-	1.49	3.59	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	***4.9***	13.0	82.1	0.0	0.0	0.0	1023	-	1.40	3.68	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.0	0.0	0.0	***5.2***	14.3	80.5	0.0	0.0	0.0	1008	-	1.48	3.59	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.0	0.0	***5.2***	14.6	80.2	1.0	0.0	-	1014	0.28	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	0.0	0.0	0.0	***8.5***	9.8	81.7	0.0	0.0	0.0	1023	0.56	1.92	3.15	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.0	***9.1***	9.7	81.2	0.0	0.0	0.0	1020	0.51	1.92	3.16	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.0	0.1	0.0	***9.2***	9.4	81.4	0.0	0.0	0.1	1015	0.71	Dry	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	***9.5***	9.0	81.5	0.0	0.0	0.0	1011	0.79	Dry	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.4	0.0	***4.5***	15.9	79.6	0.0	0.0	0.0	1013	-0.06	NA	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.1	0.0	***2.2***	18.7	79.1	0.0	0.0	-0.3	1009	-0.62	NA	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.0	0.0	***2.4***	19.6	78.0	0.0	0.0	0.0	1018	-0.55	NA	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	***3.0***	16.9	80.1	0.0	0.0	0.0	1033	-1.79	NA	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.0	0.0	***2.7***	19.0	78.3	0.0	0.0	0.0	1025	-0.39	NA	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	***3.8***	15.1	81.1	0.0	0.0	0.0	986	0.06	NA	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.1	0.1	0.0	***8.4***	10.0	81.7	0.0	1.0	0.0	1007	-0.15	NA	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.1	0.1	1.0	***7.4***	10.0	82.4	0.0	0.0	-0.1	1026	-0.02	NA		03:44/16:17	10:26/23:14

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH14	M1	29/06/2009	***80.3***	***82.1***	>>>	***4.3***	0.7	14.6	0.0	0.0	-	1014	0.16	NA	NA	05:40 / 18:07	12:08 / 00:28
	M2	03/07/2009	***72.0***	***72.0***	>>>	***4.5***	2.0	-	0.0	0.0	-	1007	-	NA	NA	09:53 / 22:21	03:49 / 16:15
	M3	07/07/2009	***14.0***	***14.5***	>>>	***2.0***	15.6	-	0.0	0.0	-	1010	-	NA	NA	00:27 / 12:39	06:57 / 19:03
	M4	15/07/2009	0.5	0.5	14.5	*0.6*	19.9	-	0.0	0.0	-	1011	-	NA	NA	04:27 / 16:50	11:05 / 23:35
	M5	16/07/2009	***9.1***	***9.4***	>>>	***4.1***	9.3	77.6	0.0	0.0	0.0	1013	-0.18	NA	NA	05:20 / 17:57	12:00 / 23:30
	M6	18/09/2009	***70.3***	***80.0***	>>>	***4.4***	2.5	22.3	0.0	1.0	0.0	1015	0.27	NA	NA	10:57 / 23:24	05:06 / 17:24
	M7	18/09/2009	***72.2***	***79.8***	>>>	***4.2***	3.0	23.3	0.0	1.0	0.0 / 0.0*	1014	0.41	NA	NA	10:57 / 23:24	05:06 / 17:24
	M8	07/10/2009	***69.6***	***78.8***	>>>	***4.7***	2.8	22.9	0.0	0.0	0.0	1010	0.32	NA	NA	01:48 / 14:08	08:21 / 20:41
	M9	07/10/2009	***70.3***	***74.3***	>>>	***4.9***	2.4	22.4	0.0	1.0	0.0	1010	0.17	NA	NA	01:48 / 14:08	08:21 / 20:41
	M10	21/01/2010	***80.4***	***80.4***	>>>	***3.4***	0.7	15.4	0.0	0.0	0.5	997	-	NA	NA	02:55 / 15:14	09:30 / 21:55
	M11	22/02/2010	***12.5***	***12.7***	>>>	***2.2***	14.4	71.3	0.0	0.0	0.0	986	-	NA	NA	04:40 / 17:03	11:24 / 23:58
	M12	01/03/2010	0.0	0.0	0.0	0.1	21.1	78.8	0.0	0.0	0.1	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	-0.1	1023	-	3.50	2.19	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***44.5***	***44.5***	>>>	***3.1***	6.4	46.3	0.0	0.0	0.1	1013	-	3.59	2.09	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***4.3***	***4.3***	>>>	***2.6***	14.2	78.9	0.0	0.0	-0.1	1023	-	4.35	1.34	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***38.0***	***38.1***	>>>	***2.9***	8.8	50.2	0.0	1.0	0.0	1008	-	3.53	2.15	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***36.2***	***36.4***	>>>	***2.8***	9.5	51.4	0.0	3.0	-	1011	0.15	NA	NA	08:17 / 20:46	01:43 / 14:30
	M18	16/06/2010	***70.4***	***70.4***	>>>	***5.3***	0.0	24.3	0.0	4.0	0.0	1023	0.71	3.77	1.92	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***68.3***	***68.3***	>>>	***5.4***	0.3	26.0	0.0	2.0	0.0	1020	0.50	3.76	1.92	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***67.6***	***67.6***	>>>	***5.6***	0.1	26.7	0.0	2.0	0.0	1015	0.76	3.75	1.93	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***68.0***	***68.0***	>>>	***5.7***	0.0	26.3	0.0	4.0	0.0	1011	0.93	3.75	1.93	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***66.6***	***66.7***	>>>	***6.3***	0.2	26.9	1.0	0.0	0.0	1012	6.29	3.51	2.18	11:10/23:19	05:20/17:37
	M23	19/12/2011	***59.1***	***59.1***	>>>	***4.0***	0.7	36.2	1.0	4.0	0.1	1008	-0.54	2.78	2.91	05:56/18:31	12:23:00
	M24	23/01/2012	***70.8***	***70.8***	>>>	***4.3***	0.0	24.9	0.0	2.0	0.1	1019	-0.42	3.24	2.44	11:40/23:58	05:42/18:10
	M25	13/02/2012	***34.3***	***36.4***	>>>	***1.8***	8.7	55.2	0.0	3.0	0.0	1034	-0.61	2.98	2.70	03:04/15:26	09:31/22:01
	M26	08/03/2012	***60.6***	***60.6***	>>>	***3.6***	0.3	35.5	0.0	0.0	0.0	1025	-0.22	3.30	2.38	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***57.0***	***57.1***	>>>	***3.8***	0.4	38.8	0.0	0.0	0.0	985	-0.11	3.28	2.40	11:11/23:27	05:03/17:27
	M28	28/08/2012	***76.6***	***76.6***	>>>	***6.2***	0.2	17.1	0.0	0.0	0.0	1007	-0.07	3.27	2.42	10:01/22:36	4:04/16:27
	M29	06/11/2012	***15.7***	***16.0***	>>>	***6.6***	3.8	74.0	0.0	0.0	-0.1	1025	-0.60	3.29	2.40	03:44/16:17	10:26/23:14
	M30	01/02/2017	***46.4***	***46.4***	>>>	***3.6***	0.0	50.0	0.0	0.0	1.6	985	-0.36	3.69	1.99	14:42/03:00	08:48/21:12
	M31	02/02/2017	***30.2***	***31.0***	>>>	***3.3***	6.4	59.1	0.0	0.0	0.6	974	-0.31	3.67	2.01	03:00/15:36	09:30/21:48
	M32	21/02/2017	***25.9***	***25.9***	>>>	***4.2***	0.3	69.5	0.0	0.0	0.6	1009	-0.46	3.69	1.99	08:11/20:37	01:17/14:10
	M33	21/02/2017	***24.8***	***24.8***	>>>	***3.8***	3.4	67.9	0.0	0.0	0.8	1005	-0.50	3.99	1.69	08:11/20:37	01:17/14:10
BH20	M12	01/03/2010	0.0	0.0	0.0	0.1	19.8	80.1	0.0	0.0	-0.1	1005	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.5	79.4	0.0	0.0	0.0	1024	-	2.39	NA	01:41 / 14:02	08:17 / 20:36
	M14a	16/03/2010	0.0	0.1	0.0	0.5	18.1	81.4	0.0	0.0	0.0	1014	-	2.48	NA	12:04:00	06:23 / 18:40
	M14b	16/03/2010	0.0	0.2	0.0	0.5	16.6	81.9	0.0	0.0	0.0	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.0	21.4	78.6	0.0	0.0	0.0	1023	-	2.50	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.0	0.0	0.0	*0.6*	19.8	79.6	0.0	0.0	-0.1	1008	-	2.57	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.1	0.0	*0.6*	19.7	79.6	1.0	3.0	-	1011	0.21	NA	NA	08:17 / 20:46	01:43 / 14:30
	M117	30/04/2010	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	0.0	0.0	0.0	*1.4*	9.1	89.5	0.0	0.0	-0.1	1024	0.24	2.57	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.0	*1.2*	11.7	87.0	0.0	0.0	0.0	1021	0.44	2.59	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.0	0.0	0.0	***1.6***	10.7	87.7	0.0	0.0	0.0	1015	0.76	2.71	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	***4.0***	0.0	*1.5*	9.8	88.7	0.0	0.0	0.0	1011	0.77	2.66	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.3	0.9	6.0	0.5	16.7	82.5	0.0	0.0	0.0	1013	0.06	2.43	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.0	0.0	0.3	16.7	83.0	0.0	0.0	0.0	1008	-0.59	2.21	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.1	0.0	0.1	20.2	79.7	0.0	0.0	0.0	1019	-0.56	2.36	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.2	18.1	81.7	0.0	0.0	-0.7	1034	-0.71	1.97	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.2	0.0	0.1	20.5	79.4	0.0	0.0	0.0	1025	-0.43	2.40	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.2	20.3	79.5	0.0	0.0	0.0	985	-0.38	2.41	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.3	***1.1***	6.0	0.3	19.0	80.5	0.0	0.0	0.1	1007	0.07	2.46	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.0	0.1	0.0	*0.5*	18.3	81.2	0.0	0.0	-0.4	1025	-0.10	NA	NA	03:44/16:17	10:26/23:14
	M30	02/02/2017	0.1	0.1	1.0	*1.0*	18.0	80.9	0.0	0.0	0.6	974	-0.37	2.02	NA	03:00/15:36	09:30/21:48
	M31	21/02/2017	0.1	0.1	1.0	***1.6***	17.6	80.7	0.0	0.0	0.4	1010	-0.29	2.79	NA	08:11/20:37	01:17/14:10
BH21	M12	01/03/2010	***30.9***	***32.4***	>>>	*0.7*	6.6	61.8	5.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	***43.7***	***44.4***	>>>	*1.5*	1.3	53.7	0.0	0.0	0.0	1024	-	NA	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***48.2***	***48.4***	>>>	***1.8***	0.0	50.0	0.0	0.0	0.0	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***55.8***	***58.0***	>>>	*1.5*	1.3	41.4	0.0	0.0	0.0	1024	-	NA	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	***56.2***	***56.2***	>>>	***2.0***	0.3	41.5	0.0	0.0	0.0	1008	-	NA	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	***56.5***	***56.9***	>>>	***2.0***	1.0	40.4	1.0	1.0	-	1010	0.20	NA	NA	08:17 / 20:46	01:43 / 14:30
	M17	30/04/2010	***76.0***	***76.0***	>>>	***2.1***	0.5	21.4	0.0	0.0	0.0	1002	0.48	1.58	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	***63.6***	***63.6***	>>>	***2.5***	1.3	32.6	0.0	0.0	0.0	1024	0.05	NA	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***71.8***	***71.8***	>>>	***2.7***	0.2	25.3	0.0	0.0	0.1	1021	0.65	NA	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***67.2***	***67.3***	>>>	***2.7***	0.5	29.6	0.0	0.0	0.0	1015	0.74	NA	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***74.0***	***74.0***	>>>	***2.9***	0.3	22.8	0.0	0.0	-0.2	1011	0.55	NA	NA	10:45 / 23:08	04:53 / 17:06
	M23	19/12/2011	***32.4***	***80.2***	>>>	0.5	12.1	55.0	0.0	0.0	0.0	1010	-0.61	NA	NA	05:56/18:31	12:23:00
	M23	22/12/2011	***14.3***	***27.5***	>>>	0.0	18.0	67.7	0.0	2.0	0.0	1015	-0.21	NA	NA	09:24/21:53	03:21/15:49
	M24	23/01/2012	***40.6***	***40.6***	>>>	***2.2***	0.0	57.2	0.0	1.0	0.1	1019	-4.03	NA	NA	11:40/23:58	05:42/18:10
	M25	14/02/2012	***11.2***	***17.6***	>>>	0.1	13.0	75.7	0.0	29.0	0.0	1034	-0.35	NA	NA	03:54/16:18	10:26/23:04
	M26	08/03/2012	***67.0***	***67.0***	>>>	*1.5*	0.3	31.2	0.0	1.0	0.0	1026	-0.54	NA	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***90.7***	***90.7***	>>>	***2.3***	0.0	7.0	0.0	1.0	0.0	986	-3.84	NA	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***91.5***	***91.9***	>>>	***4.4***	0.0	4.1	2.0	0.0	0.0	1007	-6.35	NA	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	***86.1***	***86.1***	>>>	***3.6***	0.0	10.3	3.0	0.0	0.2	1026	-0.08	NA	NA	03:44/16:17	10:26/23:14

Table 4: Landfill Gas Monitoring Results

Monitoring Well I.D.	Monitoring Event	Monitoring Date	Stable Methane (CH_4)	Peak Methane (CH_4)	LEL	Carbon Dioxide (CO_2)	Oxygen (O_2)	Balance	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Flow Measurement	Atmospheric Pressure	Relative Pressure	Depth to Water	Water Level	Low Tide Times	High Tide Times
			%	%	%	%	%	%	ppm	ppm	l/h	mb	mb	mbTOC	mAOD	24 hr	
BH22	M12	01/03/2010	***6.2***	***14.4***	>>>	*0.6*	19.3	73.9	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.3	0.0	0.1	21.0	78.9	0.0	0.0	0.0	1023	-	0.96	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.0	0.0	0.1	20.9	79.1	0.0	0.0	0.1	1013	-	1.07	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.0	20.9	79.1	0.0	0.0	0.0	1024	-	0.97	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.1	0.1	1.0	0.1	21.1	78.7	0.0	0.0	-0.1	1008	-	1.14	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.1	0.1	1.0	0.0	21.2	78.6	1.0	3.0	-	1011	0.38	NA	NA	08:17 / 20:46	01:43 / 14:30
	M17	30/04/2010	0.0	0.0	0.0	0.1	20.9	79.0	0.0	0.0	0.1	1002	0.50	1.04	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	0.9	0.9	18.0	***9.3***	0.0	89.8	0.0	0.0	0.0	1023	0.70	1.35	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***1.1***	***1.1***	21.0	***9.6***	0.2	89.1	0.0	0.0	0.0	1020	0.54	1.36	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	1.0	***1.1***	20.0	***10.0***	0.0	89.0	0.0	0.0	0.0	1015	0.78	1.38	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***1.4***	***1.4***	28.0	***10.1***	0.0	88.5	0.0	0.0	0.0	1011	0.94	1.38	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***44.8***	***53.2***	>>>	***5.0***	6.1	44.1	0.0	0.0	-2.2	1013	-6.05	0.72	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	***30.6***	***30.7***	>>>	***4.5***	4.4	60.5	0.0	0.0	5.9	1008	4.91	0.55	NA	05:56/18:31	12:23:00
	M24	23/01/2012	***7.7***	***7.7***	>>>	***4.1***	13.4	74.8	0.0	0.0	0.0	1019	-0.46	1.08	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.2	21.5	78.3	0.0	0.0	0.0	1033	-0.59	0.42	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	***4.3***	***7.8***	86.0	0.5	20.3	74.9	0.0	0.0	0.0	1025	-0.34	0.70	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.5	20.6	78.9	0.0	0.0	0.0	986	-4.10	0.74	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***77.8***	***80.4***	>>>	***6.5***	0.8	15.1	0.0	0.0	4.6	1007	24.04	0.81	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	***28.6***	***32.1***	>>>	***2.8***	12.6	56.3	0.0	0.0	6.6	1025	-0.40	0.68	NA	03:44/16:17	10:26/23:14
BH23	M12	01/03/2010	***10.0***	***18.0***	>>>	*1.0*	14.6	74.4	0.0	243.0	-0.1	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	***13.4***	***18.8***	>>>	*0.7*	10.8	75.2	0.0	73.0	0.0	1023	-	4.25	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	***36.7***	***36.7***	>>>	***4.1***	2.2	57.4	0.0	0.0	0.1	1013	-	1.54	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	***18.2***	***23.8***	>>>	***1.6***	7.5	72.7	0.0	0.0	-0.1	1024	-	1.50	NA	00:54 /13:03	07:25 / 19:36
	M16M	16/04/2010	***11.3***	***15.4***	>>>	***3.2***	14.5	71.0	0.0	0.0	0.0	1008	-	1.53	NA	08:17 / 20:46	01:43 / 14:30
	M16C	16/04/2010	***11.2***	***13.4***	>>>	***3.0***	15.2	71.3	1.0	2.0	-	1011	0.190	NA	NA	08:17 / 20:46	01:43 / 14:30
	M17	30/04/2010	***29.2***	***29.2***	>>>	***10.0***	3.1	57.7	0.0	0.0	0.1	1002	0.540	1.48	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	***81.4***	***81.4***	>>>	***6.1***	0.2	12.3	0.0	1.0	0.0	1023	0.720	1.76	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	***74.6***	***75.6***	>>>	***6.9***	0.5	18.1	0.0	1.0	0.1	1020	0.560	1.73	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	***78.0***	***78.5***	>>>	***7.3***	0.3	14.5	0.0	1.0	0.0	1015	0.840	1.72	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	***78.5***	***78.9***	>>>	***7.6***	0.3	13.6	0.0	0.0	0.0	1011	0.980	1.69	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	***66.5***	***68.6***	>>>	***3.8***	4.3	25.4	0.0	0.0	0.8	1012	-0.110	1.43	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	***45.8***	***70.9***	>>>	***2.4***	6.1	45.7	13.0	0.0	3.6	1008	-0.550	1.45	NA	05:56/18:31	12:23:00
	M24	23/01/2012	***71.2***	***71.5***	>>>	***2.3***	0.0	26.5	0.0	0.0	4.9	1019	6.070	1.68	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	***56.6***	***57.1***	>>>	***3.2***	0.0	40.2	11.0	1.0	1.6	1034	-0.740	1.16	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	***66.7***	***70.9***	>>>	***2.2***	0.8	30.3	0.0	0.0	3.3	1025	3.580	1.45	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	***78.4***	***78.4***	>>>	***3.0***	0.0	18.6	4.0	0.0	7.1	986	7.200	1.34	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	***76.0***	***82.3***	>>>	***6.4***	0.8	14.7	0.0	0.0	4.5	1006	5.500	1.37	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	***81.3***	***82.4***	>>>	***4.1***	0.1	14.9	13.0	0.0	6.8	1025	-0.090	1.84	NA	03:44/16:17	10:26/23:14
	M30	02/02/2017	***24.3***	***24.3***	>>>	***4.1***	11.4	60.2	0.0	0.0	1.0	968	-0.071	1.84	NA	15:30/03:36	09:30/21:48
	M31	21/02/2017	0.4	0.4	8.0	0.1	20.9	78.6	0.0	0.0	2.1	1009	-0.050	2.08	NA	15:30/03:36	09:30/21:48
BH24	M12	01/03/2010	0.0	0.0	0.0	0.1	20.5	79.4	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.3	19.4	80.3	0.0	0.0	0.0	1024	-	1.34	NA	01:41 / 14:02	08:17 / 20:36
	M14	16/03/2010	0.0	0.3	0.0	*1.5*	17.2	81.3	0.0	0.0	0.0	1013	-	1.46	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	***2.2***	14.4	83.4	0.0	0.0	0.0	1024	-	1.38	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.1	0.3	2.0	***2.0***	15.3	82.7	0.0	0.0	0.1	1008	-	1.47	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.1	0.2	1.0	***2.1***	15.1	82.6	0.0	0.0	-	1011	0.38	NA	NA	08:17 / 20:46	01:43 / 14:30
	M17	30/04/2010	0.0	0.0	0.0	***2.0***	18.4	79.6	0.0	0.0	-0.1	1001	0.26	1.46	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	0.0	0.1	0.0	*1.3*	19.1	79.6	0.0	0.0	0.0	1024	-1.63	1.60	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.0	0.4	20.3	79.3	0.0	0.0	-0.1	1021	0.56	1.60	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.0	0.0	0.0	***2.1***	18.5	79.3	0.0	0.0	0.0	1016	0.29	1.61	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	***2.7***	17.3	80.0	0.0	0.0	0.0	1011	0.96	1.60	NA	10:45 / 23:08	04:53 / 17:06
	M23	19/12/2011	0.0	0.0	0.0	*0.6*	17.7	81.7	0.0	0.0	0.0	1009	-0.58	1.02	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.0	0.0	***2.4***	12.2	85.4	0.0	0.0	0.0	1018	-0.77	1.21	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	*0.7*	17.4	81.9	0.0	0.0	0.0	1034	-0.76	1.13	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.0	0.0	***2.1***	11.7	86.2	0.0	0.0	0.0	1025	-0.45	1.09	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	0.5	19.5	80.0	0.0	0.0	0.0	987	-8.20	1.24	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	0.0	0.0	0.0	***3.7***	11.9	84.5	0.0	0.0	0.0	1006	-1.48	1.30	NA	10:01/22:36	4:04/16:27
	M29	06/11/2012	0.0	0.4	0.0	0.0	21.0	79.0	0.0	0.0	0.2	1026	0.00	-	NA	03:44/16:17	10:26/23:14
BH25	M12	01/03/2010	0.0	0.0	0.0	0.1	20.7	79.2	0.0	0.0	0.0	1006	-	NA	NA	12:06:00	06:08 / 18:30
	M13	04/03/2010	0.0	0.0	0.0	0.1	20.8	79.1	0.0	0.0	0.0	1024	-	3.69	NA	01:41 / 14:02	08:17 / 20:36
	M14a	16/03/2010	0.0	0.1	0.0	*0.7*	18.8	80.5	0.0	0.0	-0.2	1014	-	1.56	NA	12:04:00	06:23 / 18:40
	M14b	16/03/2010	0.0	0.6	0.0	0.4	19.6	80.0	0.0	0.0	-1.1	1011	-	NA	NA	12:04:00	06:23 / 18:40
	M15**	15/04/2010	0.0	0.0	0.0	0.1	21.6	78.3	0.0	0.0	0.2	1024	-	1.26	NA	00:54 /13:03	07:25 / 19:36
	M16M	23/04/2010	0.1	0.9	2.0	*0.8*	19.7	79.4	0.0	0.0	-0.2	1008	-	1.57	NA	08:17 / 20:46	01:43 / 14:30
	M16C	23/04/2010	0.0	0.1	1.0	0.3	20.6	78.9	0.0	0.0	-	1014	-1.96	NA	NA	08:17 / 20:46	01:43 / 14:30
	M17	30/04/2010	0.0	0.0	0.0	*0.8*	20.0	79.2	0.0	0.0	-0.3	1001	0.02	1.52	NA	01:18/ 13:36	07:49/ 20:02
	M18	16/06/2010	0.0	0.1	0.0	0.3	20.5	79.2	0.0	0.0	0.1	1023	0.83	1.90	NA	03:02 / 15:13	09:38 / 21:51
	M19	18/06/2010	0.0	0.0	0.0	0.3	20.5	79.2	0.0	0.0	0.6	1021	1.44	1.96	NA	04:43 / 17:00	11:27 / 23:52
	M20	22/06/2010	0.0	0.2	0.0	***2.3***	14.7	83.0	0.0	0.0	-0.4	1015	-0.40	2.03	NA	08:22 / 20:49	02:10 / 14:41
	M21	25/06/2010	0.0	0.0	0.0	*1.3*	17.1	81.6	0.0	0.0	-0.2	1011	0.37	2.05	NA	10:45 / 23:08	04:53 / 17:06
	M22	10/11/2011	0.0	0.0	0.0	0.4	20.7	78.9	0.0	0.0	0.6	1014	0.00	1.37	NA	11:10/23:19	05:20/17:37
	M23	19/12/2011	0.0	0.0	0.0	0.3	21.3	78.4	0.0	0.0	0.0	1010	-0.72	1.08	NA	05:56/18:31	12:23:00
	M24	23/01/2012	0.0	0.0	0.0	0.5	21.2	78.3	0.0	0.0	-0.4	1019	-0.62	1.59	NA	11:40/23:58	05:42/18:10
	M25	13/02/2012	0.0	0.0	0.0	0.1	21.4	78.5	0.0	0.0	0.0	1034	-0.66	1.04	NA	03:04/15:26	09:31/22:01
	M26	08/03/2012	0.0	0.1	0.0	0.2	21.4	78.4	0.0	0.0	0.0	1026	-0.54	1.25	NA	11:48/ 23:24	05:52/ 18:13
	M27	18/04/2012	0.0	0.0	0.0	***1.8***	20.0	78.2	0.0	0.0	5.6	987	8.62	1.26	NA	11:11/23:27	05:03/17:27
	M28	28/08/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	10:01/22:36	4:04/16:27
	M29	06/11/2012	***1.2***	***1.2***	0.0	*1.0*	17.2	80.6	0.0	0.0	1.7	1025	-0.40	1.43	-	03:44/16:17	10:26/23:14
	M30	06/11/2012	0.4	0.4	0.0	*0.6*	19.4	79.6	0.0	0.0	0.0	1026	-0.05	-	-	03:44/16:17	10:26/23:14
EPA 1997 Thresholds[1]			1.0	1.0	~	1.5	~	~	~	~	~	~	~	~	~	~	~
DOE Exposure Limits[2]			1.0	1.0	~	0.5	~	~	~	~	~	~	~	~	~	~	~

Notes:
LEL denotes Lower Explosive Limit (expressed as percentage of 5% v/v methane).
>>> denotes exceeds the LEL.
* denotes measurement without moisture filter on Gas monitoring instrument.
**denotes values represent the final values recorded during a 15 minute monitoring session.
~ denotes no threshold available.
- not recorded.
NA denotes measurement not available.
mbTOC denotes metres below top of casing.
mAOD denotes metres above ordnance datum.
Bold denotes level exceeds EPA threshold.

Italics denotes level exceeds DOE exposure limit.
M16M denotes monitoring event carried out using MOR GA2000.
M16C denotes monitoring event carried out using CSL GA2000 for comparitive purposes.
Low and High Tide information from Easy Tide Predictions & Tide Tables 2012 (All Ireland).
Atmospheric Pressure information from 29/06/09 to 06/11/12 from MET Eireann Finner Weather Station.
Readings from 29/06/09 to 15/07/09 collected using GasData LMSXi.
Readings from 16/07/09 to 29/08/12 collected using GA2000.
1: Environmental Protection Agency (EPA) 1997: Landfill Manuals - Landfill operational Practices. EPA, Ireland.
2: Department of the Environment (1994): Protection of New Buildings and Occupants from Landfill Gas. DOE, Ireland

Certificate of Authorisation
Addendum Environmental Risk Assessment
Former Finisklin Landfill
Sligo County Council

Table 5A Indoor Gas Monitoring Survey Results - 17 02 03 - Clearway

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	10:44	10:44	0.1	1.0	0.1	0.0	21.2	78.8	1	0.0	986.0	-0.0056	0
Main office under desk	10:49	10:49	0.1	1.0	0.1	0.0	21.2	78.8	2	0.0	986.0	-0.0056	2.2
Reception under desk	10:50	10:50	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	2.3
Link storage	10:51	10:51	0.1	1.0	0.1	0.0	21.1	78.8	4	0.0	986.0	-0.0056	2.1
Behind male toilet	10:52	10:52	0.1	1.0	0.1	0.0	21.1	78.8	4	0.0	986.0	-0.0056	2.3
Manhole under office	10:54	10:54	0.1	1.0	0.1	0.0	21.2	78.8	4	0.0	986.0	-0.0056	2
Electrical pipe	10:56	10:56	0.1	1.0	0.1	0.0	21.2	78.8	4	0.0	986.0	-0.0056	1.6
Red pipe	10:57	10:57	0.1	1.0	0.1	0.0	21.3	78.8	4	0.0	986.0	-0.0056	2
Storage shed 1	10:59	11:00	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	2
Crack in garage floor	11:03	11:03	0.1	1.0	0.1	0.0	21.2	78.8	1	0.0	986.0	-0.0056	2.3
manhole tool shed	11:04	11:07	0.1	1.0	0.1	0.0	21.2	78.8	2	0.0	986.0	-0.0056	45.1
Double pipe by wall	11:08	11:08	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	2.5
Manhole in front of G1	11:09	11:12	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	71.1
Crack in concrete (Back wall)	11:15	11:16	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	2.3
Manhole near crusher	11:25	11:25	0.1	1.0	0.1	0.0	21.2	78.8	3	0.0	986.0	-0.0056	16.8
Drain at entrance	11:28	11:28	0.1	1.0	0.1	0.0	21.3	78.8	3	0.0	986.0	-0.0056	2.1

Table 5B Indoor Gas Monitoring Survey Results - 17 02 22 - Clearway

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	10:00	10:00	0.1	1.0	0.1	0.1	21.2	78.8	1	0.0	1006.0	-0.3500	0
Main office under desk	10:04	10:04	0.1	1.0	0.1	0.1	21.2	78.8	2	0.0	1006.0	-0.3500	0
Reception under desk	10:06	10:06	0.1	1.0	0.1	0.1	21.1	78.7	2	0.0	1006.0	-0.2400	0
Link storage	10:07	10:07	0.1	1.0	0.1	0.1	21.2	78.9	2	0.0	1006.0	-0.3500	0
Behind male toilet	10:09	10:09	0.1	1.0	0.1	0.1	21.3	78.8	2	0.0	1006.0	-0.3500	0
Manhole under office	10:11	10:11	0.1	1.0	0.1	0.1	21.3	78.7	2	0.0	1006.0	-0.3500	0
Electrical pipe	10:13	10:13	0.1	1.0	0.1	0.1	21.3	78.9	6	0.0	1006.0	-0.3500	0
Red pipe	10:15	10:15	0.1	1.0	0.1	0.1	21.3	78.9	2	0.0	1006.0	-0.3500	0
Storage shed 1	10:17	10:17	0.1	1.0	0.1	0.1	21.3	78.7	2	0.0	1006.0	-0.3500	258
Crack in garage floor	10:18	10:18	0.1	1.0	0.1	0.1	21.3	78.8	2	0.0	1006.0	-0.3500	0
manhole tool shed	10:20	10:20	**4.3**	**86.0**	**4.5**	**2.4**	19.2	73.4	2	0.0	1006.0	-0.2400	>>>
Double pipe by wall	10:22	10:22	0.1	1.0	0.1	0.1	21.2	78.6	2	0.0	1006.0	-0.2400	0
Manhole in front of G1	10:23	10:23	**5.9**	>>>	**10.3**	**2.5**	19.4	72.4	2	0.0	1006.0	-0.1800	>>>
Crack in concrete (Back wall)	10:27	10:27	0.1	1.0	0.1	0.1	21.2	78.7	2	0.0	1006.0	-0.3500	16.5
Manhole near crusher	~	~	~	~	~	~	~	~	~	~	~	~	~
Drain at entrance	10:32	10:32	0.1	1.0	0.1	0.1	21.3	78.9	2	0.0	1006.0	0.0000	0

Note:
- denotes no access.
Bold denotes level exceeds EPA threshold.
>>> denotes exceeds the LEL.

Table 6A Indoor Gas Monitoring Survey Results - 03/02/2017 - Cold Chon

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	09:56	09:56	0.10	1.0	0.0	0	21.1	78.8	1	0	986	-0.56	2.5
SW Drain	09:59	09:59	0.10	1.0	0.10	0	21.0	78.8	1	0	986	-0.56	2.5
Exposed pipe	10:03	10:03	0.10	1.0	0.10	0	21.1	78.8	1	0	986	-0.56	2.3
Drain	10:05	10:05	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	2.4
Boiler room pipe	10:10	10:10	0.10	1.0	0.10	0	21.1	78.8	1	0	986	-0.56	2.5
Drain beside toilet	10:11	10:11	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	2.7
Skirting board outside lab	10:13	10:13	0.10	1.0	0.10	0	21.3	78.8	1	0	986	-0.56	2.1
Pipe up from ground	10:18	10:18	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	2.1
Pipe with two inserted tubes	10:20	10:20	0.10	1.0	0.10	0	21.1	78.8	1	0	986	-0.56	2.1
Pipe (beside hand protection sign)	10:22	10:22	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	1.8
Drain 1 sales office	10:24	10:24	0.10	1.0	0.10	0	21.3	78.8	1	0	986	-0.56	1.9
Drain 2 sales offic	10:25	10:25	0.10	1.0	0.10	0	21.3	78.8	1	0	986	-0.56	1.9
Drain 3 sales office	10:26	10:26	0.10	1.0	0.10	0	21.3	78.8	1	0	986	-0.56	2
Under radiator staff room	10:27	10:27	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	2.1
Drain inside toilet	10:29	10:29	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	2
Small manhole outside toilet	10:30	10:30	0.10	1.0	0.10	0	21.3	78.8	1	0	986	-0.56	1.9
Drain 1 outside toilet	10:31	10:31	0.10	1.0	0.10	0	21.2	78.8	3	0	986	-0.56	2.2
Drain 2 outside toilet	10:32	10:32	0.10	1.0	0.10	0	21.3	78.8	5	0	986	-0.56	1.9
Manhole outside main office	10:34	10:34	0.10	1.0	0.10	0	21.2	78.8	3	0	986	-0.56	2
Pipe 1 radiator manager office	10:35	10:35	0.10	1.0	0.10	0	21.2	78.8	1	0	986	-0.56	4.5
Pipe 2 radiator manager office	10:37	10:37	0.10	1.0	0.10	0	21.2	78.8	2	0	986	-0.56	3.6
omputer room manager office	10:38	10:38	0.10	1.0	0.10	0	21.1	78.8	1	0	986	-0.56	2.6
Toilet skirting board manager office	10:39	10:39	0.10	1.0	0.10	0	21.2	78.8	4	0	986	-0.56	5.1
SW drain 2	10:42	10:42	0.10	1.0	0.10	0	21.2	78.8	3	0	986	-0.56	2.2

Table 6B Indoor Gas Monitoring Survey Results - 22/02/2017 - Cold Chon

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	09:19	09:19	0.01	0.0	0.0	0	21.1	78.6	1	0	1006	-0.35	0
SW Drain	09:22	09:22	0.01	0.0	0.0	0	21.0	79.1	4	0	1006	-0.35	0
Exposed pipe	09:27	09:27	0.01	0.0	1.3	0	21.1	78.9	17	0	1006	-0.35	6
Drain	09:29	09:29	0.01	0.0	1.2	0	21.2	78.8	13	0	1006	-0.35	0
Boiler room pipe	09:33	09:33	0.01	0.0	1.1	0	21.1	78.6	6	0	1006	-0.35	0
Drain beside toilet	09:35	09:35	0.01	0.0	0.1	0	21.2	78.7	6	0	1006	-0.35	0
Skirting board outside lab	09:37	09:37	0.01	0.0	0.1	0	21.3	78.8	6	0	1006	-0.35	0
Pipe up from ground	09:38	09:38	0.01	0.0	0.1	0	21.2	78.2	6	0	1006	-0.35	0
Pipe with two inserted tubes	09:39	09:39	0.01	0.0	0.1	0	21.1	78.3	3	0	1006	-0.35	0
Pipe (beside hand protection sign)	09:41	09:41	0.01	0.0	0.1	0	21.2	78.1	2	0	1006	-0.35	0
Drain 1 sales office	09:43	09:43	0.01	0.0	0.1	0	21.3	78.6	2	0	1006	-0.35	0
Drain 2 sales offic	09:45	09:45	0.01	0.0	0.1	0	21.3	78.6	2	0	1006	-0.35	0
Drain 3 sales office	09:46	09:46	0.01	0.0	0.1	0	21.3	78.8	2	0	1006	-0.35	0
Under radiator staff room	09:48	09:48	0.01	0.0	0.1	0	21.2	78.6	2	0	1006	-0.35	0
Drain inside toilet	09:49	09:49	0.01	0.0	0.1	0	21.2	78.6	2	0	1006	-0.35	0
Small manhole outside toilet	09:50	09:50	0.01	0.0	0.1	0	21.3	78.6	2	0	1006	-0.35	0
Drain 1 outside toilet	09:51	09:51	0.01	0.0	0.1	0	21.2	78.9	2	0	1006	-0.35	0
Drain 2 outside toilet	09:49	09:49	0.01	1.0	0.1	0	21.3	78.9	2	0	1006	-0.35	0
Manhole outside main office	09:52	09:52	0.01	1.0	0.1	0	21.2	78.6	2	0	1006	-0.35	0
Pipe 1 radiator manager office	09:57	09:57	0.01	1.0	1.3	0	21.2	78.7	2	0	1006	-0.35	0
Pipe 2 radiator manager office	09:58	09:58	0.01	1.0	0.1	0	21.2	78.8	2	0	1006	-0.35	0
omputer room manager office	09:59	09:59	0.01	1.0	0.1	0	21.1	78.7	2	0	1006	-0.35	0
Toilet skirting board manager office	10:00	10:00	0.01	1.0	0.1	0	21.2	78.7	2	0	1006	-0.35	0
SW drain 2	10:02	10:02	0.01	1.0	0.1	0	21.2	78.9	1	0	1006	-0.35	0

Certificate of Authorisation
Addendym Environmental Risk Assessment
Former Finisklin Landfill
Sligo County Council

Table 7A Indoor Gas Monitoring Survey Results - 17 02 03 - Calor Gas

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	11:36	11:38	0.1	1.0	0.1	0.0	21.2	78.8	1	0	986	-0.05	0
Behind toilet office	11:39	11:39	0.1	1.0	0.1	0.0	21.3	78.8	4	0	986	-0.05	2
Under gas oven	11:40	11:40	0.1	1.0	0.1	0.0	21.2	78.8	3	0	986	-0.05	1.8
Manhole beside offic	11:43	11:43	0.1	1.0	0.1	0.0	21.3	78.8	2	0	986	-0.05	2
White pipe	11:44	11:44	0.1	1.0	0.1	0.0	21.2	78.8	3	0	986	-0.05	2.2
Manhole beside hut	11:45	11:45	0.1	1.0	0.1	0.0	21.1	78.8	1	0	986	-0.05	2.2
Pump room	11:47	11:47	0.1	1.0	0.1	0.0	21.3	78.8	3	0	986	-0.05	2
Drain beside hut	11:48	11:48	0.1	1.0	0.1	0.0	21.2	78.8	4	0	986	-0.05	2
Manhole back wall	11:50	11:50	0.1	1.0	0.1	0.0	21.3	78.8	3	0	986	-0.05	2
Manhole 1 side wall	11:52	11:52	0.1	1.0	0.1	0.0	21.2	78.8	2	0	986	-0.05	2
Manhole 2 side wall	11:53	11:53	0.1	1.0	0.1	0.0	21.3	78.8	5	0	986	-0.05	1.9
Manhole 3 side wall	11:54	11:54	0.1	1.0	0.1	0.0	21.2	78.8	3	0	986	-0.05	1.8
Drain 1 (gas loading)	11:54	11:54	0.1	1.0	0.1	0.0	21.3	78.8	2	0	986	-0.05	2
Drain 2 (gas loading)	11:55	11:55	0.1	1.0	0.1	0.0	21.2	78.8	3	0	986	-0.05	2
Manhole under yellow pipe	11:56	11:56	0.1	1.0	0.1	0.0	21.2	78.8	3	0	986	-0.05	2.1

Table 7B Indoor Gas Monitoring Survey Results - 17 02 03 - Calor Gas

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading					-	-	-	-	-	-	-	-	-
Behind toilet office					-	-	-	-	-	-	-	-	-
Under gas oven					-	-	-	-	-	-	-	-	-
Manhole beside offic					-	-	-	-	-	-	-	-	-
White pipe					-	-	-	-	-	-	-	-	-
Manhole beside hut					-	-	-	-	-	-	-	-	-
Pump room					-	-	-	-	-	-	-	-	-
Drain beside hut					-	-	-	-	-	-	-	-	-
Manhole back wall					-	-	-	-	-	-	-	-	-
Manhole 1 side wall					-	-	-	-	-	-	-	-	-
Manhole 2 side wall					-	-	-	-	-	-	-	-	-
Manhole 3 side wall					-	-	-	-	-	-	-	-	-
Drain 1 (gas loading)					-	-	-	-	-	-	-	-	-
Drain 2 (gas loading)					-	-	-	-	-	-	-	-	-
Manhole under yellow pipe					-	-	-	-	-	-	-	-	-

Note:

- denotes 'no access'.

Table 8A Indoor Gas Monitoring Survey Results - 17 02 03 - WWTP

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	12:06	12:06	0.1	1.0	0.1	0.0	21.2	78.6	1	0.0	987.0	-0.0056	2.1
Lab under sink	12:08	12:08	0.1	1.0	0.1	0.0	21.1	78.6	6	0.0	987.0	-0.0056	2.3
Mainoffice under desk	12:10	12:10	0.1	1.0	0.1	0.0	21.0	78.6	7	0.0	987.0	-0.0056	2.6
Smaller office under desk	12:12	12:12	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2.8
Store room	12:13	12:13	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2.6
Behind toilet	12:15	12:15	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2.5
Canteen	12:15	12:15	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2.3
Manhole at entrance	12:17	12:17	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2
Drain at entrance	12:18	12:18	0.1	1.0	0.1	0.0	21.1	78.6	2	0.0	987.0	-0.0056	2.7

Table 8B Indoor Gas Monitoring Survey Results - 17 02 22 - WWTP

Location Surveyed	GA2000 results												FID results
	Start time	End time	% CH_4	%LEL CH_4	Peak CH_4 (%)	% CO_2	O_2	Balance	CO ppm	H_2S ppm	Barometric Pressure	Relative Pressure	VOCs equivalent to CH_4 (ppm) Stable
Ambient outdoor reading	10:58	10:58	0.0	0.0	0.0	0.0	21.2	78.8	1	0.0	1006.0	-0.3500	0
Lab under sink	11:00	11:00	0.0	0.0	0.0	0.0	21.1	79.1	2	0.0	1006.0	-0.3500	0
Mainoffice under desk	11:03	11:03	0.0	0.0	0.0	0.0	21.2	78.7	2	0.0	1006.0	-0.3500	0
Smaller office under desk	11:05	11:05	0.0	0.0	0.0	0.0	21.2	78.8	2	0.0	1006.0	-0.3500	0
Store room	11:07	11:07	0.0	0.0	0.0	0.0	21.1	79.2	2	0.0	1006.0	-0.3500	0
Behind toilet	11:08	11:08	0.0	0.0	0.0	0.0	21.2	79.2	2	0.0	1006.0	-0.3500	0
Canteen	11:10	11:10	0.0	0.0	0.0	0.0	21.2	78.7	2	0.0	1006.0	-0.3500	0
Manhole at entrance	11:12	11:12	0.0	0.0	0.0	0.0	21.2	79.3	2	0.0	1006.0	-0.3500	0
Drain at entrance	11:14	11:14	0.0	0.0	0.0	0.0	21.1	79.3	2	0.0	1006.0	-0.3500	0

DRAWINGS

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DRAWING ISSUE FORM

Job No :	Job :		Date Issued
E0715	**Former Finisklin Landfill Environmental Assessment Project**	Day	01
		Month	08
		Year	17

Drawing No.	Drawing Title	Status	Date	Drawn	Revision 2011	Date	Issue M	Revision 2017	Date	Job No.
1	Regional Site Location	Final	Mar-11	MS	Final	6/4/11	CD			
2	Ordnance Survey Map (1942)	Final	Mar-11	SP	Final	6/4/11	CD			
3	Proposed Central Landfill Site - Map 2 (1978)	Final	Mar-11	SP	Final	6/4/11	CD			
4	Initial Study Relating to the Extension of Finisklin (…)	Final	Mar-11	SP	Final	6/4/11	CD			
5	Aerial Photograph - 2007	Final	Mar-11	SP	Final	6/4/11	CD			
6	Extent of Landfill, Surrounding Landuse and (…)	Final	Mar-11	MS	Final	6/4/11	CD			
7	Quaternary Geology	Final	Mar-11	SP	Final	6/4/11	CD			
8	Bedrock Geology	Final	Mar-11	SP	Final	6/4/11	CD			
9	Aquifer Classification	Final	Mar-11	SP	Final	6/4/11	CD			
10	Groundwater Vulnerability	Final	Mar-11	SP	Final	6/4/11	CD			
11	GSI Well Search	Final	Mar-11	SP	Final	6/4/11	CD			
12a	Services within 250m of the site Mainwater/rising (…)	Final	Mar-11	MS	Final	6/4/11	CD			
12b	Services within 250m of the site Foul, Storm and (…)	Final	Mar-11	MS	Final	6/4/11	CD			
12c	Services within 250m of the site ESB and Eircom	Final	Mar-11	MS	Final	6/4/11	CD			
13	Sligo County Council Zoning Map (2010-2016)	Final	Mar-11	MS	Final	6/4/11	CD			
14	Location of pNHAs and cSACs within 1km	Final	Mar-11	SP	Final	6/4/11	CD			
15	Location of SPA within 1km	Final	Mar-11	SP	Final	6/4/11	CD			
16	Schematic Diagram Showing Premilinary (…)	Final	Mar-11	MS	Final	6/4/11	CD			
17	Site Investigation Locations: Trial Pits	Final	Mar-11	MS	Final	6/4/11	CD			
18	Site Investigation Locations: Boreholes	Final	Mar-11	MS	Final	8/4/11	CD			
19	Permanent Monitoring Locations (…)	Final	Mar-11	MS	Final	6/4/11	CD	Rev01	Aug-17	E1342
20	Internal Gas Survey Locations	Final	Mar-11	MS	Final	6/4/11	CD			
21	Inferred Groundwater Flow Direction Low Tide (…)	Final	Mar-11	MS	Final	6/4/11	CD			
22	Landfill Gas Monitoring Results	Final	Mar-11	MS	Final	6/4/11	CD			
23	Revised Schematic Diagram Showing Conceptual (…)	Final	Mar-11	MS	Final	6/4/11	CD	Rev01	Aug-17	E1342

Job No :	Job :		Date Issued
E0861	**Former Finisklin Landfill Certificate of Authorisation Application Addendum**	Day	01
		Month	08
		Year	17

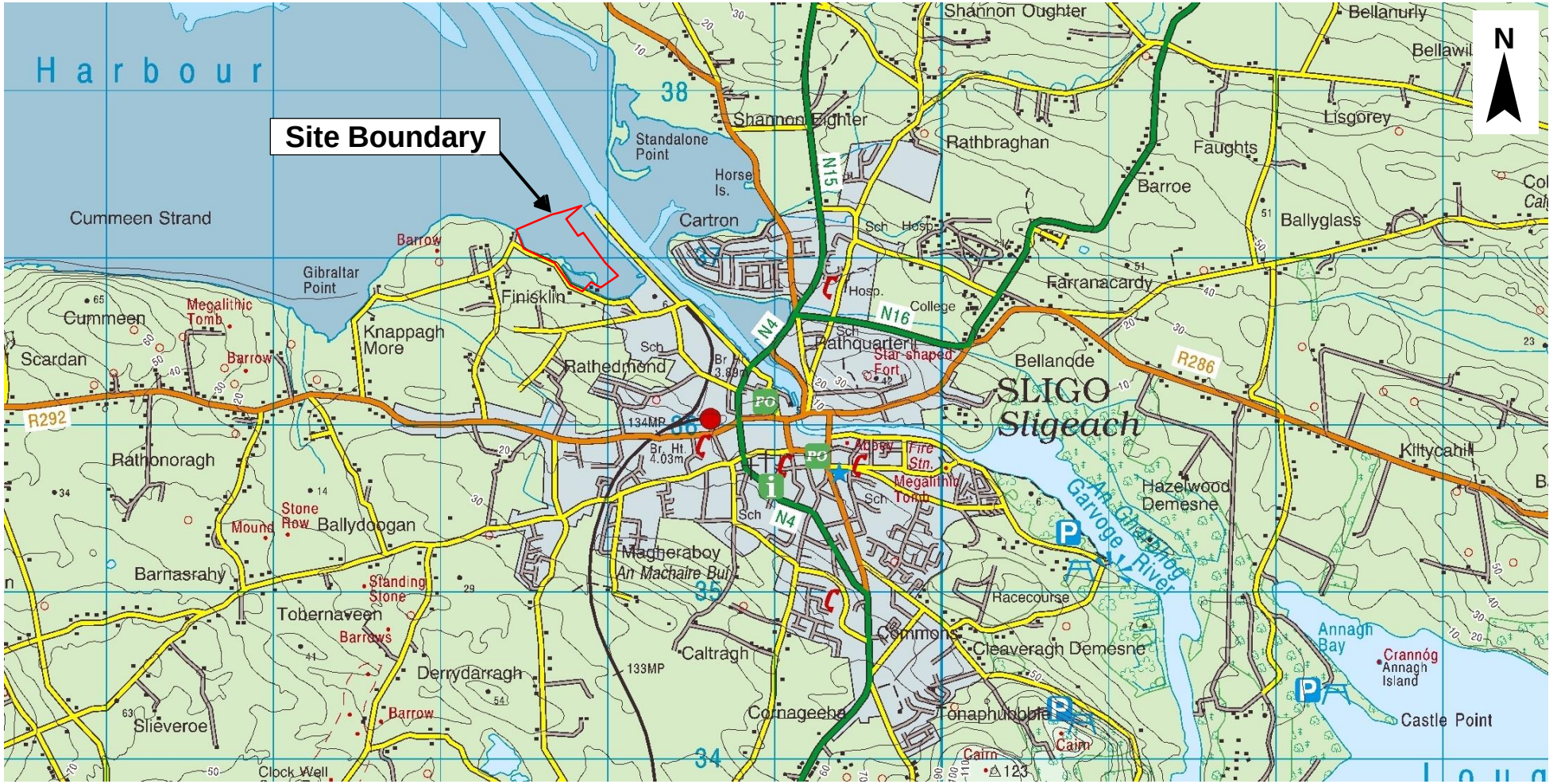
Drawing No.	Drawing Title	Status	Date	Drawn	Revision 2011	Date	Issue M	Revision 2017	Date	Job No.
1	Regional Site Location	Final	May-12	JA	Final	8/5/12	CD	Rev 01	Aug-17	E1342
2	Landfill Gas Monitoring Results	Final	May-22	CMcG	Final	22/5/12	CD	Rev 01	Aug-17	E1342
3	Internal Gas Survey Locations	Final	May-12	JA	Final	10/5/12	CD	Rev 01	Aug-17	E1342
4	Remediation System Locations	Final	May-12	JA	Final	10/5/12	CD	Rev 01	Aug-17	E1342
5	Schematic of Passive Venting Well System	Final	May-12	JA	Final	10/5/12	CD			

Issued to :		No. of Copies
Client	Sligo County Council	1
Project Director	Kevin O'Regan	
Project Manager	Claire Clifford	
Others		

Purpose of Issue :	
Issued by :	EC

Issue Method

Hardcopy = H Compact Disk = CD Email = E Compact Disc = CD Floppy Disc = D



Legend:

Site Boundary

0m 500m 1000m

Ordnance Survey Ireland No. EN0002512 © Ordnance Survey Ireland and Government of Ireland

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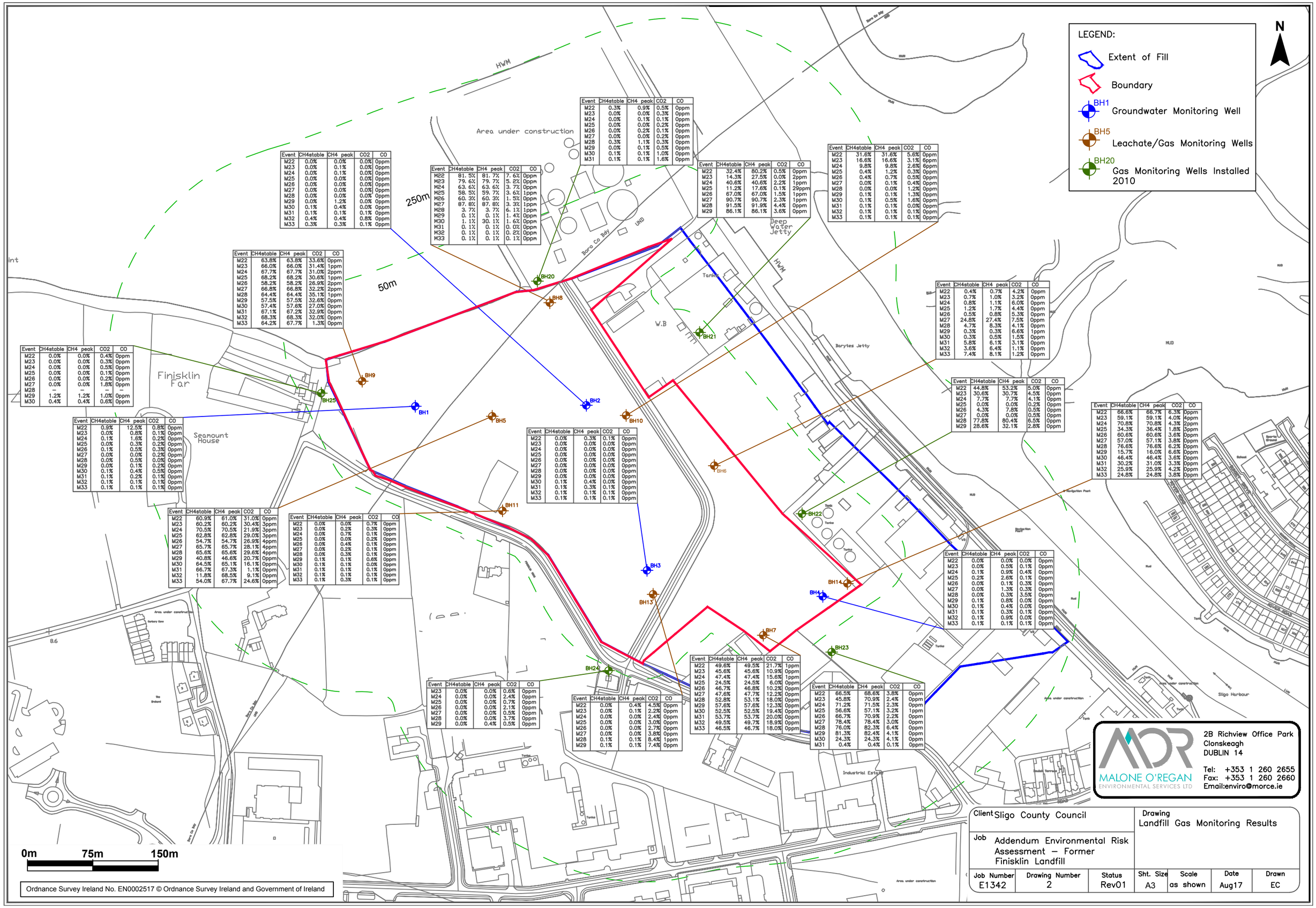
Client	Drawing
Sligo County Council	Regional Site Location
Job Addendum Environmental Risk Assessment – Former Finisklin Landfill	

Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	1	Rev01	A4	as shown	Aug 17	EC



Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.0%	0.0%	0ppm
M23	0.0%	0.1%	0.0%	0ppm
M24	0.0%	0.1%	0.0%	0ppm
M25	0.0%	0.0%	0.0%	0ppm
M26	0.0%	0.0%	0.0%	0ppm
M27	0.0%	0.0%	0.0%	0ppm
M28	0.0%	0.0%	0.0%	0ppm
M29	0.0%	1.2%	0.0%	0ppm
M30	0.1%	0.4%	0.0%	0ppm
M31	0.1%	0.1%	0.1%	0ppm
M32	0.4%	0.4%	0.8%	0ppm
M33	0.3%	0.3%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.3%	0.9%	0.5%	0ppm
M23	0.0%	0.0%	0.3%	0ppm
M24	0.0%	0.1%	0.1%	0ppm
M25	0.0%	0.0%	0.2%	0ppm
M26	0.0%	0.2%	0.1%	0ppm
M27	0.0%	0.0%	0.2%	0ppm
M28	0.3%	1.1%	0.3%	0ppm
M29	0.0%	0.1%	0.5%	0ppm
M30	0.1%	0.1%	1.0%	0ppm
M31	0.1%	0.1%	1.6%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	81.5%	81.7%	7.6%	0ppm
M23	79.6%	79.7%	5.2%	0ppm
M24	63.6%	63.6%	3.7%	0ppm
M25	58.5%	59.7%	3.6%	1ppm
M26	60.3%	60.3%	1.5%	0ppm
M27	87.8%	87.8%	3.3%	1ppm
M28	3.7%	3.7%	6.1%	1ppm
M29	0.1%	0.1%	1.4%	0ppm
M30	1.1%	30.1%	1.6%	0ppm
M31	0.1%	0.1%	0.0%	0ppm
M32	0.1%	0.1%	0.2%	0ppm
M33	0.1%	0.1%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	32.4%	80.2%	0.5%	0ppm
M23	14.3%	27.5%	0.0%	2ppm
M24	40.6%	40.6%	2.2%	1ppm
M25	11.2%	17.6%	0.1%	29ppm
M26	67.0%	67.0%	1.5%	1ppm
M27	90.7%	90.7%	2.3%	1ppm
M28	91.5%	91.9%	4.4%	0ppm
M29	86.1%	86.1%	3.6%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	31.6%	31.6%	5.6%	0ppm
M23	16.6%	16.6%	3.1%	6ppm
M24	9.8%	9.8%	2.6%	6ppm
M25	0.4%	1.2%	0.3%	0ppm
M26	0.4%	0.7%	0.5%	0ppm
M27	0.0%	0.1%	0.4%	0ppm
M28	0.0%	0.0%	1.2%	0ppm
M29	0.1%	0.1%	1.3%	0ppm
M30	0.1%	0.5%	1.6%	0ppm
M31	0.1%	0.1%	0.0%	0ppm
M32	0.1%	0.1%	0.1%	0ppm
M33	0.1%	0.1%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	63.8%	63.8%	33.6%	0ppm
M23	66.0%	66.0%	31.4%	1ppm
M24	67.7%	67.7%	31.0%	2ppm
M25	68.2%	68.2%	30.6%	1ppm
M26	58.2%	58.2%	26.9%	2ppm
M27	66.8%	66.8%	32.2%	2ppm
M28	64.4%	64.4%	35.1%	1ppm
M29	57.5%	57.5%	32.6%	0ppm
M30	57.4%	57.6%	27.0%	0ppm
M31	67.1%	67.2%	32.9%	0ppm
M32	68.3%	68.3%	32.0%	0ppm
M33	64.2%	67.7%	1.3%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.4%	0.7%	4.2%	0ppm
M23	0.7%	1.0%	3.2%	0ppm
M24	0.8%	1.1%	6.0%	0ppm
M25	1.2%	1.7%	4.4%	0ppm
M26	0.5%	0.8%	5.3%	0ppm
M27	24.8%	27.4%	7.5%	0ppm
M28	4.7%	8.3%	4.1%	0ppm
M29	0.3%	0.3%	6.6%	1ppm
M30	0.3%	0.5%	1.5%	0ppm
M31	5.8%	6.1%	3.1%	0ppm
M32	3.6%	6.4%	1.1%	0ppm
M33	7.4%	8.1%	1.2%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.0%	0.4%	0ppm
M23	0.0%	0.0%	0.3%	0ppm
M24	0.0%	0.0%	0.5%	0ppm
M25	0.0%	0.0%	0.1%	0ppm
M26	0.0%	0.0%	0.2%	0ppm
M27	0.0%	0.0%	1.8%	0ppm
M28	--	--	--	--
M29	1.2%	1.2%	1.0%	0ppm
M30	0.4%	0.4%	0.6%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.9%	12.5%	0.8%	0ppm
M23	0.0%	0.8%	0.1%	0ppm
M24	0.1%	1.6%	0.2%	0ppm
M25	0.0%	0.3%	0.2%	0ppm
M26	0.1%	0.5%	0.3%	0ppm
M27	0.0%	0.0%	0.2%	0ppm
M28	0.0%	0.5%	0.0%	0ppm
M29	0.0%	0.1%	0.2%	0ppm
M30	0.1%	0.4%	0.5%	0ppm
M31	0.1%	0.2%	0.1%	0ppm
M32	0.1%	0.1%	0.1%	0ppm
M33	0.1%	0.1%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	60.9%	61.0%	31.0%	0ppm
M23	60.2%	60.2%	30.4%	3ppm
M24	70.5%	70.5%	21.9%	3ppm
M25	62.8%	62.8%	29.0%	3ppm
M26	54.7%	54.7%	26.9%	4ppm
M27	65.7%	65.7%	28.1%	4ppm
M28	65.6%	65.6%	29.6%	4ppm
M29	40.8%	46.6%	20.7%	0ppm
M30	64.5%	65.1%	16.1%	0ppm
M31	66.7%	67.3%	1.1%	0ppm
M32	11.8%	68.5%	9.1%	0ppm
M33	54.0%	67.7%	24.6%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.0%	0.7%	0ppm
M23	0.0%	0.2%	0.3%	0ppm
M24	0.0%	0.7%	0.1%	0ppm
M25	0.0%	0.0%	0.2%	0ppm
M26	0.0%	0.4%	0.1%	0ppm
M27	0.0%	0.2%	0.1%	0ppm
M28	0.0%	0.3%	0.1%	0ppm
M29	0.1%	0.1%	0.6%	0ppm
M30	0.1%	0.1%	0.0%	0ppm
M31	0.1%	0.1%	0.1%	0ppm
M32	0.1%	0.1%	0.1%	0ppm
M33	0.1%	0.3%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.3%	0.1%	0ppm
M23	0.0%	0.0%	0.0%	0ppm
M24	0.0%	0.0%	0.0%	0ppm
M25	0.0%	0.0%	0.0%	0ppm
M26	0.0%	0.0%	0.0%	0ppm
M27	0.0%	0.0%	0.0%	0ppm
M28	0.0%	0.0%	0.0%	0ppm
M29	0.0%	0.0%	0.0%	0ppm
M30	0.1%	0.4%	0.0%	0ppm
M31	0.1%	0.3%	0.1%	0ppm
M32	0.1%	0.1%	0.1%	0ppm
M33	0.1%	0.1%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	49.6%	49.5%	21.7%	1ppm
M23	45.6%	45.6%	10.9%	0ppm
M24	47.4%	47.4%	15.6%	1ppm
M25	24.5%	24.5%	5.0%	0ppm
M26	46.7%	46.8%	10.2%	0ppm
M27	47.6%	47.7%	12.2%	0ppm
M28	52.8%	53.1%	18.0%	0ppm
M29	57.6%	57.6%	12.3%	0ppm
M30	52.5%	52.5%	19.4%	0ppm
M31	53.7%	53.7%	20.0%	0ppm
M32	49.5%	49.7%	18.9%	0ppm
M33	46.5%	46.7%	18.0%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	66.5%	68.6%	3.8%	0ppm
M23	45.8%	70.9%	2.4%	0ppm
M24	71.2%	71.5%	2.3%	0ppm
M25	56.6%	57.1%	3.2%	1ppm
M26	66.7%	70.9%	2.2%	0ppm
M27	78.4%	78.4%	3.0%	0ppm
M28	76.0%	82.3%	6.4%	0ppm
M29	81.3%	82.4%	4.1%	0ppm
M30	24.3%	24.3%	4.1%	0ppm
M31	0.4%	0.4%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	44.8%	53.2%	5.0%	0ppm
M23	30.6%	30.7%	4.5%	0ppm
M24	7.7%	7.7%	4.1%	0ppm
M25	0.0%	0.0%	0.2%	0ppm
M26	4.3%	7.8%	0.5%	0ppm
M27	0.0%	0.0%	0.5%	0ppm
M28	77.8%	80.4%	6.5%	0ppm
M29	28.6%	32.1%	2.8%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.0%	0.0%	0ppm
M23	0.0%	0.5%	0.1%	0ppm
M24	0.1%	0.9%	0.4%	0ppm
M25	0.2%	2.6%	0.1%	0ppm
M26	0.0%	0.1%	0.3%	0ppm
M27	0.0%	1.3%	0.3%	0ppm
M28	0.0%	0.3%	3.5%	0ppm
M29	0.1%	0.8%	0.0%	0ppm
M30	0.1%	0.4%	0.0%	0ppm
M31	0.1%	0.3%	0.1%	0ppm
M32	0.1%	0.9%	0.0%	0ppm
M33	0.1%	0.1%	0.1%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	66.6%	66.7%	6.3%	0ppm
M23	59.1%	59.1%	4.0%	4ppm
M24	70.8%	70.8%	4.3%	2ppm
M25	34.3%	36.4%	1.8%	5ppm
M26	60.6%	60.6%	3.6%	0ppm
M27	57.0%	57.1%	3.8%	0ppm
M28	76.6%	76.6%	6.2%	0ppm
M29	15.7%	16.0%	6.6%	0ppm
M30	46.4%	46.4%	3.6%	0ppm
M31	30.2%	31.0%	3.3%	0ppm
M32	25.9%	25.9%	4.2%	0ppm
M33	24.8%	24.8%	3.8%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M23	0.0%	0.0%	0.6%	0ppm
M24	0.0%	0.0%	2.4%	0ppm
M25	0.0%	0.0%	0.7%	0ppm
M26	0.0%	0.0%	2.1%	0ppm
M27	0.0%	0.0%	0.5%	0ppm
M28	0.0%	0.0%	3.7%	0ppm
M29	0.0%	0.4%	0.5%	0ppm

Event	CH4stable	CH4 peak	CO2	CO
M22	0.0%	0.4%	4.5%	0ppm
M23	0.0%	0.1%	2.2%	0ppm
M24	0.0%	0.0%	2.4%	0ppm
M25	0.0%	0.0%	3.0%	0ppm
M26	0.0%	0.0%	2.7%	0ppm
M27	0.0%	0.0%	3.8%	0ppm
M28	0.1%	0.1%	8.4%	1ppm
M29	0.1%	0.1%	7.4%	0ppm

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Client	Sligo County Council
Job	Addendum Environmental Risk Assessment – Former Finisklin Landfill
Drawing	Landfill Gas Monitoring Results

Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	2	Rev01	A3	as shown	Aug17	EC

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Waste Water Treatment Plant

Calor Teoranta

Cold Chon

Clear Way
f.k.a Erin Recyclers Ltd.

LEGEND:

Landfill Boundary

N

0m 50m 100m

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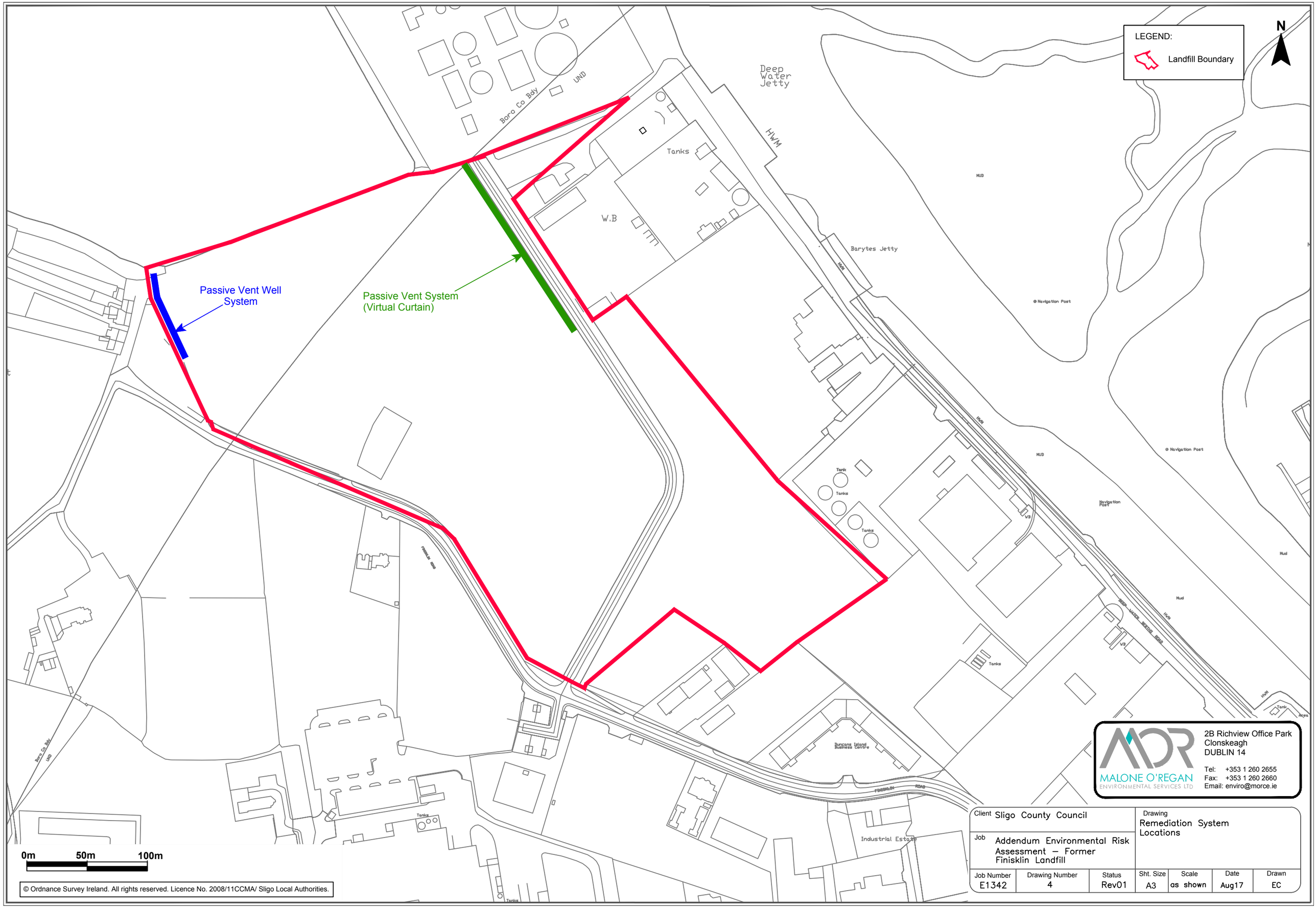
Client: Sligo County Council			Drawing: Internal Gas Survey Locations			
Job: Addendum Environmental Risk Assessment – Former Finisklin Landfill						
Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	3	Rev01	A3	as shown	Aug17	EC



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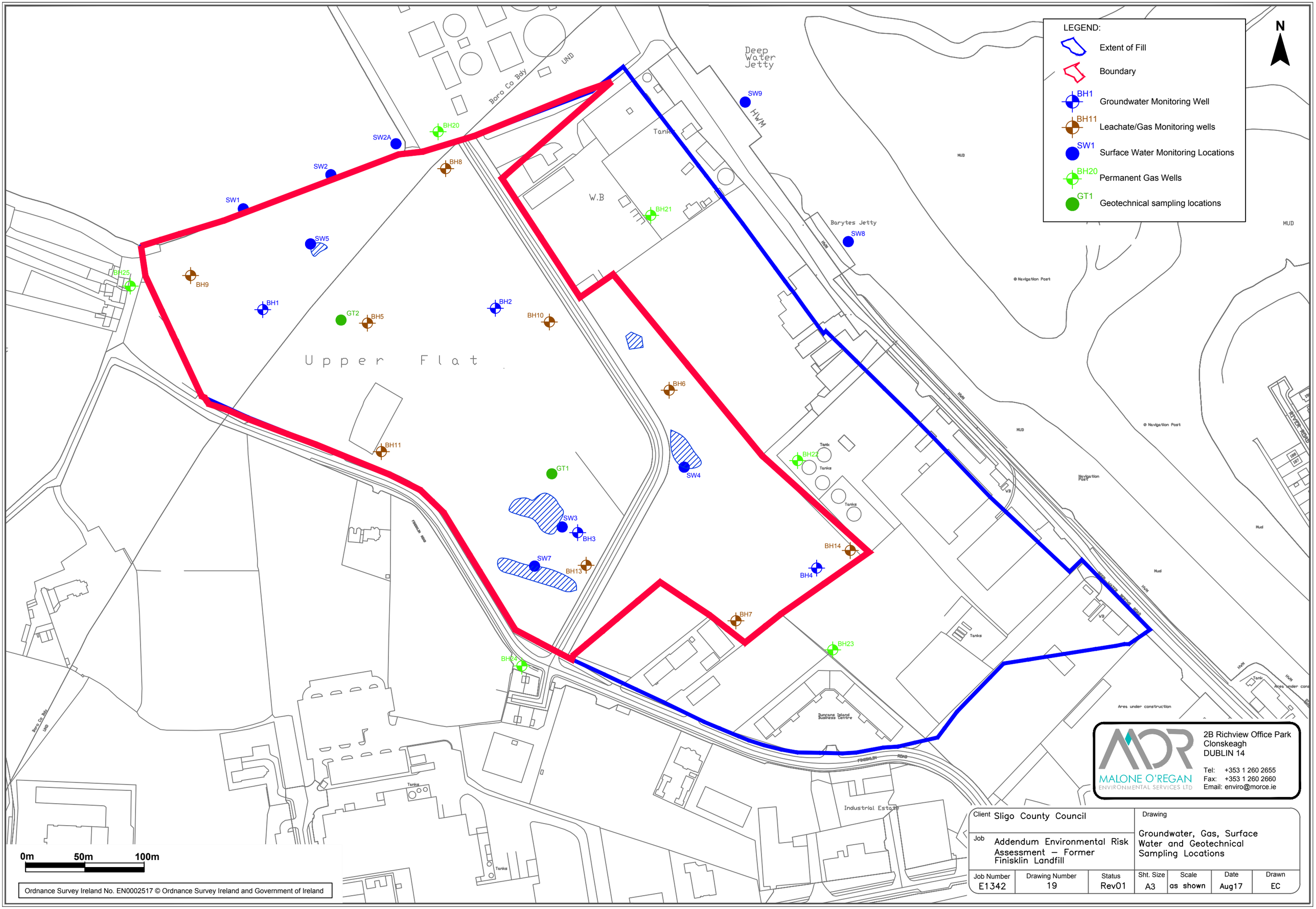
Client: Sligo County Council			Drawing: Remediation System Locations			
Job: Addendum Environmental Risk Assessment – Former Finisklin Landfill						
Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	4	Rev01	A3	as shown	Aug17	EC



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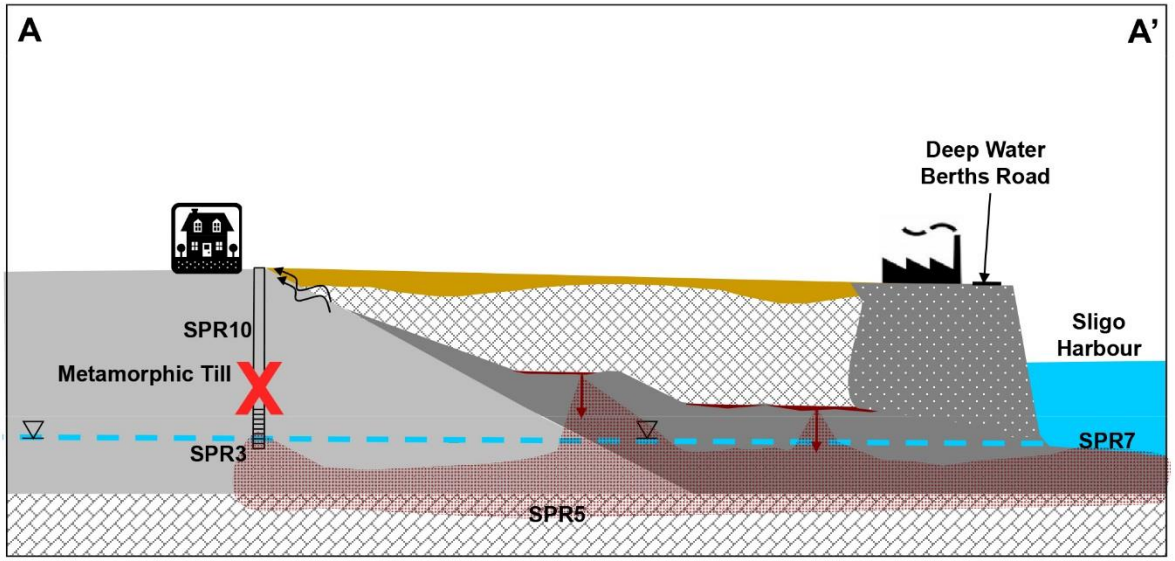
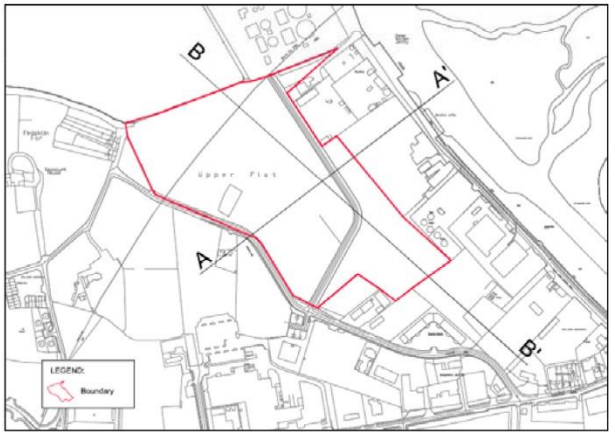
Client: Sligo County Council			Drawing: Groundwater, Gas, Surface Water and Geotechnical Sampling Locations			
Job: Addendum Environmental Risk Assessment – Former Finisklin Landfill						
Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	19	Rev01	A3	as shown	Aug17	EC

Section A-A':





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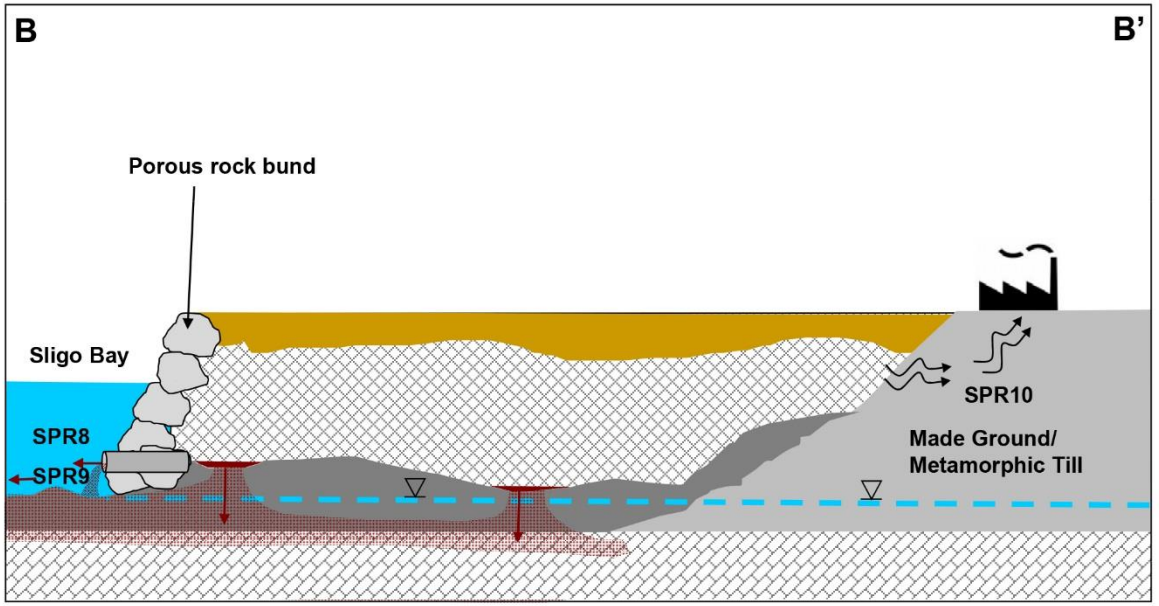

Section B-B':

Legend:

- Landfill gas
- Leachate
- Clay capping
- Landfill material
- Leachate
- Glencar limestone formation
- Estuarine silts and clays
- Commercial/Industrial
- Residential
- Associated with Sligo Harbour reclamation and development works – potential for municipal wastes

Note: This is a schematic and indicative drawing illustrating the potential SPR linkages on site

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Client	Sligo County Council
Job	Addendum Environmental Risk Assessment – Former Finisklin Landfill
Drawing	Revised Schematic Diagram Showing Conceptual Site Model

Job No.	Drawing No.	Status	Sht. Size	Scale	Date	Drawn
E1342	23	Rev01	A4	NTS	Aug17	EC

APPENDIX A

Certificate of Authorisation Application Form

Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations, 2008

EPA Ref. Nº: *(Office use only)*	

Environmental Protection Agency
PO Box 3000, Johnstown Castle Estate, Co. Wexford
Lo Call: 1890 335599 Telephone: 053-9160600 Fax: 053-9160699
Web: www.epa.ie Email: info@epa.ie

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APPLICATION GUIDANCE NOTES

This application must be completed in accordance with the guidance notes below and the instructions accompanying each section of the application form.

This form is for the purpose of making an application for a Certificate of Authorisation in accordance with Regulation 7 (1) of the Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations, 2008 (hereinafter referred to as 'the Regulations'). A valid application must, as a minimum, contain the information prescribed in Regulation 7(2) of the Regulations.

The applicant must conform to the format set out in this application form and accompanying instructions. Each page of the completed application form must be numbered, e.g. *page 5 of 20,* etc. The basic information should be supplied in the spaces given in the application form, with supporting documentation supplied as attachments, as specified. All sections of the form must be completed. Where a section is not relevant to the application, the words "not applicable" should be clearly written. The abbreviation "N/A" should not be used.

The Risk Assessment (required under Regulation 6(1) of the Regulations) shall be submitted in full as Attachment D.1 to this application form. Risk Assessments are to be carried out in accordance with the '*Code of Practice - Environmental Risk Assessment for Unregulated Waste Disposal Sites'* (hereinafter referred to as the Code of Practice).

All maps/drawings/plans must be no larger than A3 size and scaled appropriately such that they are clearly legible. In exceptional circumstances, where A3 is considered inadequate, a larger size may be requested by the Agency.

All drawings should

- be titled and dated;
- have a unique reference number and be signed by a clearly identifiable person; and
- indicate a scale and the direction of north.

Information supplied on this application, including supporting documentation, will be put on public display and open to inspection by any person. Should the applicant consider information to be confidential, this information should be submitted in a separate enclosure bearing the legend "In the event that this information is deemed not to be held as confidential, it must be returned to…..". In the event that information is considered to be of a confidential nature, then the nature of this information, and the reasons why it is considered confidential (with reference to the "Access to Information on the Environment" Regulations) should be stated in the Application Form, where relevant.

An original signed application shall be submitted together with 1 copy. A copy of the application (and risk assessment) shall also be provided on 2 CD-ROMs in searchable PDF format.

It should be noted that it will not be possible to process or determine the application until the required documents have been provided in sufficient detail and to a satisfactory standard.

This document does not purport to be and should not be considered a legal interpretation of the provisions and requirements of the Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008).

SECTION A: NON-TECHNICAL SUMMARY

A non-technical summary of the application is to be included here. The summary should identify all environmental impacts of significance associated with the site.

The following information must be included in the non-technical summary:

A description of:

- The site location.
- A brief history of the site, types and volumes of waste deposited, duration of disposal activities and date of cessation.
- The hydrogeology and ecology of the site and surrounding area, to include protected areas.
- Risk category of the site
- Actual and potential environmental impacts.
- Proposed remediation including timescale.

Supporting information should form **Attachment A.1.**

NON-TECHNICAL SUMMARY

This non-technical summary presents the findings of the Environmental Assessment Report (MOR, 2011) and Addendum Report (MOR, 2012) prepared for the original application submitted in 2012 together with the results of the Addendum Risk Assessment Report prepared in 2017 (MOR, 2017) to supplement the application.

1.0 Site Location

The former Finisklin landfill is a closed landfill located on the outskirts of Sligo Town. The former landfill covers an area of approximately 13 hectares (ha) on the southern shores of the Garavogue River estuary approximately 1.5km north west of Sligo City Centre.

The former landfill is bordered to the north by Sligo Harbour and a new Wastewater Treatment Works (WWTW), to the east by commercial/industrial facilities located on Deepwater Berths Road, to the south by commercial/industrial facilities and to the west by Finisklin Road and a cul-de-sac in an area known as Far Finisklin.

Drawing A1, contained in Attachment A.1. illustrates the site in a regional context. Drawing A2, contained in Attachment A.2. illustrates the extent of the former landfill and surrounding land uses within 1km of the former landfill.

2.0 History of the site

From a review of historical mapping, reports and aerial photographs, all of the land between Finisklin Road and Deepwater Berth Road has been reclaimed under a series of reclamation and filling projects completed since 1890.

The former Finisklin landfill was operated by Sligo Harbour Commissioners, and subsequently Sligo County Council, from 1958 to 1994. The former landfill forms part of the area filled as part of reclamation works. There was no associated landfill infrastructure installed at the site. The land reclamation process was completed by depositing waste material directly on top of the existing mudflats

and progressively filling into the estuary parallel to the shore. The boundary of the former landfill is illustrated on Drawings A1-A3, Attachment A.1.

The boundary of Finisklin Landfill for the purpose of the Code of Practice is identified in the Drawings contained in Appendix A.1. and Appendix B.1 and is estimated to be 13 Hectares (Ha). It appears based on available information that waste materials have been deposited external to the boundary, however, this land does not fall under the remit of the Code of Practice and associated legislation as firstly it was reportedly filled prior to the 15th July 1977 and secondly these lands were not under the control of Sligo County Council at the time of filling but rather Sligo Harbour Commissioners who were abolished in 2006. Please note, the identified boundary is a conservative estimate of the extent of the former landfill that falls under the scope of the Code of Practice and relevant legislation.

2.1 Summary of Phasing of Waste Deposition/ Reclamation Works

The waste deposition or reclamation process within the site boundary can be divided into three phases as follows:

- Waste deposited between 15th July 1977 and 1985 - southern portion of the site.
- Waste deposited between 1985 and 1994 (earlier filling activities) – middle portion of the site.
- Waste deposited between 1985 and 1994 (later filling activities) – northern portion of the site.

A large rock bund was constructed to function as the outermost boundary of the former landfill (into the harbour) and all filling activities were undertaken on the landside of this bund.

2.2 Type and Volume of Waste Disposed

Based on the site investigation works completed at the former landfill, it has been calculated that approximately 625,000 tonnes of municipal waste was accepted into the former landfill at Finisklin during its operational lifespan and that 250,000 tonnes of capping material was accepted. The type of waste currently found within the former landfill is variable and includes domestic, commercial and construction and demolition (C&D) waste.

3.0 Hydrogeology and Ecology of the Site

3.1 Hydrogeology of the site

The bedrock aquifer beneath the former landfill is classified by the GSI as a Locally Important Aquifer whereby the aquifer is moderately productive only in local areas. Less than 1km from the former landfill, the aquifer is classified as a Regionally Important Aquifer which is karstified and dominated by conduit flow associated with the Dartry Limestone Formation of massive cherty calcarenite wackestone.

The GSI has assigned a groundwater vulnerability rating of High beneath the former landfill. Areas of extreme vulnerability have been identified approximately 1km south of the former landfill. Based on a review of available information, including the topographical gradient, the inferred groundwater flow direction is to the north east towards Sligo Harbour and the Garavogue Estuary.

A GSI well search identified no wells within the 1km zone. Sligo County Council also indicated that there were no drinking water sources in the area and that all houses are supplied by mains water. The GSI Source Protection Area data

indicates that there are no designated Source Protection Zones in the immediate vicinity of the former landfill.

3.2 Hydrology of the Site

Sligo harbour is located immediately at the northern boundary of the former landfill. From an examination of the rock armour during a period of low tide, a number of direct surface water outfalls from the former landfill to Sligo Harbour were observed along the northern boundary. Surface water (ponds and standing water), possibly as a result of the recent capping activities undertaken at the former landfill, was observed at a number of locations across the former landfill however some of these appear to be seasonal.

3.3 Ecology of the Site

Protected Sites

Sligo Harbour has been designated under the Habitats Directive as a Special Area of Conservation (SAC) and is included in the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, site code 000627. The relevant habitats in this instance are 'Estuaries' and 'Mudflats and sandflats not covered by seawater at low tide'. In addition, Sligo Harbour has also been designated as a proposed Natural Heritage Area (pNHA). (Refer to Figure 1 – Addendum Report).

A portion of the former landfill and the adjacent harbour have also been designated a Special Protection Area (SPA) under S.I. No. 31 of 1995 (Cummeen Strand SPA, site code 004035).The site is selected for the Special Conservation Interests listed below, all of which are relevant to the present assessment:

- Light-bellied Brent Goose (Branta bernicla hrota) [A046].
- Oystercatcher (Haematopus ostralegus) [A130].
- Redshank (Tringa totanus) [A162].
- Wetlands & Waterbirds [A999].

Ecology of the Former Landfill

The portion of the former landfill above the estuary is well vegetated with a mix of rank, weedy vegetation, wet grassland and scrub (mostly willow). The edge of the former landfill is stepped towards the rock armour. The rock armour is continuous along the margin of the former landfill. The lower strip of rock armour is inundated by the tide and is almost totally covered with brown fucoid algae. Green algae occur on the boulders at the top of the tide line.

Intertidal sediments occur immediately below the fucoid zone. There is obvious accumulation in the eastern corner, as the sediments here are noticeably higher (and last to fill at high tide). The sediments are fairly uniform throughout the zone and are described as medium to fine sands. They are aerobic at the surface, with the anaerobic layer mostly one to several centimetres below the surface.

4.0 Risk Category of the Site

In accordance with the EPA's published Code of Practice (CoP): Environmental Risk Assessment for Unregulated Waste Disposal Sites (2007), the risk category assigned to the former Finisklin landfill is Class A – High Risk. This represents the intrinsic risk that the former landfill poses to the environment. The linkages of greatest concern include the risk of leachate migration to surface water and protected areas, and landfill gas migration to off-site receptors.

5.0 Actual and Potential Environmental Impacts

The potential and actual environmental impacts of the former Finisklin landfill are presented below. The impacts described are based on the findings of the detailed site investigations and risk assessments completed in respect of the former landfill.

5.1 Soils/ Waste

It is estimated that approximately 625,000 tonnes of municipal waste was accepted into the former landfill during its operational lifespan and that 250,000 tonnes of capping material was accepted.

Soil and waste samples (5No.) were analysed for the waste acceptance criteria (WAC) analytical suite for inert, non-hazardous and hazardous licensed waste facilities. The findings of the assessment concluded that for the majority of the parameters analysed, the soils/waste deposited within the former landfill complied with the inert WAC. All other parameters complied with the non-hazardous WAC.

5.2 Potential/ Actual Impacts of Leachate

Surface and Groundwater Quality

It has been established that leachate is present in the landfill and as there is no landfill liner and no confining layer present there is a pathway between the leachate present in the former landfill and the groundwater beneath. There is also a potential direct pathway for leachate migration into the Garavogue Estuary via surface water seeps from the former landfill.

In addition to the potential surface and groundwater contaminants associated with the former landfill, both the groundwater body beneath the former landfill and the surface water seeps clearly show evidence of tidal intrusion largely influenced by its proximity to the tidal waters of the Garavogue Estuary. Other sources of contaminants were also identified and include the waste located beyond the former landfill boundary, the former practice of discharging untreated sewage, and diffuse agricultural and point source emissions from surrounding industrial and residential properties.

It has been calculated that, based on the available assimilative capacity within the receiving water bodies, leachate at the former landfill is unlikely to be significantly impacting on these receiving water bodies. This is further supported by published reports that confirm there is no significant impact on the receiving water quality within the surface water bodies from the leachate within the former landfill (or from other contributory sources).

Designated Ecological Sites

As outlined in Section 3.3 above, Sligo Harbour has been designated under the Habitats Directive as a SAC, a pNHA and a portion of the former landfill and the adjacent harbour have also been designated a SPA.

The findings of ecological surveys assessments completed in 2011/2012 and in 2017 concluded that the presence of the former landfill, alone or in-combination with other sources, does not appear to be adversely affecting the habitats of the adjoining SAC, SPA or pNHA or indeed any other Natura 2000 site in the wider area of Sligo Bay.

The findings of the detailed risk assessment of the potential risks associated with leachate migrating from the former landfill taking account of the findings of the ecological assessments verify that there are no adverse impacts on the water quality or dependant sensitive habitats associated with the former landfill. Therefore, remedial measures to mitigate against the potential risk of leachate migration from the former landfill are not required.

5.3 Potential/ Actual Impacts of Landfill gas

Elevated concentrations of landfill gas have been identified both onsite and offsite during the comprehensive monitoring and assessment programme that has been undertaken in respect of the former landfill. Therefore, it was considered that the potential for the migration of landfill gas offsite needed to be addressed further in a detailed quantitative gas risk assessment.

The findings of the detailed gas risk assessment completed in 2011 based on 21 monitoring events completed between 2009 and 2010, concluded that the risk posed by the presence of methane and carbon dioxide from the former landfill is variable. The southern, older parts of the former landfill are a lower risk and grading to the northern, more recently filled areas a moderate to high risk exists.

There is no clear evidence that gas migration off-site is occurring along the western boundary, and given the geological setting of the former landfill (underlain with clayey soils) it is considered unlikely that widespread migration could occur for any great distance. There are also a limited number of isolated receptors along this boundary. The risk associated with migration beyond the western boundary is considered low.

Gas migration across the eastern boundary towards the buildings on Deepwater Berths Road is unlikely in the southern part of the former landfill. However, the risk increases to high towards the north as there is evidence of gas migration adjacent to the northern part of the eastern boundary (Erin Recyclers, now Clearway). The findings of the internal surveys indicate that there is no immediate risk to these buildings, although a potential risk does remain that the gas could accumulate within these buildings. The specific risk from the former landfill itself is complicated by the fact that waste materials i.e. gas generating materials, are located beyond the boundary of the former landfill. Regardless, it is considered that there is a potential risk associated with the former landfill even if there are other offsite contributory sources.

The majority of gas being generated at the former landfill at present is most likely escaping through the surface, due to the relatively shallow depth of the landfill and the composition and distribution of the landfill cap. This will not pose a significant risk to people on or around the site as the volume of gas escaping is low and will be diluted in the atmosphere. The composition of the landfill cap currently on site is facilitating the natural venting of gas to the atmosphere and the site has been assessed assuming the existing cap remains in place (although limited regrading of the cap is permitted (approx. 10% change of existing/current thickness at any one location). Therefore, it is recommended that no further capping works are completed at the former landfill that would impair the venting process.

The findings of six additional landfill gas monitoring events that were completed between November 2011 and April 2012 and two monitoring events in February 2017 were consistent with the findings of the previous gas monitoring events and the findings of the quantitative gas risk assessment have been verified. Therefore, the recommendations made in the environmental risk assessment with regard to landfill gas remain

In summary, the findings of the detailed gas risk assessment established that there is the potential for gas to migrate beyond the site boundary form the northern portion of the former landfill. Therefore, remedial measures to mitigate against the potential risk of gas migration from the northern portion of the former landfill across the northwestern and northeastern boundaries are required.

6.0 Proposed Remediation Measures and Timescale

Remediation measures are required to mitigate the potential risks associated with gas that may be migrating offsite. Given the low volumes of gas being generated an active landfill gas system is not required and passive venting is considered to be the most appropriate remediation technique for the former landfill.

The following remediation measures are recommended:

- All the owners of buildings along Deepwater Berths Road to be advised of the presence of gas in the ground. At the northern end, all service ducts leading into all buildings should be sealed with expanding foam inside the duct to prevent gas ingress (Cold Chon, Erin Recyclers (now Clearway) and Calor). (This has been completed).
- All Service companies to be made aware of the presence of landfill gas in the area so that suitable precautions can be taken if any works on services are required. (This has been completed).
- Along the eastern and western boundary of the former landfill (north end) a passive venting measures to be installed. Based on the findings of an options feasibility assessment, the Virtual Curtain system was identified as the most appropriate for the former landfill which will prevent any potential migration of landfill gas to offsite locations and to vent this gas in a controlled manner to the atmosphere. The approximate location proposed for the Virtual Curtain is presented below. The specific details on the design and a proposed programme for these works are presented in the Addendum Report (MOR, 2012) included in Attachment D.1.
- A landfill gas monitoring programme as per the recent monitoring events will continue on a bi-annual basis until the remedial measures are installed on the site.
- Following the implementation of the proposed remedial measures, it is recommended that the internal gas monitoring and monitoring of the nearby wells (both inside and outside the former landfill) will be undertaken on a monthly basis for a three-month period. The results of this post remediation monitoring will then be evaluated before determining the need for any further monitoring.
- In accordance with the land zoning and local area development plan for the Site, the northern portion of the Site will be developed as a local amenity area with particular emphasis on nature conservation and ecological enhancement and education. The overall design ethos for the landscape design was to enhance the existing amenity and make it available for the community with an emphasis on education and ecological enhancement.
- A Natura Impact Statement (NIS) was completed in accordance with the requirements of the Habitats Directive (92/43/EEC) in order to determine the potential impacts, if any, of the proposed remediation measures on the conservation status of nearby sites with European Conservation designations (i.e. Natura 2000 sites). The NIS concluded that the presence proposed remedial works, alone or in-combination with other projects,

would not appear to be adversely affect the conservation objectives or the various qualifying interests of the Sligo Harbour SAC and pNHA, the Cummeen Strand SPA, or indeed any other Natura 2000 site in the wider area of Sligo Bay.

APPENDIX B

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MALONE O'REGAN
ENVIRONMENTAL SERVICES LTD

23rd August 2017

Director of Services.
Sligo County Council,
County Hall,
Riverside, Sligo.

MOR Ref: E1342

Re: Finisklin Landfill - Risk assessment on an historic landfill in support of an application for a certificate of authorisation in accordance with regulation 7 of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (EPA Reg. No. H0006-01).

Dear Sirs,

As a person who is qualified, trained and experienced to the standard set out in section 2.3 of *Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites* (EPA, 2007), it is my opinion that the risk assessment carried out by Malone O'Regan (MOR) on behalf of Sligo County Council in relation to a closed landfill at Finisklin, Co. Sligo is adequate and complete.

The risk assessment complies with all of the requirements of the Code of Practice. MOR, has followed and completed the steps set out in the Code of Practice and associated guidance (Matrix 1 and Matrix 2 – as published) in carrying out the risk assessment.

The following items:

- the risk assessment,
- the findings and conclusions of the risk assessment,
- the remedial measures proposed, and
- the monitoring proposed to be carried out to demonstrate the effectiveness of the remedial measures,

are, in my opinion, appropriate and adequate to:

- identify the instances and risks of environmental pollution arising from the closed landfill to which this application refers, and
- proportionately address any and all such instances and risks of environmental pollution.

MOR have carried out and managed the Tier 2 Risk Assessment, and Tier 3 Risk Assessment including DQRA and have advised Sligo County Council in regards to remedial measures and validation monitoring based on the findings of the Tier 3 Risk Assessment.

Yours sincerely,
for **Malone O'Regan**

Claire Clifford

QUALITY
ISO 9001:2008
NSAI Certified

APPENDIX C

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Zone 3
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Tel: +44 (0) 1244 833780
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	16th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3335 Batch 1
Location :	Finisklin Landfill
Date samples received :	2nd February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 2nd February, 2017 of which two 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:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

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.	1-8	9-16									LOD/LOR	Units	Method No.
Sample ID	BH1	BH2											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											
Dissolved Arsenic #	<2.5	3.5									<2.5	ug/l	TM30/PM14
Dissolved Boron	121	663									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	153.1	110.9									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	270									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	17.3	43.8									<0.1	mg/l	TM30/PM14
Dissolved Manganese #	812	333									<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	5	3									<2	ug/l	TM30/PM14
Dissolved Potassium #	7.5	34.3									<0.1	mg/l	TM30/PM14
Dissolved Sodium #	49.2	183.9									<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3									<3	ug/l	TM30/PM14
Total Arsenic	<2.5	43.6									<2.5	ug/l	TM30/PM14
Total Boron	124	677									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	145.7	126.3									<0.2	mg/l	TM30/PM14
Total Chromium	2.0	1.7									<1.5	ug/l	TM30/PM14
Total Copper	<7	16									<7	ug/l	TM30/PM14
Total Iron	3480	45190$_{AB}$									<20	ug/l	TM30/PM14
Total Lead	<5	<5									<5	ug/l	TM30/PM14
Total Magnesium	17.3	43.3									<0.1	mg/l	TM30/PM14
Total Manganese	862	404									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	8	9									<2	ug/l	TM30/PM14
Total Potassium	7.2	30.8									<0.1	mg/l	TM30/PM14
Total Sodium	53.0	171.9									<0.1	mg/l	TM30/PM14
Total Zinc	6	42									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	102									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	94									<0	%	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-8	9-16									LOD/LOR	Units	Method No.
Sample ID	BH1	BH2											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Disulfoton	<0.02 $_{AA}$	<0.02 $_{AA}$									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

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.	1-8	9-16									LOD/LOR	Units	Method No.
Sample ID	BH1	BH2											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	0.4									<0.3	mg/l	TM173/PM0
Sulphate #	11.5	13.3									<0.5	mg/l	TM38/PM0
Chloride #	53.1	115.9									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	0.8	<0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06									<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	6.65	30.76									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	8.09	37.40									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	8.57	39.61									<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	518	728									<1	mg/l	TM75/PM0
Total Organic Carbon #	<2	<2									<2	mg/l	TM60/PM0
Total Dissolved Solids #	587	898									<35	mg/l	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

SVOC Report : **Liquid**

J E Sample No.	1-8	9-16											
Sample ID	BH1	BH2											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											
SVOC MS											LOD/LOR	Units	Method No.
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Naphthalene #	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1									<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

SVOC Report : **Liquid**

J E Sample No.	1-8	9-16											
Sample ID	BH1	BH2											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	97	181									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	101	192									<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3335

VOC Report : **Liquid**

J E Sample No.	1-8	9-16											
Sample ID	BH1	BH2											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	02/02/2017	02/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	102									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	94									<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3335						

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.

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/3335

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x5 Dilution

JE Job No: 17/3335

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/3335

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
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	20th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3437 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Three samples were received for analysis on 4th February, 2017 of which three 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:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-18	19-27								LOD/LOR	Units	Method No.
Sample ID	SW5	SW7	SW8										
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G										
Sample Date	03/02/2017	03/02/2017	03/02/2017										
Sample Type	Surface Water	Surface Water	Surface Water										
Batch Number	1	1	1										
Date of Receipt	04/02/2017	04/02/2017	04/02/2017										
Dissolved Arsenic #	<2.5	<2.5	<2.5								<2.5	ug/l	TM30/PM14
Dissolved Boron	<12	82	985								<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Dissolved Calcium #	93.6	161.1	115.8								<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7								<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	54	76								<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5								<5	ug/l	TM30/PM14
Dissolved Magnesium #	5.2	16.8	299.7$_{AB}$								<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	574	3								<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1								<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	2								<2	ug/l	TM30/PM14
Dissolved Potassium #	1.8	5.0	89.2								<0.1	mg/l	TM30/PM14
Dissolved Sodium #	17.0	16.4	2708.0$_{AC}$								<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	3								<3	ug/l	TM30/PM14
Total Arsenic	<2.5	<2.5	<2.5								<2.5	ug/l	TM30/PM14
Total Boron	15	77	971								<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Calcium	89.8	157.1	113.6								<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Total Copper	<7	<7	<7								<7	ug/l	TM30/PM14
Total Iron	226	7847	199								<20	ug/l	TM30/PM14
Total Lead	<5	<5	<5								<5	ug/l	TM30/PM14
Total Magnesium	5.0	15.9	302.7$_{AB}$								<0.1	mg/l	TM30/PM14
Total Manganese	44	584	6								<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1								<1	ug/l	TM30/PM14
Total Nickel	<2	<2	<2								<2	ug/l	TM30/PM14
Total Potassium	1.7	4.6	85.6								<0.1	mg/l	TM30/PM14
Total Sodium	16.4	15.3	2912.0$_{AC}$								<0.1	mg/l	TM30/PM14
Total Zinc	5	4	<3								<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1								<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2								<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	106	107								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	98	100								<0	%	TM15/PM10
SVOC TICs	ND	ND	ND									None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

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.	1-9	10-18	19-27									
Sample ID	SW5	SW7	SW8									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.03 AA	<0.03 AA	<0.03 AA								<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.03 AA	<0.03 AA	<0.03 AA								<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.03 AA	<0.03 AA	<0.03 AA								<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

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.	1-9	10-18	19-27									
Sample ID	SW5	SW7	SW8									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	<0.3	0.4								<0.3	mg/l	TM173/PM0
Sulphate #	24.0	11.1	644.9								<0.5	mg/l	TM38/PM0
Chloride #	39.0	28.3	4785.0								<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	<0.2	<0.2								<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01								<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.04	0.05	0.05								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.05	0.06	0.07								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.05	0.06	0.07								<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	206	424	114								<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
BOD (Settled) #	2	3	1								<1	mg/l	TM58/PM0
COD (Settled) #	28	28	163								<7	mg/l	TM57/PM0
Total Organic Carbon #	8	2	8								<2	mg/l	TM60/PM0
Total Dissolved Solids #	315	584	8458								<35	mg/l	TM20/PM0
Total Suspended Solids #	22	38	23								<10	mg/l	TM37/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27									
Sample ID	SW5	SW7	SW8									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS												
Phenols												
2-Chlorophenol #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27									
Sample ID	SW5	SW7	SW8									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	79	103	83							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	93	85	103							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3437

VOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27									
Sample ID	SW5	SW7	SW8									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
VOC MS												
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	106	107							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	98	100							<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3437						

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.: 17/3437

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x3 Dilution
AB	x5 Dilution
AC	x20 Dilution

JE Job No: 17/3437

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/3437

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
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3437

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Deeside
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	17th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3439 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Three samples were received for analysis on 4th February, 2017 of which three 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

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.	1-8	9-15	16-23								LOD/LOR	Units	Method No.
Sample ID	BH10	BH14	BH5										
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G										
Sample Date	03/02/2017	03/02/2017	03/02/2017										
Sample Type	Leachate	Leachate	Leachate										
Batch Number	1	1	1										
Date of Receipt	04/02/2017	04/02/2017	04/02/2017										
Total Arsenic	20.8	18.6	11.0								<2.5	ug/l	TM30/PM14
Total Boron	98	52	23								<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Calcium	227.1	192.3	116.3								<0.2	mg/l	TM30/PM14
Total Chromium	18.1	6.7	3.5								<1.5	ug/l	TM30/PM14
Total Copper	41	72	25								<7	ug/l	TM30/PM14
Total Iron	45060$_{AD}$	151100$_{AE}$	75240$_{AD}$								<20	ug/l	TM30/PM14
Total Lead	52	58	29								<5	ug/l	TM30/PM14
Total Magnesium	23.2	13.6	6.1								<0.1	mg/l	TM30/PM14
Total Manganese	1179	3406	493								<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1								<1	ug/l	TM30/PM14
Total Nickel	62	28	29								<2	ug/l	TM30/PM14
Total Potassium	6.5	8.7	6.1								<0.1	mg/l	TM30/PM14
Total Sodium	19.8	17.2	18.7								<0.1	mg/l	TM30/PM14
Total Zinc	421	172	85								<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5	0.7								<0.5	ug/l	TM15/PM10
Toluene	<5	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1								<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2	<2								<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	106	106	109								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	97	94								<0	%	TM15/PM10
SVOC TICs	ND	See Attached	See Attached									None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-8	9-15	16-23								LOD/LOR	Units	Method No.
Sample ID	BH10	BH14	BH5										
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G										
Sample Date	03/02/2017	03/02/2017	03/02/2017										
Sample Type	Leachate	Leachate	Leachate										
Batch Number	1	1	1										
Date of Receipt	04/02/2017	04/02/2017	04/02/2017										
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	0.06$_{AA}$								<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.10$_{AD}$								<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.05$_{AB}$	<0.05$_{AB}$	<0.10$_{AD}$								<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.05$_{AB}$	<0.05$_{AB}$	<0.10$_{AD}$								<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.06$_{AC}$								<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.02$_{AA}$								<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	<10	19	<10								<10	ug/l	TM36/PM12
>C6-C8	<10	<10	<10								<10	ug/l	TM36/PM12
>C8-C10	<10	12	<10								<10	ug/l	TM36/PM12
>C10-C12	<5	<5	<5								<5	ug/l	TM5/PM30
>C12-C16	<10	<10	<10								<10	ug/l	TM5/PM30
>C16-C21	<10	<10	<10								<10	ug/l	TM5/PM30
>C21-C35	<10	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	31	<10								<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

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.	1-8	9-15	16-23									
Sample ID	BH10	BH14	BH5									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16	<10	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21	<10	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35	<10	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	<10	31	<10								<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	0.5	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Sulphate	131.2	<0.5	17.2								<0.5	mg/l	TM38/PM0
Chloride	34.4	30.5	50.8								<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2	<0.2								<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	0.07	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.33	13.69	3.67								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.40	16.64	4.47								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	0.42	17.63	4.73								<0.03	mg/l	TM38/PM0
BOD (Settled)	4	30	18								<1	mg/l	TM58/PM0
COD (Settled)	37	94	87								<7	mg/l	TM57/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

SVOC Report : **Liquid**

J E Sample No.	1-8	9-15	16-23									
Sample ID	BH10	BH14	BH5									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10								<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
Phenol	<1	<1	<1								<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
Naphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1								<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	2.4	<0.5								<0.5	ug/l	TM16/PM30
Pyrene	<0.5	2.2	<0.5								<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	1.1	<0.5								<0.5	ug/l	TM16/PM30
Chrysene	<0.5	1.2	<0.5								<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	2	<1								<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5								<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5								<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

SVOC Report : **Liquid**

J E Sample No.	1-8	9-15	16-23									
Sample ID	BH10	BH14	BH5									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene	<1	<1	<1									
1,2,4-Trichlorobenzene	<1	<1	<1									
1,3-Dichlorobenzene	<1	<1	<1									
1,4-Dichlorobenzene	<1	<1	<1									
2-Nitroaniline	<1	<1	<1									
2,4-Dinitrotoluene	<0.5	<0.5	<0.5									
2,6-Dinitrotoluene	<1	<1	<1									
3-Nitroaniline	<1	<1	<1									
4-Bromophenylphenylether	<1	<1	<1									
4-Chloroaniline	<1	<1	<1									
4-Chlorophenylphenylether	<1	<1	<1									
4-Nitroaniline	<0.5	<0.5	<0.5									
Azobenzene	<0.5	<0.5	<0.5									
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5									
Bis(2-chloroethyl)ether	<1	<1	<1									
Carbazole	<0.5	<0.5	<0.5									
Dibenzofuran	<0.5	<0.5	<0.5									
Hexachlorobenzene	<1	<1	<1									
Hexachlorobutadiene	<1	<1	<1									
Hexachlorocyclopentadiene	<1	<1	<1									
Hexachloroethane	<1	<1	<1									
Isophorone	<0.5	<0.5	<0.5									
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5									
Nitrobenzene	<1	<1	<1									
Surrogate Recovery 2-Fluorobiphenyl	97	80	88									
Surrogate Recovery p-Terphenyl-d14	105	102	105									

Please see attached notes for all abbreviations and acronyms

LOD/LOR	Units	Method No.
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0	%	TM16/PM30
<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3439

VOC Report : **Liquid**

J E Sample No.	1-8	9-15	16-23									
Sample ID	BH10	BH14	BH5									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
										LOD/LOR	Units	Method No.
VOC MS												
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5	0.7							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	106	106	109							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	97	94							<0	%	TM15/PM10

Job number: 17/3439
Sample number: 15
Sample identity: BH14
Sample depth:
Sample Type: Leachate
Units: ug/l

Method: **SVOC**
Matrix: **Liquid**

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
373-49-9	Palmitoleic acid	11.032	93	636
10544-50-0	Cyclic octaatomic sulfur	11.521	97	714
57-88-5	Cholesterol	16.253	97	869

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 17/3439
Sample number: 22
Sample identity: BH5
Sample depth:
Sample Type: Leachate
Units: ug/l

Method: **SVOC**
Matrix: **Liquid**

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
13798-23-7	Hexathiane	8.875	96	204
10544-50-0	Cyclic octaatomic sulfur	11.445	80	3572

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3439						

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.: 17/3439

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x5 Dilution
AC	x6 Dilution
AD	x10 Dilution
AE	x20 Dilution

JE Job No: 17/3439

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3439

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	17th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3440 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 4th February, 2017 of which two 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

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.	1-9	10-16											
Sample ID	BH10H	BH5H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Total Arsenic	<2.5	85.5									<2.5	ug/l	TM30/PM14
Total Boron	95	<12									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	148.0	172.7									<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	10.6									<1.5	ug/l	TM30/PM14
Total Copper	<7	146									<7	ug/l	TM30/PM14
Total Iron	3441	533800$_{AF}$									<20	ug/l	TM30/PM14
Total Lead	<5	85									<5	ug/l	TM30/PM14
Total Magnesium	17.0	8.9									<0.1	mg/l	TM30/PM14
Total Manganese	518	1137									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	4	218									<2	ug/l	TM30/PM14
Total Potassium	5.3	9.5									<0.1	mg/l	TM30/PM14
Total Sodium	18.5	21.3									<0.1	mg/l	TM30/PM14
Total Zinc	10	320									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	108									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	97									<0	%	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-16									LOD/LOR	Units	Method No.
Sample ID	BH10H	BH5H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017											
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	0.07 AA									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.10 AE									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.05 AC	<0.10 AE									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.05 AC	<0.10 AE									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.06 AD									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.04 AB									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.02 AA									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	<10	<10									<10	ug/l	TM36/PM12
>C6-C8	<10	<10									<10	ug/l	TM36/PM12
>C8-C10	<10	<10									<10	ug/l	TM36/PM12
>C10-C12	<5	<5									<5	ug/l	TM5/PM30
>C12-C16	<10	<10									<10	ug/l	TM5/PM30
>C16-C21	<10	<10									<10	ug/l	TM5/PM30
>C21-C35	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-16									LOD/LOR	Units	Method No.
Sample ID	BH10H	BH5H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017											
TPH CWG													
Aromatics													
>C5-EC7	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	0.5	<0.3									<0.3	mg/l	TM173/PM0
Sulphate	109.9	50.9									<0.5	mg/l	TM38/PM0
Chloride	33.1	46.1									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	0.4	<0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06									<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.67	6.85									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.81	8.33									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	0.86	8.82									<0.03	mg/l	TM38/PM0
BOD (Settled)	5	26									<1	mg/l	TM58/PM0
COD (Settled)	39	128									<7	mg/l	TM57/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

SVOC Report : **Liquid**

J E Sample No.	1-9	10-16									LOD/LOR	Units	Method No.
Sample ID	BH10H	BH5H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017											
SVOC MS													
Phenols													
2-Chlorophenol	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1									<1	ug/l	TM16/PM30
Naphthalene	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1									<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

SVOC Report : **Liquid**

J E Sample No.	1-9	10-16											
Sample ID	BH10H	BH5H											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017											
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1									<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1									<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	96	83									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	100	86									<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3440

VOC Report : **Liquid**

J E Sample No.	1-9	10-16											
Sample ID	BH10H	BH5H											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	03/02/2017	03/02/2017											
Sample Type	Leachate	Leachate											
Batch Number	1	1											
Date of Receipt	04/02/2017	04/02/2017									LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2									<2	ug/l	TM15/PM10
Chloroform	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2									<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	108									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	97									<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3440						

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.: 17/3440

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x4 Dilution
AC	x5 Dilution
AD	x6 Dilution
AE	x10 Dilution
AF	x50 Dilution

JE Job No: 17/3440

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3440

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	20th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3441 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 4th February, 2017 of which four 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

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.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	SW1	SW2	SW3	SW9									
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5							<2.5	ug/l	TM30/PM14
Dissolved Boron	2992	3249	56	1113							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Calcium #	453.4$_{AA}$	403.4$_{AA}$	96.3	125.4							<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	79							<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Magnesium #	1191.0$_{AC}$	1196.0$_{AC}$	10.5	357.2$_{AB}$							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	63	<2	<2	3							<2	ug/l	TM30/PM14
Dissolved Mercury #	1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2	<2							<2	ug/l	TM30/PM14
Dissolved Potassium #	399.8$_{AA}$	372.8$_{AA}$	3.6	115.1$_{AB}$							<0.1	mg/l	TM30/PM14
Dissolved Sodium #	9584.0$_{AD}$	9922.0$_{AD}$	17.0	3348.0$_{AD}$							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	4	<3	<3							<3	ug/l	TM30/PM14
Total Arsenic	<2.5	<2.5	<2.5	<2.5							<2.5	ug/l	TM30/PM14
Total Boron	3206	2964	54	1143							<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Calcium	409.1$_{AA}$	413.2$_{AA}$	92.9	120.1							<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Total Copper	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Total Iron	2702	234	20	220							<20	ug/l	TM30/PM14
Total Lead	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Total Magnesium	1135.0$_{AC}$	1125.0$_{AC}$	9.9	377.0$_{AB}$							<0.1	mg/l	TM30/PM14
Total Manganese	70	4	<2	6							<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Total Nickel	<2	<2	<2	<2							<2	ug/l	TM30/PM14
Total Potassium	357.9$_{AA}$	380.3$_{AA}$	3.4	121.7$_{AB}$							<0.1	mg/l	TM30/PM14
Total Sodium	9800.0$_{AD}$	10250.0$_{AD}$	16.0	3473.0$_{AD}$							<0.1	mg/l	TM30/PM14
Total Zinc	3	5	<3	<3							<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND								None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	110	109	106	107							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	97	96	98							<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	ND								None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

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.	1-9	10-18	19-27	28-36									
Sample ID	SW1	SW2	SW3	SW9									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.05 AA	<0.05 AA	<0.05 AA	<0.05 AA							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.05 AA	<0.05 AA	<0.05 AA	<0.05 AA							<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

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.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	SW1	SW2	SW3	SW9									
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	1.1	1.1	<0.3	0.4							<0.3	mg/l	TM173/PM0
Sulphate #	2401.6	2552.8	72.7	719.2							<0.5	mg/l	TM38/PM0
Chloride #	15086.7$_{AB}$	16056.8$_{AB}$	61.8	5360.3							<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	0.08	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.42	0.64	<0.03	0.40							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.51	0.78	<0.03	0.49							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.54	0.83	0.03	0.52							<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	156	144	218	116							<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM94/PM48
BOD (Settled) #	-	-	2	2							<1	mg/l	TM58/PM0
BOD (Settled) #	<1	<1	-	-							<1	mg/l	TM58/PM0
COD (Settled) #	961$_{AB}$	1360$_{AB}$	24	29							<7	mg/l	TM57/PM0
Total Organic Carbon #	2	3	6	7							<2	mg/l	TM60/PM0
Total Dissolved Solids #	29377	26101	699	9839							<35	mg/l	TM20/PM0
Total Suspended Solids #	129	145	11	46							<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	SW1	SW2	SW3	SW9									
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	SW1	SW2	SW3	SW9									
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	96	86	87	93							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	100	91	93	98							<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3441

VOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	SW1	SW2	SW3	SW9									
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	110	109	106	107							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	97	96	98							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3441						

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.: 17/3441

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x10 Dilution
AC	x20 Dilution
AD	x50 Dilution

JE Job No: 17/3441

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/3441

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
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3441

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Zone 3
Deeside Industrial Park
Deeside
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	20th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3443 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Three samples were received for analysis on 4th February, 2017 of which three 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-5	6-13	14-21								LOD/LOR	Units	Method No.
Sample ID	BH8	BH6	BH20										
Depth													
COC No / misc													
Containers	V H BOD	V H P BOD G	V H P BOD G										
Sample Date	03/02/2017	03/02/2017	03/02/2017										
Sample Type	Leachate	Leachate	Leachate										
Batch Number	1	1	1										
Date of Receipt	04/02/2017	04/02/2017	04/02/2017										
Total Arsenic	4.3	3.8	6.3								<2.5	ug/l	TM30/PM14
Total Boron	43	128	274								<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Calcium	130.1	232.2	623.6_{AA}								<0.2	mg/l	TM30/PM14
Total Chromium	6.0	2.1	3.5								<1.5	ug/l	TM30/PM14
Total Copper	35	7	9								<7	ug/l	TM30/PM14
Total Iron	5574	9687	19680_{AA}								<20	ug/l	TM30/PM14
Total Lead	16	9	6								<5	ug/l	TM30/PM14
Total Magnesium	12.1	24.7	335.1_{AA}								<0.1	mg/l	TM30/PM14
Total Manganese	129	565	376								<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1								<1	ug/l	TM30/PM14
Total Nickel	17	5	14								<2	ug/l	TM30/PM14
Total Potassium	4.3	10.6	40.7								<0.1	mg/l	TM30/PM14
Total Sodium	23.3	13.5	2345.0_{AB}								<0.1	mg/l	TM30/PM14
Total Zinc	73	28	27								<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether	-	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Benzene	-	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Toluene	-	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene	-	<1	<1								<1	ug/l	TM15/PM10
p/m-Xylene	-	<2	<2								<2	ug/l	TM15/PM10
o-Xylene	-	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	-	108	108								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	96	97								<0	%	TM15/PM10
SVOC TICs	ND	ND	ND									None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

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.	1-5	6-13	14-21									
Sample ID	BH8	BH6	BH20									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
Pesticides												
Organochlorine Pesticides												
Aldrin	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDE	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	-	<0.05$_{AA}$	<0.05$_{AA}$							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	-	<0.05$_{AA}$	<0.05$_{AA}$							<0.01	ug/l	TM149/PM30
p,p'-TDE	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides												
Azinphos methyl	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	-	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG												
Aliphatics												
>C5-C6	-	<10	<10							<10	ug/l	TM36/PM12
>C6-C8	-	<10	<10							<10	ug/l	TM36/PM12
>C8-C10	-	<10	<10							<10	ug/l	TM36/PM12
>C10-C12	-	<5	<5							<5	ug/l	TM5/PM30
>C12-C16	-	<10	<10							<10	ug/l	TM5/PM30
>C16-C21	-	<10	<10							<10	ug/l	TM5/PM30
>C21-C35	-	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35	-	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

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.	1-5	6-13	14-21									
Sample ID	BH8	BH6	BH20									
Depth												
COC No / misc												
Containers	V H BOD	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7	-	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8	-	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10	-	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12	-	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16	-	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21	-	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35	-	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35	-	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	-	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Sulphate	83.3	17.7	664.4								<0.5	mg/l	TM38/PM0
Chloride	64.0	25.7	4334.8								<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2	0.2								<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.08	8.45	0.50								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.09	10.27	0.60								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	0.10	10.88	0.64								<0.03	mg/l	TM38/PM0
BOD (Settled)	4	20	3								<1	mg/l	TM58/PM0
COD (Settled)	28	48	210								<7	mg/l	TM57/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

SVOC Report : **Liquid**

J E Sample No.	1-5	6-13	14-21									
Sample ID	BH8	BH6	BH20									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Phenols												
2-Chlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

SVOC Report : **Liquid**

J E Sample No.	1-5	6-13	14-21									
Sample ID	BH8	BH6	BH20									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Other SVOCs												
1,2-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	88	98	90							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	97	103	98							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3443

VOC Report : **Liquid**

J E Sample No.	1-5	6-13	14-21									
Sample ID	BH8	BH6	BH20									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
VOC MS										LOD/LOR	Units	Method No.
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	108	108	108							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	96	97							<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3443						

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.: 17/3443

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x20 Dilution

JE Job No: 17/3443

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3443

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	15th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3445 Batch 1
Location :	Finisklin Landfill
Date samples received :	4th February, 2017
Status :	Final report
Issue :	1

Three samples were received for analysis on 4th February, 2017 of which three 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:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

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.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth												
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Total Arsenic	7.6	21.8	2.6								<2.5	ug/l	TM30/PM14
Total Boron	<12	92	119								<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Calcium	163.6	235.6	266.9								<0.2	mg/l	TM30/PM14
Total Chromium	13.5	7.6	6.5								<1.5	ug/l	TM30/PM14
Total Copper	114	95	16								<7	ug/l	TM30/PM14
Total Iron	13090	163400$_{AB}$	17300$_{AA}$								<20	ug/l	TM30/PM14
Total Lead	36	55	16								<5	ug/l	TM30/PM14
Total Magnesium	15.5	15.5	28.1								<0.1	mg/l	TM30/PM14
Total Manganese	213	4249	609								<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1								<1	ug/l	TM30/PM14
Total Nickel	38	30	8								<2	ug/l	TM30/PM14
Total Potassium	7.1	10.0	12.5								<0.1	mg/l	TM30/PM14
Total Sodium	28.6	19.9	15.6								<0.1	mg/l	TM30/PM14
Total Zinc	211	251	47								<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Toluene	<5	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1								<1	ug/l	TM15/PM10
p/m-Xylene	<2	3	<2								<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	108	107	106								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	95	94								<0	%	TM15/PM10
SVOC TICs	See Attached	See Attached	See Attached									None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

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.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth												
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dieldrin	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan I	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan II	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan sulphate	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endrin	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-DDE	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-DDT	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-TDE	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Diazinon	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dichlorvos	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Disulfoton	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethion	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Fenitrothion	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Malathion	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Methyl Parathion	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Mevinphos	-	<0.01	<0.01								<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	<10	<10	<10								<10	ug/l	TM36/PM12
>C6-C8	<10	<10	<10								<10	ug/l	TM36/PM12
>C8-C10	<10	19	<10								<10	ug/l	TM36/PM12
>C10-C12	<5	<5	<5								<5	ug/l	TM5/PM30
>C12-C16	<10	<10	<10								<10	ug/l	TM5/PM30
>C16-C21	<10	<10	<10								<10	ug/l	TM5/PM30
>C21-C35	<10	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	19	<10								<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

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.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth												
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16	<10	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21	<10	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35	<10	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	<10	19	<10								<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Sulphate	57.3	<0.5	21.3								<0.5	mg/l	TM38/PM0
Chloride	55.8	30.7	24.4								<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2	0.7								<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	-	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.08	13.58	8.25								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.09	16.51	10.03								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	0.10	17.49	10.62								<0.03	mg/l	TM38/PM0
BOD (Settled)	7	35	22								<1	mg/l	TM58/PM0
COD (Settled)	38	103	46								<7	mg/l	TM57/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

SVOC Report : **Liquid**

J E Sample No.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Phenols												
2-Chlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

SVOC Report : **Liquid**

J E Sample No.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Other SVOCs												
1,2-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	88	107	124							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	106	122	138							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3445

VOC Report : **Liquid**

J E Sample No.	1-6	7-15	16-23									
Sample ID	BH8H	BH14H	BH6H									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H BOD G	V H P BOD G	V H P BOD G									
Sample Date	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017									
										LOD/LOR	Units	Method No.
VOC MS												
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene	<2	3	<2							<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	108	107	106							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	95	94							<0	%	TM15/PM10

Job number: 17/3445
Sample number: 6
Sample identity: BH8H
Sample depth:
Sample Type: Leachate
Units: ug/l

Method: **SVOC**
Matrix: **Liquid**

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
3622-84-2	Benzenesulfonamide, N-butyl-	10.214	94	118

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Job number: 17/3445
Sample number: 14
Sample identity: BH14H
Sample depth:
Sample Type: Leachate
Units: ug/l

Method: **SVOC**
Matrix: **Liquid**

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
3622-84-2	Benzenesulfonamide, N-butyl-	10.215	94	134

Job number: 17/3445
Sample number: 22
Sample identity: BH6H
Sample depth:
Sample Type: Leachate
Units: ug/l

Method: **SVOC**
Matrix: **Liquid**

Note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

CAS No.	Tentative Compound Identification	Retention Time (minutes)	% Match	Concentration
3622-84-2	Benzenesulfonamide, N-butyl-	10.214	94	154

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3445						

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.: 17/3445

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x20 Dilution

JE Job No: 17/3445

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/3445

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

4225

Attention :	Claire Clifford
Date :	15th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3501 Batch 1
Location :	Finiskiln Landfill
Date samples received :	6th February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 6th February, 2017 of which two 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:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

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.	1-9	10-18											
Sample ID	BH3	BH4											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Arsenic #	16.8	3.0									<2.5	ug/l	TM30/PM14
Dissolved Boron	1852	337									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	50.5	152.9									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	27	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	51	<20									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	67.5	30.0									<0.1	mg/l	TM30/PM14
Dissolved Manganese #	167	438									<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	11	<2									<2	ug/l	TM30/PM14
Dissolved Potassium #	66.8	18.1									<0.1	mg/l	TM30/PM14
Dissolved Sodium #	652.6$_{AB}$	65.1									<0.1	mg/l	TM30/PM14
Dissolved Zinc #	15	<3									<3	ug/l	TM30/PM14
Total Arsenic	59.1	5.2									<2.5	ug/l	TM30/PM14
Total Boron	1657	264									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	1053.0$_{AB}$	149.7									<0.2	mg/l	TM30/PM14
Total Chromium	45.3	<1.5									<1.5	ug/l	TM30/PM14
Total Copper	173	<7									<7	ug/l	TM30/PM14
Total Iron	97530$_{AC}$	19580$_{AB}$									<20	ug/l	TM30/PM14
Total Lead	90	<5									<5	ug/l	TM30/PM14
Total Magnesium	84.8	28.1									<0.1	mg/l	TM30/PM14
Total Manganese	2189	439									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	212	<2									<2	ug/l	TM30/PM14
Total Potassium	61.0	16.9									<0.1	mg/l	TM30/PM14
Total Sodium	667.9$_{AB}$	60.3									<0.1	mg/l	TM30/PM14
Total Zinc	583	4									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-18									LOD/LOR	Units	Method No.
Sample ID	BH3	BH4											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017											
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-18									LOD/LOR	Units	Method No.
Sample ID	BH3	BH4											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017											
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	1.6	<0.3									<0.3	mg/l	TM173/PM0
Sulphate #	20.7	<0.5									<0.5	mg/l	TM38/PM0
Chloride #	369.4	59.0									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	<0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	0.08	<0.06									<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	34.32	23.30									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	41.73	28.32									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	44.20	30.00									<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	3572	610									<1	mg/l	TM75/PM0
Total Organic Carbon #	7	<2									<2	mg/l	TM60/PM0
Total Dissolved Solids #	2562	630									<35	mg/l	TM20/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18									LOD/LOR	Units	Method No.
Sample ID	BH3	BH4											
Depth													
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017											
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Naphthalene #	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1									<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18											
Sample ID	BH3	BH4											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017											
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	129	113									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	103	90									<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford
JE Job No.: 17/3501

VOC Report : **Liquid**

J E Sample No.	1-9	10-18											
Sample ID	BH3	BH4											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G											
Sample Date	01/02/2017	01/02/2017											
Sample Type	Ground Water	Ground Water											
Batch Number	1	1											
Date of Receipt	06/02/2017	06/02/2017									LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	103									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	94									<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1342
Location: Finiskiln Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3501						

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.: 17/3501

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x3 Dilution
AB	x5 Dilution
AC	x10 Dilution

JE Job No: 17/3501

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/3501

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
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
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Deeside
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	20th February, 2017
Your reference :	E1342
Our reference :	Test Report 17/3507 Batch 1
Location :	Finisklin Landfill
Date samples received :	6th February, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 6th February, 2017 of which four 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

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.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
Dissolved Arsenic #	<2.5	5.9	6.0	<2.5							<2.5	ug/l	TM30/PM14
Dissolved Boron	166	733	1920	349							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Calcium #	172.8	122.9	45.8	143.4							<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	52	115							<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Magnesium #	22.0	47.2	109.4$_{AB}$	30.0							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	1243	265	141	448							<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	7	6	5	<2							<2	ug/l	TM30/PM14
Dissolved Potassium #	11.8	39.9	128.4$_{AB}$	17.9							<0.1	mg/l	TM30/PM14
Dissolved Sodium #	62.4	190.4	470.2$_{AB}$	76.7							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	4	<3							<3	ug/l	TM30/PM14
Total Arsenic	<2.5	14.7	7.5	3.2							<2.5	ug/l	TM30/PM14
Total Boron	158	641	1793	288							<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Calcium	170.1	152.5	103.4	148.2							<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	4.8	4.5	<1.5							<1.5	ug/l	TM30/PM14
Total Copper	<7	9	<7	<7							<7	ug/l	TM30/PM14
Total Iron	1393	22410$_{AB}$	12400	11980							<20	ug/l	TM30/PM14
Total Lead	<5	7	5	<5							<5	ug/l	TM30/PM14
Total Magnesium	20.5	45.6	109.7$_{AB}$	30.3							<0.1	mg/l	TM30/PM14
Total Manganese	1211	366	261	439							<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Total Nickel	7	20	20	3							<2	ug/l	TM30/PM14
Total Potassium	11.0	37.8	129.5$_{AB}$	17.5							<0.1	mg/l	TM30/PM14
Total Sodium	56.1	185.7	475.1$_{AB}$	76.3							<0.1	mg/l	TM30/PM14
Total Zinc	<3	33	35	4							<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND								None	TM15/PM10
SVOC TICs	ND	ND	ND	ND								None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

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.	1-9	10-18	19-27	28-36									
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.03 AA	<0.03 AA	<0.03 AA	<0.03 AA							<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.03 AA	<0.03 AA	<0.03 AA	<0.03 AA							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.03 AA	<0.03 AA	<0.03 AA	<0.03 AA							<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

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.	1-9	10-18	19-27	28-36									
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	0.6	0.7	0.3							<0.3	mg/l	TM173/PM0
Sulphate #	11.8	15.7	<0.5	3.0							<0.5	mg/l	TM38/PM0
Chloride #	69.6	127.3	314.2	73.0							<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	0.5	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	10.51	37.13	65.01	23.09							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	12.78	45.15	79.04	28.08							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	13.54	47.82	83.72	29.74							<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	554	880	1594	614							<1	mg/l	TM75/PM0
Total Organic Carbon #	<2	<2	7	<2							<2	mg/l	TM60/PM0
Total Dissolved Solids #	580	1513	1818	662							<35	mg/l	TM20/PM0

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	120	123	102	90							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	95	114	81	72							<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford
JE Job No.: 17/3507

VOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-36							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	02/02/2017	02/02/2017	02/02/2017	02/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	06/02/2017	06/02/2017	06/02/2017	06/02/2017									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	105	104	104	106							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	94	94	95							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location: Finisklin Landfill
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/3507						

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.: 17/3507

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.

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x3 Dilution
AB	x5 Dilution

JE Job No: 17/3507

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/3507

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
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-02806-1
Initial Date of Issue:	07-Feb-2017
Client	Malone ORegan
Client Address:	2B Richview Office Park Dublin 14 Dublin Ireland
Contact(s):	Martin Kearns
Project	Malone O'Regan Unit 2b Richview Office Park Clonskeagh

Quotation No.:		**Date Received:**	06-Feb-2017
Order No.:	E1342	**Date Instructed:**	06-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	10-Feb-2017
Date Approved:	07-Feb-2017	**Subcon Results Due:**	27-Feb-2017

Approved By:

Details: Robert Monk, Technical Development Chemist

Chemtest
The right chemistry to deliver results

Results - Soil

Project: Malone O'Regan Unit 2b Richview Office Park Clonskeagh

Client: Malone ORegan			**Chemtest Job No.:**		17-02806	17-02806	17-02806	17-02806
Quotation No.:			**Chemtest Sample ID.:**		408154	408155	408156	408157
Order No.: E1342			Client Sample Ref.:		BH1	BH2	BH3	BH4
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Date Sampled:		01-Feb-2017	01-Feb-2017	01-Feb-2017	01-Feb-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
E. coli (Subcon)	SN		cfu/g	N/A	0	0	0	0
Total Coliforms (Subcon)	SN		cfu/g	N/A	1	8	1	0

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

Amended Report

Report No.:	17-02838-2		
Initial Date of Issue:	08-Feb-2017	**Date of Re-Issue:**	28-Feb-2017
Client	Malone ORegan		
Client Address:	2B Richview Office Park Dublin 14 Dublin Ireland		
Contact(s):	Martin Kearns		
Project	Malone O'Regan 2B Richview Office PLC Clonskeagh		
Quotation No.:		**Date Received:**	06-Feb-2017
Order No.:	E1342	**Date Instructed:**	06-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	10-Feb-2017
Date Approved:	28-Feb-2017	**Subcon Results Due:**	27-Feb-2017

Approved By:

Details: Glynn Harvey, Laboratory Manager

Results - Water

Project: Malone O'Regan 2B Richview Office PLC Clonskeagh

Client: Malone ORegan			**Chemtest Job No.:**		17-02838	17-02838	17-02838	17-02838
Quotation No.:			**Chemtest Sample ID.:**		408316	408317	408318	408319
Order No.: E1342			Client Sample Ref.:		BH1H	BH2H	BH3H	BH4H
			Sample Type:		WATER	WATER	WATER	WATER
			Date Sampled:		02-Feb-2017	02-Feb-2017	02-Feb-2017	02-Feb-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
E. coli (Subcon)	S		cfu/100ml	N/A	0	0	0	0
Total Coliforms (Subcon)	S		cfu/100ml	N/A	20	0	25	0

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	7th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4336 Batch 1
Location :	
Date samples received :	22nd February, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 22nd February, 2017 of which four 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:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

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.	1-3	4-11	12-21	22-31							LOD/LOR	Units	Method No.
Sample ID	BH8H	BH5H	BH10H	BH20H									
Depth													
COC No / misc													
Containers	V H P	V H P G	V H P BOD G	V H P BOD G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
Total Arsenic	<2.5	22.2	19.0	<2.5							<2.5	ug/l	TM30/PM14
Total Boron	57	49	110	383							<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Calcium	146.7$_{AB}$	191.9$_{AB}$	261.2$_{AB}$	528.5$_{AB}$							<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	9.1	15.8	<1.5							<1.5	ug/l	TM30/PM14
Total Copper	<7	73	33	<7							<7	ug/l	TM30/PM14
Total Iron	996	126200$_{AC}$	45220$_{AA}$	5147							<20	ug/l	TM30/PM14
Total Lead	<5	121	45	<5							<5	ug/l	TM30/PM14
Total Magnesium	13.4$_{AB}$	12.4$_{AB}$	28.1$_{AB}$	414.1$_{AB}$							<0.1	mg/l	TM30/PM14
Total Manganese	72	695	1183	292							<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Total Nickel	8	56	46	5							<2	ug/l	TM30/PM14
Total Potassium	5.1$_{AB}$	9.4$_{AB}$	6.6$_{AB}$	64.8$_{AB}$							<0.1	mg/l	TM30/PM14
Total Sodium	26.6$_{AB}$	22.9$_{AB}$	22.0$_{AB}$	2627.0$_{AB}$							<0.1	mg/l	TM30/PM14
Total Zinc	40	261	379	6							<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND								None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Toluene	<5	6	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene	<2	4	<2	<2							<2	ug/l	TM15/PM10
o-Xylene	<1	1	<1	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	106	107	99							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	93	93	97							<0	%	TM15/PM10
SVOC TICs	-	ND	ND	ND								None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

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.	1-3	4-11	12-21	22-31							LOD/LOR	Units	Method No.
Sample ID	BH8H	BH5H	BH10H	BH20H									
Depth													
COC No / misc													
Containers	V H P	V H P G	V H P BOD G	V H P BOD G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
Pesticides													
Organochlorine Pesticides													
Aldrin	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDE	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-TDE	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	-	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	-	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8	-	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10	-	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12	-	<5	<5	<5							<5	ug/l	TM5/PM30
>C12-C16	-	<10	<10	<10							<10	ug/l	TM5/PM30
>C16-C21	-	<10	<10	<10							<10	ug/l	TM5/PM30
>C21-C35	-	<10	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35	-	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

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.	1-3	4-11	12-21	22-31							LOD/LOR	Units	Method No.
Sample ID	BH8H	BH5H	BH10H	BH20H									
Depth													
COC No / misc													
Containers	V H P	V H P G	V H P BOD G	V H P BOD G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
TPH CWG													
Aromatics													
>C5-EC7	-	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8	-	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10	-	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12	-	<5	<5	<5							<5	ug/l	TM5/PM30
>EC12-EC16	-	<10	<10	<10							<10	ug/l	TM5/PM30
>EC16-EC21	-	<10	<10	<10							<10	ug/l	TM5/PM30
>EC21-EC35	-	<10	<10	<10							<10	ug/l	TM5/PM30
Total aromatics C5-35	-	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	-	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	<0.3	0.4	<0.3							<0.3	mg/l	TM173/PM0
Sulphate as SO4	71.6	35.9	155.0	782.5							<0.5	mg/l	TM38/PM0
Chloride	53.7	43.3	35.9	5560.0							<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.16	0.56	0.40	1.02							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.20	0.68	0.49	1.24							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	0.21	0.72	0.52	1.31							<0.03	mg/l	TM38/PM0
BOD (Settled)	-	-	2	2							<1	mg/l	TM58/PM0
COD (Settled)	16	46	19	153							<7	mg/l	TM57/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

SVOC Report : **Liquid**

J E Sample No.	4-11	12-21	22-31									
Sample ID	BH5H	BH10H	BH20H									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H P G	V H P BOD G	V H P BOD G									
Sample Date	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Liquid	Liquid	Liquid									
Batch Number	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Phenols												
2-Chlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

SVOC Report : **Liquid**

J E Sample No.	4-11	12-21	22-31									
Sample ID	BH5H	BH10H	BH20H									
Depth											Please see attached notes for all abbreviations and acronyms	
COC No / misc												
Containers	V H P G	V H P BOD G	V H P BOD G									
Sample Date	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Liquid	Liquid	Liquid									
Batch Number	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017									
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1								<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1								<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1								<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1	<1								<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1								<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1	<1								<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1	<1								<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1	<1								<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1								<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1	<1								<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1	<1								<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	93	95	85								<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	98	97	90								<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4336

VOC Report : **Liquid**

J E Sample No.	1-3	4-11	12-21	22-31								
Sample ID	BH8H	BH5H	BH10H	BH20H								
Depth												
COC No / misc												
Containers	V H P	V H P G	V H P BOD G	V H P BOD G								
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017								
Sample Type	Liquid	Liquid	Liquid	Liquid								
Batch Number	1	1	1	1								
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017								

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene	<5	6	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene	<2	4	<2	<2							<2	ug/l	TM15/PM10
o-Xylene	<1	1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	107	106	107	99							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	93	93	97							<0	%	TM15/PM10

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4336	1	BH5H		4-11	No interpretation possible
17/4336	1	BH10H		12-21	No interpretation possible
17/4336	1	BH20H		22-31	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4336						

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.: 17/4336

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x10 Dilution
AC	x50 Dilution

JE Job No: 17/4336

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/4336

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	7th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4338 Batch 1
Location :	
Date samples received :	22nd February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 22nd February, 2017 of which two 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

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.	1-10	11-20									LOD/LOR	Units	Method No.
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											
Total Arsenic	19.1	85.3									<2.5	ug/l	TM30/PM14
Total Boron	177	326									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	308.4$_{AB}$	313.6$_{AB}$									<0.2	mg/l	TM30/PM14
Total Chromium	10.9	30.9									<1.5	ug/l	TM30/PM14
Total Copper	54	223									<7	ug/l	TM30/PM14
Total Iron	102300$_{AB}$	375800$_{AC}$									<20	ug/l	TM30/PM14
Total Lead	45	253									<5	ug/l	TM30/PM14
Total Magnesium	28.3$_{AB}$	22.6$_{AB}$									<0.1	mg/l	TM30/PM14
Total Manganese	699	7022									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	20	78									<2	ug/l	TM30/PM14
Total Potassium	12.2$_{AB}$	12.2$_{AB}$									<0.1	mg/l	TM30/PM14
Total Sodium	15.9$_{AB}$	22.0$_{AB}$									<0.1	mg/l	TM30/PM14
Total Zinc	148	587									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	103									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	91									<0	%	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-10	11-20									LOD/LOR	Units	Method No.
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.02$_{AA}$	<0.02$_{AA}$									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.02$_{AA}$	<0.02$_{AA}$									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	<10	<10									<10	ug/l	TM36/PM12
>C6-C8	<10	<10									<10	ug/l	TM36/PM12
>C8-C10	<10	<10									<10	ug/l	TM36/PM12
>C10-C12	<5	<5									<5	ug/l	TM5/PM30
>C12-C16	<10	<10									<10	ug/l	TM5/PM30
>C16-C21	<10	<10									<10	ug/l	TM5/PM30
>C21-C35	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

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.	1-10	11-20									LOD/LOR	Units	Method No.
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											
TPH CWG													
Aromatics													
>C5-EC7	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Sulphate as SO4	6.9	<0.5									<0.5	mg/l	TM38/PM0
Chloride	25.6	29.8									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06									<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	7.95	13.42									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	9.67	16.31									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	10.24	17.28									<0.03	mg/l	TM38/PM0
BOD (Settled)	4	12									<1	mg/l	TM58/PM0
COD (Settled)	37	41									<7	mg/l	TM57/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20									LOD/LOR	Units	Method No.
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											
SVOC MS													
Phenols													
2-Chlorophenol	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1									<1	ug/l	TM16/PM30
Naphthalene	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1									<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20											
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<1	<1											
1,2,4-Trichlorobenzene	<1	<1											
1,3-Dichlorobenzene	<1	<1											
1,4-Dichlorobenzene	<1	<1											
2-Nitroaniline	<1	<1											
2,4-Dinitrotoluene	<0.5	<0.5											
2,6-Dinitrotoluene	<1	<1											
3-Nitroaniline	<1	<1											
4-Bromophenylphenylether	<1	<1											
4-Chloroaniline	<1	<1											
4-Chlorophenylphenylether	<1	<1											
4-Nitroaniline	<0.5	<0.5											
Azobenzene	<0.5	<0.5											
Bis(2-chloroethoxy)methane	<0.5	<0.5											
Bis(2-chloroethyl)ether	<1	<1											
Carbazole	<0.5	<0.5											
Dibenzofuran	<0.5	<0.5											
Hexachlorobenzene	<1	<1											
Hexachlorobutadiene	<1	<1											
Hexachlorocyclopentadiene	<1	<1											
Hexachloroethane	<1	<1											
Isophorone	<0.5	<0.5											
N-nitrosodi-n-propylamine	<0.5	<0.5											
Nitrobenzene	<1	<1											
Surrogate Recovery 2-Fluorobiphenyl	81	98											
Surrogate Recovery p-Terphenyl-d14	86	102											

Please see attached notes for all abbreviations and acronyms

LOD/LOR	Units	Method No.
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0	%	TM16/PM30
<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4338

VOC Report : **Liquid**

J E Sample No.	1-10	11-20											
Sample ID	BH6H	BH14H											
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G											
Sample Date	20/02/2017	20/02/2017											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	22/02/2017	22/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2									<2	ug/l	TM15/PM10
Chloroform	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2									<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	103									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	91									<0	%	TM15/PM10

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4338	1	BH6H		1-10	No interpretation possible
17/4338	1	BH14H		11-20	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4338						

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.: 17/4338

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x10 Dilution
AC	x50 Dilution

JE Job No: 17/4338

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/4338

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	7th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4344 Batch 1
Location :	
Date samples received :	22nd February, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 22nd February, 2017 of which four 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

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.	1-10	11-20	21-30	31-40							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
Dissolved Arsenic #	<2.5	2.7	3.8	<2.5							<2.5	ug/l	TM30/PM14
Dissolved Boron	146	811	2095	339							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Calcium #	165.5	116.0	47.9	141.9							<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	9	<7							<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	56	<20							<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Magnesium #	21.0	46.4	86.5	28.3							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	1278	310	397	429							<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	7	<2	7	<2							<2	ug/l	TM30/PM14
Dissolved Potassium #	9.3	38.1	94.0	16.6							<0.1	mg/l	TM30/PM14
Dissolved Sodium #	55.3	179.6	517.0$_{AB}$	55.3							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	31	<3							<3	ug/l	TM30/PM14
Total Arsenic	<2.5	24.1	22.3	7.0							<2.5	ug/l	TM30/PM14
Total Boron	143	786	1990	332							<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Calcium	186.5$_{AC}$	131.7$_{AC}$	285.7$_{AC}$	156.5							<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5	9.7	<1.5							<1.5	ug/l	TM30/PM14
Total Copper	<7	9	29	<7							<7	ug/l	TM30/PM14
Total Iron	1369	27940$_{AB}$	24570$_{AB}$	17790$_{AB}$							<20	ug/l	TM30/PM14
Total Lead	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Total Magnesium	23.6$_{AC}$	53.4$_{AC}$	110.9$_{AC}$	30.9							<0.1	mg/l	TM30/PM14
Total Manganese	1255	317	806	417							<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Total Nickel	7	<2	37	<2							<2	ug/l	TM30/PM14
Total Potassium	9.8$_{AC}$	41.6$_{AC}$	104.9$_{AC}$	17.4							<0.1	mg/l	TM30/PM14
Total Sodium	59.2$_{AC}$	202.4$_{AC}$	524.7$_{AC}$	56.9							<0.1	mg/l	TM30/PM14
Total Zinc	<3	5	129	3							<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND								None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	2	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	113	110	113	112							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	99	100	101							<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	ND								None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

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.	1-10	11-20	21-30	31-40							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.02 AA	<0.02 AA	<0.02 AA	<0.02 AA							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.02 AA	<0.02 AA	<0.02 AA	<0.02 AA							<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

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.	1-10	11-20	21-30	31-40							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	0.3	0.8	<0.3							<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	12.0	11.6	<0.5	<0.5							<0.5	mg/l	TM38/PM0
Chloride #	78.4	128.2	330.9	58.6							<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	0.5	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	8.89	38.38	38.03	22.58							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	10.81	46.67	46.23	27.45							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	11.45	49.43	48.97	29.08							<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	578	882	1636	606							<1	mg/l	TM75/PM0
Total Organic Carbon #	5	15	23	11							<2	mg/l	TM60/PM0
Total Dissolved Solids #	634	1005	1985	621							<35	mg/l	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30	31-40							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30	31-40									
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	104	103	108	96							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	111	112	117	101							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4344

VOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30	31-40							LOD/LOR	Units	Method No.
Sample ID	BH1H	BH2H	BH3H	BH4H									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P G									
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/02/2017	22/02/2017	22/02/2017	22/02/2017									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	2	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	113	110	113	112							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	99	100	101							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4344	1	BH1H		1-10	No interpretation possible
17/4344	1	BH2H		11-20	No interpretation possible
17/4344	1	BH3H		21-30	No interpretation possible
17/4344	1	BH4H		31-40	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4344						

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.: 17/4344

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x5 Dilution
AC	x10 Dilution

JE Job No: 17/4344

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			

JE Job No: 17/4344

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
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Deeside
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	9th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4388 Batch 1
Location :	
Date samples received :	23rd February, 2017
Status :	Final report
Issue :	1

Three samples were received for analysis on 23rd February, 2017 of which three 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

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.	1-11	12-22	23-33								LOD/LOR	Units	Method No.
Sample ID	SW5	SW7	SW3										
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G										
Sample Date	21/02/2017	21/02/2017	21/02/2017										
Sample Type	Surface Water	Surface Water	Surface Water										
Batch Number	1	1	1										
Date of Receipt	23/02/2017	23/02/2017	23/02/2017										
Dissolved Arsenic #	<2.5	4.9	<2.5								<2.5	ug/l	TM30/PM14
Dissolved Boron	<12	94	48								<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Dissolved Calcium #	100.3	152.1	107.9								<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7								<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	33	<20								<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5								<5	ug/l	TM30/PM14
Dissolved Magnesium #	5.8	17.9	10.7								<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	411	<2								<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1								<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2								<2	ug/l	TM30/PM14
Dissolved Potassium #	2.4	4.5	2.9								<0.1	mg/l	TM30/PM14
Dissolved Sodium #	15.5	14.7	15.4								<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	<3								<3	ug/l	TM30/PM14
Total Arsenic	<2.5	<2.5	<2.5								<2.5	ug/l	TM30/PM14
Total Boron	35	90	47								<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5								<0.5	ug/l	TM30/PM14
Total Calcium	113.8 AC	163.8 AC	116.2 AC								<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5	<1.5								<1.5	ug/l	TM30/PM14
Total Copper	<7	<7	<7								<7	ug/l	TM30/PM14
Total Iron	4597	6827	22								<20	ug/l	TM30/PM14
Total Lead	<5	<5	<5								<5	ug/l	TM30/PM14
Total Magnesium	6.5 AC	19.3 AC	11.3 AC								<0.1	mg/l	TM30/PM14
Total Manganese	3732	483	3								<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1								<1	ug/l	TM30/PM14
Total Nickel	3	<2	<2								<2	ug/l	TM30/PM14
Total Potassium	4.9 AC	5.2 AC	2.9 AC								<0.1	mg/l	TM30/PM14
Total Sodium	16.7 AC	15.3 AC	15.3 AC								<0.1	mg/l	TM30/PM14
Total Zinc	38	3	<3								<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND									None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5								<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1								<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2								<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1								<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	111	110	120								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	99	91								<0	%	TM15/PM10
SVOC TICs	ND	ND	ND									None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

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.	1-11	12-22	23-33									
Sample ID	SW5	SW7	SW3									
Depth												
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor	<0.02 AA	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.10 AC	<0.01	<0.05 AB								<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.10 AC	<0.02 AA	<0.05 AB								<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.10 AC	<0.02 AA	<0.05 AB								<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01								<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

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.	1-11	12-22	23-33									
Sample ID	SW5	SW7	SW3									
Depth												
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10								<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	23.5	9.5	76.1								<0.5	mg/l	TM38/PM0
Chloride #	37.4	25.8	28.1								<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	<0.2	<0.2								<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01								<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.09	0.06	0.05								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.10	0.08	0.07								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.11	0.08	0.07								<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	278	452	256								<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1	<0.1								<0.1	ug/l	TM94/PM48
BOD (Settled) #	5	2	3								<1	mg/l	TM58/PM0
COD (Settled) #	36	<7	<7								<7	mg/l	TM57/PM0
Total Organic Carbon #	10	8	9								<2	mg/l	TM60/PM0
Total Dissolved Solids #	369	497	410								<35	mg/l	TM20/PM0
Total Suspended Solids #	140	41	<10								<10	mg/l	TM37/PM0

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22	23-33									
Sample ID	SW5	SW7	SW3									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									
SVOC MS												
Phenols												
2-Chlorophenol #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22	23-33									
Sample ID	SW5	SW7	SW3									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									
SVOC MS										LOD/LOR	Units	Method No.
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	147	102	143							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	174	119	172							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4388

VOC Report : **Liquid**

J E Sample No.	1-11	12-22	23-33									
Sample ID	SW5	SW7	SW3									
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Surface Water	Surface Water	Surface Water									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									
VOC MS										LOD/LOR	Units	Method No.
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<4							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	111	110	120							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	99	91							<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4388	1	SW5		1-11	No interpretation possible
17/4388	1	SW7		12-22	No interpretation possible
17/4388	1	SW3		23-33	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4388						

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.: 17/4388

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x2 Dilution
AB	x5 Dilution
AC	x10 Dilution

JE Job No: 17/4388

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			

JE Job No: 17/4388

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
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				

JE Job No: 17/4388

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
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	7th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4391 Batch 1
Location :	
Date samples received :	23rd February, 2017
Status :	Final report
Issue :	1

Five samples were received for analysis on 23rd February, 2017 of which five 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

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.	1-10	11-20	21-30	31-33	34-36						LOD/LOR	Units	Method No.
Sample ID	BH14	BH10	BH6	BH5	BH8								
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P	V H P								
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017								
Sample Type	Leachate	Leachate	Leachate	Leachate	Leachate								
Batch Number	1	1	1	1	1								
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017	23/02/2017								
Total Arsenic	4.5	10.0	8.1	30.1	<2.5						<2.5	ug/l	TM30/PM14
Total Boron	91	80	83	<12	36						<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Total Calcium	174.5	232.3	278.7	239.4	162.0						<0.2	mg/l	TM30/PM14
Total Chromium	5.7	8.8	6.7	12.4	7.7						<1.5	ug/l	TM30/PM14
Total Copper	25	17	26	91	14						<7	ug/l	TM30/PM14
Total Iron	31020$_{AA}$	27340$_{AA}$	38060$_{AA}$	143800$_{AB}$	4975						<20	ug/l	TM30/PM14
Total Lead	51	20	30	131	<5						<5	ug/l	TM30/PM14
Total Magnesium	16.8	25.5	26.9	19.6	15.9						<0.1	mg/l	TM30/PM14
Total Manganese	1074	973	653	1082	223						<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	8	7						<1	ug/l	TM30/PM14
Total Nickel	12	25	13	70	15						<2	ug/l	TM30/PM14
Total Potassium	10.4	4.1	10.9	12.9	4.1						<0.1	mg/l	TM30/PM14
Total Sodium	20.4	21.3	14.7	48.0	32.6						<0.1	mg/l	TM30/PM14
Total Zinc	95	207	105	327	50						<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND	ND							None	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Toluene	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	112	111	104	111	106						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101	100	99	101	95						<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	-	-							None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

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.	1-10	11-20	21-30	31-33	34-36						LOD/LOR	Units	Method No.
Sample ID	BH14	BH10	BH6	BH5	BH8								
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P	V H P								
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017								
Sample Type	Leachate	Leachate	Leachate	Leachate	Leachate								
Batch Number	1	1	1	1	1								
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017	23/02/2017								
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	-	-						<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C6-C8	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C8-C10	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C10-C12	<5	<5	<5	-	-						<5	ug/l	TM5/PM30
>C12-C16	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
>C16-C21	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
>C21-C35	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
Total aliphatics C5-35	<10	<10	<10	-	-						<10	ug/l	TM5/TM36/PM30/PM12

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

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.	1-10	11-20	21-30	31-33	34-36						LOD/LOR	Units	Method No.
Sample ID	BH14	BH10	BH6	BH5	BH8								
Depth													
COC No / misc													
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P	V H P								
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017								
Sample Type	Leachate	Leachate	Leachate	Leachate	Leachate								
Batch Number	1	1	1	1	1								
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017	23/02/2017								
TPH CWG													
Aromatics													
>C5-EC7	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5	<5	-	-						<5	ug/l	TM5/PM30
>EC12-EC16	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
>EC16-EC21	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
>EC21-EC35	<10	<10	<10	-	-						<10	ug/l	TM5/PM30
Total aromatics C5-35	<10	<10	<10	-	-						<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35)	<10	<10	<10	-	-						<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	0.3	<0.3	<0.3	<0.3						<0.3	mg/l	TM173/PM0
Sulphate as SO4	5.4	170.2	19.1	104.2	78.8						<0.5	mg/l	TM38/PM0
Chloride	26.5	35.3	24.8	94.0	64.5						<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06	<0.06						<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	13.02	0.57	0.21	9.40	8.23						<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	15.83	0.69	0.25	11.43	10.01						<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	16.77	0.73	0.27	12.11	10.60						<0.03	mg/l	TM38/PM0
BOD (Settled)	<1	3	12	-	-						<1	mg/l	TM58/PM0
COD (Settled)	21	7	29	-	-						<7	mg/l	TM57/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30									
Sample ID	BH14	BH10	BH6									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									
SVOC MS												
Phenols												
2-Chlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10								<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
Phenol	<1	<1	<1								<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
Naphthalene	<1	<1	<1								<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1								<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1	<1								<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<5	<5	<5								<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5								<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30									
Sample ID	BH14	BH10	BH6									
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G									
Sample Date	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Leachate	Leachate	Leachate									
Batch Number	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017									
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene	<1	<1	<1									
1,2,4-Trichlorobenzene	<1	<1	<1									
1,3-Dichlorobenzene	<1	<1	<1									
1,4-Dichlorobenzene	<1	<1	<1									
2-Nitroaniline	<1	<1	<1									
2,4-Dinitrotoluene	<0.5	<0.5	<0.5									
2,6-Dinitrotoluene	<1	<1	<1									
3-Nitroaniline	<1	<1	<1									
4-Bromophenylphenylether	<1	<1	<1									
4-Chloroaniline	<1	<1	<1									
4-Chlorophenylphenylether	<1	<1	<1									
4-Nitroaniline	<0.5	<0.5	<0.5									
Azobenzene	<0.5	<0.5	<0.5									
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5									
Bis(2-chloroethyl)ether	<1	<1	<1									
Carbazole	<0.5	<0.5	<0.5									
Dibenzofuran	<0.5	<0.5	<0.5									
Hexachlorobenzene	<1	<1	<1									
Hexachlorobutadiene	<1	<1	<1									
Hexachlorocyclopentadiene	<1	<1	<1									
Hexachloroethane	<1	<1	<1									
Isophorone	<0.5	<0.5	<0.5									
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5									
Nitrobenzene	<1	<1	<1									
Surrogate Recovery 2-Fluorobiphenyl	162	169	170									
Surrogate Recovery p-Terphenyl-d14	163	170	165									

Please see attached notes for all abbreviations and acronyms

LOD/LOR	Units	Method No.
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<0.5	ug/l	TM16/PM30
<1	ug/l	TM16/PM30
<0	%	TM16/PM30
<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4391

VOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-30	31-33	34-36							
Sample ID	BH14	BH10	BH6	BH5	BH8							
Depth												
COC No / misc												
Containers	V H P BOD G	V H P BOD G	V H P BOD G	V H P	V H P							
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017							
Sample Type	Leachate	Leachate	Leachate	Leachate	Leachate							
Batch Number	1	1	1	1	1							
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017	23/02/2017							

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Chloroethane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chloroform	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromomethane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Toluene	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
p/m-Xylene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
o-Xylene	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Bromoform	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4						<4	ug/l	TM15/PM10
Bromobenzene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Propylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	112	111	104	111	106						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101	100	99	101	95						<0	%	TM15/PM10

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4391	1	BH14		1-10	No interpretation possible
17/4391	1	BH10		11-20	No interpretation possible
17/4391	1	BH6		21-30	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4391						

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.: 17/4391

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x20 Dilution

JE Job No: 17/4391

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID				
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.				
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.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				

JE Job No: 17/4391

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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	9th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4396 Batch 1
Location :	
Date samples received :	23rd February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 23rd February, 2017 of which two 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-11	12-22									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
Dissolved Arsenic #	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Dissolved Boron	2949	2823									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	368.2_{AA}	327.5_{AA}									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	1033.0_{AB}	967.3_{AB}									<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	<2									<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2									<2	ug/l	TM30/PM14
Dissolved Potassium #	342.9_{AA}	306.4_{AA}									<0.1	mg/l	TM30/PM14
Dissolved Sodium #	7778.0_{AE}	8060.0_{AE}									<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3									<3	ug/l	TM30/PM14
Total Arsenic	34.1	21.3									<2.5	ug/l	TM30/PM14
Total Boron	3090	2877									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	589.8	595.1									<0.2	mg/l	TM30/PM14
Total Chromium	34.5	21.7									<1.5	ug/l	TM30/PM14
Total Copper	30	17									<7	ug/l	TM30/PM14
Total Iron	56620_{AB}	34920_{AA}									<20	ug/l	TM30/PM14
Total Lead	34	17									<5	ug/l	TM30/PM14
Total Magnesium	1040.0	935.0									<0.1	mg/l	TM30/PM14
Total Manganese	406	278									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	23	15									<2	ug/l	TM30/PM14
Total Potassium	328.7	294.2									<0.1	mg/l	TM30/PM14
Total Sodium	8063.0_{AE}	8277.0_{AE}									<0.1	mg/l	TM30/PM14
Total Zinc	154	100									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102	110									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	95									<0	%	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

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.	1-11	12-22											
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.30 AD									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.30 AD									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.30 AD									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.10 AB									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

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.	1-11	12-22									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	0.9	0.9									<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	2238.9	2109.5									<0.5	mg/l	TM38/PM0
Chloride #	14222.4 **AC**	13679.0 **AC**									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	<0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06									<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.44	3.42									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.54	4.15									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.57	4.40									<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	350	302									<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
BOD (Settled) #	<1	<1									<1	mg/l	TM58/PM0
COD (Settled) #	436 **AB**	621 **AB**									<7	mg/l	TM57/PM0
Total Organic Carbon #	3	3									<2	mg/l	TM60/PM0
Total Dissolved Solids #	26177	26889									<35	mg/l	TM20/PM0
Total Suspended Solids #	1655	1346									<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22											
Sample ID	SW1	SW2											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Naphthalene #	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1									<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22											
Sample ID	SW1	SW2											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
											LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	43 SV	40 SV									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	43 SV	37 SV									<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4396

VOC Report : **Liquid**

J E Sample No.	1-11	12-22											
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	21/02/2017	21/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102	110									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	95									<0	%	TM15/PM10

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4396	1	SW1		1-11	No interpretation possible
17/4396	1	SW2		12-22	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4396						

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.: 17/4396

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x10 Dilution
AC	x20 Dilution
AD	x30 Dilution
AE	x50 Dilution

JE Job No: 17/4396

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			

JE Job No: 17/4396

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
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				

JE Job No: 17/4396

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
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Deeside
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	9th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4397 Batch 1
Location :	
Date samples received :	23rd February, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 23rd February, 2017 of which two 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-11	12-22									LOD/LOR	Units	Method No.
Sample ID	SW8	SW9											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
Dissolved Arsenic #	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Dissolved Boron	2340	2492									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	294.2$_{AB}$	293.7$_{AB}$									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	882.7$_{AC}$	988.0$_{AC}$									<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	<2									<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2									<2	ug/l	TM30/PM14
Dissolved Potassium #	270.6$_{AB}$	270.1$_{AB}$									<0.1	mg/l	TM30/PM14
Dissolved Sodium #	6326.0$_{AE}$	7641.0$_{AE}$									<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3									<3	ug/l	TM30/PM14
Total Arsenic	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Total Boron	2432	2497									<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Calcium	284.9	295.3									<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Total Copper	<7	<7									<7	ug/l	TM30/PM14
Total Iron	121	87									<20	ug/l	TM30/PM14
Total Lead	<5	<5									<5	ug/l	TM30/PM14
Total Magnesium	793.9	833.2									<0.1	mg/l	TM30/PM14
Total Manganese	2	<2									<2	ug/l	TM30/PM14
Total Mercury	<1	<1									<1	ug/l	TM30/PM14
Total Nickel	<2	<2									<2	ug/l	TM30/PM14
Total Potassium	248.1	260.4									<0.1	mg/l	TM30/PM14
Total Sodium	6768.0$_{AE}$	7306.0$_{AE}$									<0.1	mg/l	TM30/PM14
Total Zinc	3	<3									<3	ug/l	TM30/PM14
VOC TICs	ND	ND										None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102	102									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	102	103									<0	%	TM15/PM10
SVOC TICs	ND	ND										None	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

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.	1-11	12-22											
Sample ID	SW8	SW9											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.03 AA	<0.03 AA									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

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.	1-11	12-22											
Sample ID	SW8	SW9											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	0.7	0.8									<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	1788.0	1902.5									<0.5	mg/l	TM38/PM0
Chloride #	11292.2 AD	12390.2 AD									<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	<0.2	0.2									<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06									<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	0.75	0.39									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.91	0.47									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.96	0.50									<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	142	146									<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
BOD (Settled) #	2	1									<1	mg/l	TM58/PM0
COD (Settled) #	527 AC	234 AC									<7	mg/l	TM57/PM0
Total Organic Carbon #	5	4									<2	mg/l	TM60/PM0
Total Dissolved Solids #	23390	9023									<35	mg/l	TM20/PM0
Total Suspended Solids #	140	117									<10	mg/l	TM37/PM0

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22									LOD/LOR	Units	Method No.
Sample ID	SW8	SW9											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Naphthalene #	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1									<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

SVOC Report : **Liquid**

J E Sample No.	1-11	12-22									LOD/LOR	Units	Method No.
Sample ID	SW8	SW9											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017											
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	101	96									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	100	92									<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4397

VOC Report : **Liquid**

J E Sample No.	1-11	12-22											
Sample ID	SW8	SW9											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	22/02/2017	22/02/2017											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	23/02/2017	23/02/2017									LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102	102									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	102	103									<0	%	TM15/PM10

Client Name: Malone O'Regan **Matrix : Liquid**
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/4397	1	SW8		1-11	No interpretation possible
17/4397	1	SW9		12-22	No interpretation possible

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4397						

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.: 17/4397

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x3 Dilution
AB	x5 Dilution
AC	x10 Dilution
AD	x20 Dilution
AE	x50 Dilution

JE Job No: 17/4397

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			

JE Job No: 17/4397

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
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				

JE Job No: 17/4397

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
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Deeside
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Tel: +44 (0) 1244 833780
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Malone O'Regan
2b Richview Office Park
Clonskeagh
Dublin 14
Ireland

Attention :	Claire Clifford
Date :	8th March, 2017
Your reference :	E1342
Our reference :	Test Report 17/4399 Batch 1
Location :	
Date samples received :	23rd February, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 23rd February, 2017 of which four 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:

Phil Sommerton BSc
Project Manager

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

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.	1-10	11-20	21-29	30-38							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
Dissolved Arsenic #	4.4	12.0	15.9	6.7							<2.5	ug/l	TM30/PM14
Dissolved Boron	147	728	2092	338							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Calcium #	163.8	114.9	42.6	141.0							<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	59	<20							<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Magnesium #	21.5	44.3	95.8	27.7							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	1442	313	170	438							<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	7	<2	7	<2							<2	ug/l	TM30/PM14
Dissolved Potassium #	9.4	35.5	127.7_{AA}	16.2							<0.1	mg/l	TM30/PM14
Dissolved Sodium #	58.0	165.5	509.6_{AA}	50.7							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	5	<3							<3	ug/l	TM30/PM14
Total Arsenic	<2.5	26.1	6.7	7.0							<2.5	ug/l	TM30/PM14
Total Boron	145	703	2063	324							<12	ug/l	TM30/PM14
Total Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Calcium	175.2_{AB}	127.0_{AB}	85.6_{AB}	151.0_{AB}							<0.2	mg/l	TM30/PM14
Total Chromium	<1.5	<1.5	3.8	<1.5							<1.5	ug/l	TM30/PM14
Total Copper	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Total Iron	899	27920_{AA}	6814	18470_{AA}							<20	ug/l	TM30/PM14
Total Lead	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Total Magnesium	23.3_{AB}	48.5_{AB}	111.4_{AB}	30.1_{AB}							<0.1	mg/l	TM30/PM14
Total Manganese	1417	318	243	420							<2	ug/l	TM30/PM14
Total Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Total Nickel	7	<2	12	<2							<2	ug/l	TM30/PM14
Total Potassium	10.3_{AB}	37.7_{AB}	121.2_{AB}	17.5_{AB}							<0.1	mg/l	TM30/PM14
Total Sodium	60.5_{AB}	174.5_{AB}	458.1_{AB}	54.1_{AB}							<0.1	mg/l	TM30/PM14
Total Zinc	<3	6	25	5							<3	ug/l	TM30/PM14
VOC TICs	ND	ND	ND	ND								None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	121	121	115							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	97	82	82							<0	%	TM15/PM10
SVOC TICs	ND	ND	ND	ND								None	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

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.	1-10	11-20	21-29	30-38							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.05 AA	<0.05 AA	<0.05 AA	<0.05 AA							<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.05 AA	<0.05 AA	<0.05 AA	<0.05 AA							<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.05 AA	<0.05 AA	<0.05 AA	<0.05 AA							<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM149/PM30
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

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.	1-10	11-20	21-29	30-38							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
TPH CWG													
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM30/PM12
Fluoride	<0.3	0.3	0.7	<0.3							<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	12.7	11.9	<0.5	<0.5							<0.5	mg/l	TM38/PM0
Chloride #	83.3	112.6	306.4	55.7							<0.3	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	0.4	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	8.57	34.19	64.29	23.17							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	10.42	41.57	78.16	28.17							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	11.04	44.03	82.79	29.84							<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	578	856	1540	626							<1	mg/l	TM75/PM0
Total Organic Carbon #	7	17	29	19							<2	mg/l	TM60/PM0
Total Dissolved Solids #	693	954	1926	631							<35	mg/l	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-29	30-38									
Sample ID	BH1	BH2	BH3	BH4									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
SVOC MS											LOD/LOR	Units	Method No.
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

SVOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-29	30-38									
Sample ID	BH1	BH2	BH3	BH4									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
SVOC MS											LOD/LOR	Units	Method No.
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	105	103	105	99							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	99	101	99	93							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford
JE Job No.: 17/4399

VOC Report : **Liquid**

J E Sample No.	1-10	11-20	21-29	30-38							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H P G	V H P G									
Sample Date	21/02/2017	21/02/2017	21/02/2017	21/02/2017									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	23/02/2017	23/02/2017	23/02/2017	23/02/2017									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	121	121	115							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	97	82	82							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1342
Location:
Contact: Claire Clifford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/4399						

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.: 17/4399

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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
AA	x5 Dilution
AB	x10 Dilution

JE Job No: 17/4399

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
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	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.				
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			
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			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	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 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	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.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

JE Job No: 17/4399

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
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

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Email: info@chemtest.co.uk

UKAS TESTING
2183

Amended Report

Report No.:	17-02806-2		
Initial Date of Issue:	07-Feb-2017	**Date of Re-Issue:**	06-Mar-2017
Client	Malone ORegan		
Client Address:	2B Richview Office Park Dublin 14 Dublin Ireland		
Contact(s):	Martin Kearns		
Project	Malone O'Regan Unit 2b Richview Office Park Clonskeagh		
Quotation No.:		**Date Received:**	06-Feb-2017
Order No.:	E1342	**Date Instructed:**	06-Feb-2017
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	10-Feb-2017
Date Approved:	06-Mar-2017	**Subcon Results Due:**	27-Feb-2017

Approved By:

Details: Martin Dyer, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Water

Project: Malone O'Regan Unit 2b Richview Office Park Clonskeagh

Client: Malone ORegan			**Chemtest Job No.:**		17-02806	17-02806	17-02806	17-02806
Quotation No.:			**Chemtest Sample ID.:**		408154	408155	408156	408157
Order No.: E1342			Client Sample Ref.:		BH1	BH2	BH3	BH4
			Sample Type:		WATER	WATER	WATER	WATER
			Date Sampled:		01-Feb-2017	01-Feb-2017	01-Feb-2017	01-Feb-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
E. coli (Subcon)	S		cfu/100ml	N/A	0	1	0	0
Total Coliforms (Subcon)	S		cfu/100ml	N/A	1	8	1	0

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
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Chemtest Ltd.
Depot Road
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CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

Final Report

Report No.:	17-04947-1
Initial Date of Issue:	01-Mar-2017
Client	Malone ORegan
Client Address:	2B Richview Office Park Dublin 14 Dublin Ireland
Contact(s):	Claire Clifford Martin Kearns
Project	E1342

Quotation No.:		**Date Received:**	28-Feb-2017
Order No.:		**Date Instructed:**	28-Feb-2017
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	06-Mar-2017
Date Approved:	01-Mar-2017	**Subcon Results Due:**	21-Mar-2017

Approved By:

Details: Glynn Harvey, Laboratory Manager

Results - Water

Project: E1342

Client: Malone ORegan			**Chemtest Job No.:**		17-04947	17-04947	17-04947	17-04947	17-04947	17-04947	17-04947	17-04947
Quotation No.:			**Chemtest Sample ID.:**		418334	418335	418336	418337	418338	418339	418340	418341
			Client Sample ID.:		BH1H	BH2H	BH3H	BH4H	BH1	BH2	BH3	BH4
			Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
			Date Sampled:		21-Feb-2017	21-Feb-2017	21-Feb-2017	21-Feb-2017	21-Feb-2017	21-Feb-2017	21-Feb-2017	21-Feb-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
E. coli (Subcon)	S		cfu/100ml	N/A	1	0	2	0	0	0	0	0
Total Coliforms (Subcon)	S		cfu/100ml	N/A	5	0	11	13	28	9	>100	0

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
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I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

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The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
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A - Date of sampling not supplied
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All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

APPENDIX D

Landscape Design Rationale

VAT No. 9555975 V

Ref : Landscape Layout Proposals / Recommendations for former landfill site at Finisklin, Sligo.

July 25th, 2017.

Please find attached rationale, design considerations and factors in relation to the landscape proposals for the proposed amenity area at Finisklin former Landfill, Sligo.

Please read in conjunction with attached Landscape Masterplan(Drawing 17/MOR/FL/001)

Objectives :

The principal objectives of the landscape proposals are :

- To create a layout which provides a visually and aesthetically pleasing context for exploration of the existing regenerating vegetation, which creates a distinct character and maximizes views to the adjacent seascape and distant scenic landscape.

- To provide a low key natural and contextual area which maximizes the existing stands of rejuvenating Willow and Gorse scrub to best effect in conjunction with existing on-site features such as a natural wetland / pool area and extensive wildflower grassland areas.

- To optimize the subtle nature of the circulation route and resting nodes to emphasize pleasant views from the site and to ensure that negative views where possible are visually softened and integrated into pleasant surrounds.

The aim is that the landscape layout will add to and positively reinforce the naturalized character of the lands.

Design Ethos and Educational Aspects

This design style is based on a sensitive enhancement of the site, using a controlled spatial arrangement, and a visual sequence of directing focus and attention within the area. This visually entices focus into the central wildflower grassland area and to the sea and mountain views after progressing through contrasting areas of semi enclosed Willow scrub upon entering the amenity area. Spatial differentiation and view-point direction is achieved though the use of focal point nodes for punctuation within the design and the creation of clearly defined circulation routes offering a sequence of views to the best of the sites natural attributes.

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Hayesryan.com

Mobile
Anthony Ryan (086-0630552)
Geraldine Hayes (086-2219021)

Educational aspects form a key part of the proposal. Based on the re-use of the landfill for amenity purposes interpretive signage will highlight points of interest based on local natural amenity, ecology and the scenic setting.

Interpretive signage will be located at points and views of interest throughout the area and will be based on flora and fauna such as : Fauna -Common frog, Common Sea, Grey Mullet, Birds - Light-bellied Brent Goose, Oystercatcher, Redshank, Greenshank, Curlew, Wigeon, Snipe, Shelduck, Heron, Knot, Dunlin, Bar-tailed Godwit, Flora- Bulrush, Common orchid, Flag Iris, Soft rush, Gorse, Goat willow, Red clover, White clover, Silver weed, Ragwort.

Other educational proposals include developing habitat piles (hibernacular) to be built from the cleared Willow. The pond in the northern area will be enhanced with the installation clay and a small berm, and will be used to re-house any fauna from other wet areas of the remainder of the site if developed.

The key elements in the attached plan are :

- The objective is to superimpose a low key footpath network with considered key nodes which allow for exploration and appreciation of the scenic landscape and the expanse of regenerating native and naturalized vegetation.

- The intention is to form a considered network of defined circulation routes which harmonise with the existing regenerating landscape and which offers the user a sequence of landscape experiences as they progress through the site.

- Key nodes form focal point resting and viewing areas. These have been strategically placed based on a considered review and analysis of the site (see analysis insert attached)

- The resting nodes act as key pivot points offset from the circulation pathway within the natural open area, each offering a distinct focus and offering key views to the distant landscape and the bay.

- The existing regenerating vegetation is retained throughout the site. The mid sized randomly distributed clusters of Ulex and juvenile Salix scrub provide partial spatial definition and aids in the creation of a sequence of exploratory experiences throughout the site.

- Existing retained stands of Salix (Willow) provide vertical punctuation within the space. The irregular nature of the space creates interest coupled with the gradation in topography, gradually leads visitors along the footpath network to the north western corner of the site for key waterscape views.

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- A designated entrance space is proposed to link with a continuation of the southern boundary roadside footpath. Budget depending, this recessed entrance zone is proposed to be framed by a circular stone wall and stone pier features. Incorporated into the space is an interpretive guide / sign together with a possible themed flagpole to highlight the entrance area.

- Upon entering the site from the public road, the initial area which the proposed pathway passes through is currently overgrown with dense Willow. It is proposed to clear of Willow / scrub in a meandering area offset 10 meters each side of the pathway to aid enticement, movement and direction into the open amenity area. Its is proposed that scrub establishment will be minimized in this are by future ongoing management resulting in a lower level vegetated approach.

- It is proposed to surface the footpaths in a low key hoggin or water bound macadam surface. Based on a mixtures of grit and fines, this self compacting surface will be unobtrusive on the landscape and will provide a suitable surface for pedestrians, children's buggies etc..

- As part of the ongoing implementation of the works and subsequent management, a knotweed control programme will be implemented in order to control the stands of knotweed on the site at locations identified during previous ecological studies. Precise footpath locations to be modified on site, following on-site verification of knotweed locations on the ground.

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B.Agr.Sc. (L.Hort) M.L.A

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Finisklin Amenity Area

Outline recommendation for footpath surfaces :

Footpaths to consist of a self binding gravel finish.

Footpath network to follow routes as outlined on attached plan. Footpaths to be generally 2.0 metres wide.

Excavate to min 200mm depth to achieve gently graded pathways (excavations will be deeper in places to facilitate gentle gradations)

Import and fill with 100mm clause 804 hardcore. Compact and grade to falls.

Surface with self binding gravel layer which is suitable for many leisure uses such as urban or rural walkways, canal towpaths, cycle ways, bridle paths, golf pathways etc..

It is recommended that the self binding gravel is laid at a finished compacted thickness of 35-40mm. The approximate coverage is 10m2 per tonne.

The pathways will be slightly sunken (50mm) in relation to surrounding ground levels, thereby creating a slight sloping side which will frame and provide definition for the pathway edges. Create gentle falls with existing topography to allow for water runoff with exit points to adjacent lower level ground at 3-5 metre intervals

Self binding natural material quarried from selected limestone and graded approximately 6mm to fines; the fines content being naturally occurring marl which acts as the self setting agent when the material is watered and rolled to fullest compaction in the manner described below.

The Type 1 Sub Base should be laid and rolled to a flat finish with a roller of suitable weight, i.e. minimum 1.5 tonnes. On smaller areas a pedestrian roller may be used, however it is vital that the self binding gravel is rolled sufficiently to achieve fullest compaction prior to water rolling.

The material should be spread onto the prepared foundation using a flat board or the back of a rake. Do not use the prongs of a rake as this may pull the coarse components of the gravel up to the surface. Spread the material out to a depth of no more than 60mm in order to achieve a finished compacted thickness of 40mm.

The surface must then be rolled using a roller of similar type to that used for compacting the foundation with the vibratory action of the roller switched on and the area should be continually rolled until fullest compaction is achieved. It is imperative that the material is laid to a cross fall or camber in order to shed surface water. To give some indication, an adequate fall on a pathway would be 1-55 to 1-60.

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Once a uniform appearance has been achieved the second stage can be undertaken. This is the water rolling of the material for which the vibratory action of the roller must be switched off. By using a water roller, water is automatically sprayed onto the drum of the roller. The fundamental aim is to have a film of water covering the whole surface The object of water rolling this material is to float sufficient fines to the top surface to obtain a well-bonded finish.

If there are any lines or grooves in the gravel left by the weight of the roller, a soft wide broom can be used to gently pass over the surface whilst still wet – this will remove any lines and leave a perfect surface finish.

The area should then be allowed to dry out before being opened up to general use, the length of time to allow is dependant on weather conditions.

Long continuous fall over sloping ground can be minimised by the formation of 3 no railway sleeper steps at intervals where water is diverted to the side to reduce the risk of ruts occurring through the action of flowing storm water. It is envisaged this work will be carried out in Phase 2 when the required locations can be more accurately pinpointed.

On completion, the appearance of self binding gravel is a very smooth and even finish but over time with weathering and trafficking the surface will scarify, giving a loose dressing of chippings on the surface whilst maintaining a solid base.

All disturbed areas adjacent to footpath construction to be reinstated, graded, stone raked and seeded with No 2 lawn seed.

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Amenity Area Layout

Landscape recommendations in relation to Amenity area at Finisklin, Sligo.

Landscape Proposals for enhancement and usage of designated amenity area on former landfill site.

Landscape Rationale

The principal elements in the Proposals are :

- The objective is to superimpose a low key footpath network with considered key nodes which allow for exploration and appreciation of the scenic landscape and the expanse of regenerating native and naturalized vegetation.
- The intention is to form a considered network of defined circulation routes which harmonise with the existing regenerating landscape and which offers the user a sequence of landscape experiences as they progress through the site.
- Educational aspects form a key part of the proposal. Based on the re-use of the landfill for amenity purposes interpretive signage will highlight points of interest based on local natural amenity, ecology and the scenic setting.
- Key nodes form focal point resting and viewing areas. These have been strategically placed based on a considered review and analysis of the site (see analysis insert attached)
- The resting nodes act as key pivot points offset from the circulation pathway within the natural open area, each offering a distinct focus and offering key views to the distant landscape and the bay.
- The existing regenerating vegetation is retained throughout the site. The mid sized randomly distributed clusters of Ulex and juvenile Salix scrub provide partial spatial definition and aids in the creation of a sequence of exploratory experiences throughout the site.
- Other educational proposals include developing habitat piles (hibernacular) to be built from the cleared Willow. The pond in the northern area will be enhanced with the installation clay and a small berm, and will be used to rehouse any fauna from other wet areas of the remainder of the site if developed.
- Existing retained stands of Salix (Willow) provide vertical punctuation within the space. The irregular nature of the space creates interest coupled with the gradation in topography, gradually leads visitors to the north western corner of the site for key waterscape views.
- A designated entrance space is proposed to link with a continuation of the southern boundary roadside footpath. Budget depending, this recessed entrance zone is proposed to be framed by a circular stone wall and stone pier features. Incorporated into the space is an interpretive guide / sign together with a possible themed flagpole to highlight the entrance area.
- Upon entering the site from the public road, the initial area which the proposed pathway passes through is currently overgrown with dense Willow. It is proposed to clear of Willow / scrub in a meandering area offset 10 meters each side of the pathway to aid enticement, movement and direction into the open amenity area. Its is proposed that scrub establishment will be minimized in this are by future ongoing management resulting in a lower level vegetated approach.

Note :

Knotweed eradication programme to be implemented in advance and in tandem with proposed works.
Precise footpath routes subject to on-site modification following on-site verification of knotweed locations on the ground

Suggested Elements :

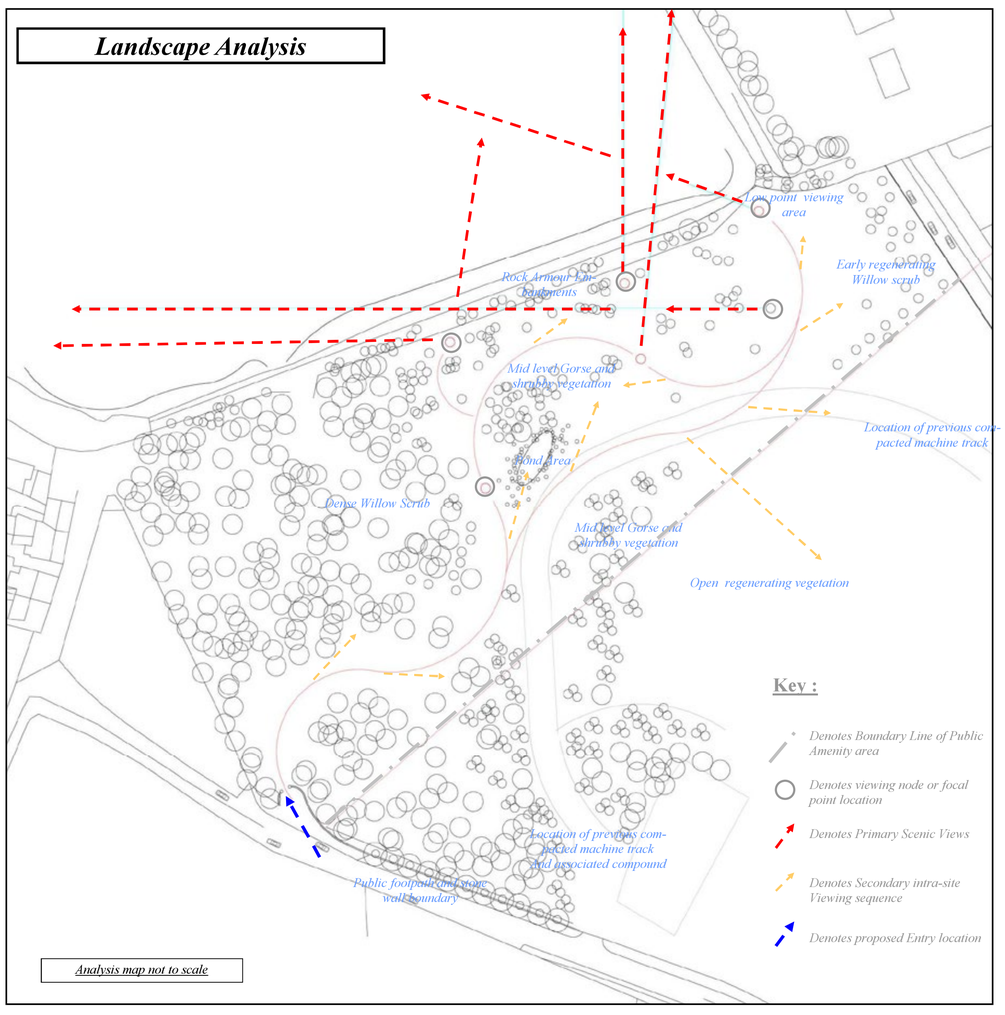
Habitat Piles created from cleared Willow

Low key interpretative signage strategically placed at locations shown

Local stone informal wall seating area each Node

Hoggin / 10mm to dust water bound macadam pathways

Landscape Analysis



Analysis map not to scale

Area for proposed extension to existing public footpath to new entry point to amenity area

Optional continuation of stone wall and pathway. Stone wall to form curved entrance / reception space

Existing track way outside of amenity area boundary. Proposed buffering with transplanted Willows at upper end to minimise views

View to industrial building swill be visually softened over time as juvenile Willow scrub matures

Selected Ulex and Willow scrub cleared from upper level rock armour area to facilitate key views

Key view to scenic bay from Node C.

Existing wildflower areas allowed to progress and develop unhindered.

Open view to establishing grassland / wildflower area and distant scenic views incorporated to best effect within amenity area layout

Key view to scenic bay from Node D. Selected Ulex Mid level Ulex scrub vegetation retained to create spatial definition through pathway network.

Key scenic view from area on higher level ground in the vicinity of Node F

Existing pond / wetland area retained within the site and used as a focal point at pathway divide. Associated interpretive signage to explain pond ecology

Selected view to northwest captured from mid level Node B

Scale 1 : 500 @A0

Drawing No: 17/MOR/FL/001/Rev A

Landscape Recommendations in relation to Finisklin Landfill Amenity Area
July 2017

Suggested Styles for Viewing / Resting Nodes.

Locally contextual natural stone finishes

Budget Dependent

Design by Anthony Ryan, B. Agr. Sc. L.Hort. M.L.A

Hayes Ryan Landscape Architecture

Landscape Architects, Horticulture & Environmental Consultants

www.hayesryan.com

Contact Details : Kilmead, Athy, Co. Kildare, Ireland. Tel 059-8626093 / 086 0630552

APPENDIX E

August 2017

SLIGO COUNTY COUNCIL

Natura Impact Statement

Proposed Remediation and Restoration

Former Finisklin Landfill

Sligo County Council

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QUALITY
ISO 9001:2008
NSAI Certified

Form ES - 04

MALONE O'REGAN
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Email: enviro@morce.ie

Title: Natura Impact Statement, Proposed Remediation and Restoration

Job Number: E1342

Prepared By: Dyfrig Hubble **Signed:**

Checked By: Claire Clifford **Signed:**

Approved By: Kevin O'Regan **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	28/08/17	NIS	Final	DH	CC	KOR

Natura Impact Statement

Proposed Remediation and Restoration

Former Finisklin Landfill

Sligo County Council

Contents

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1 INTRODUCTION

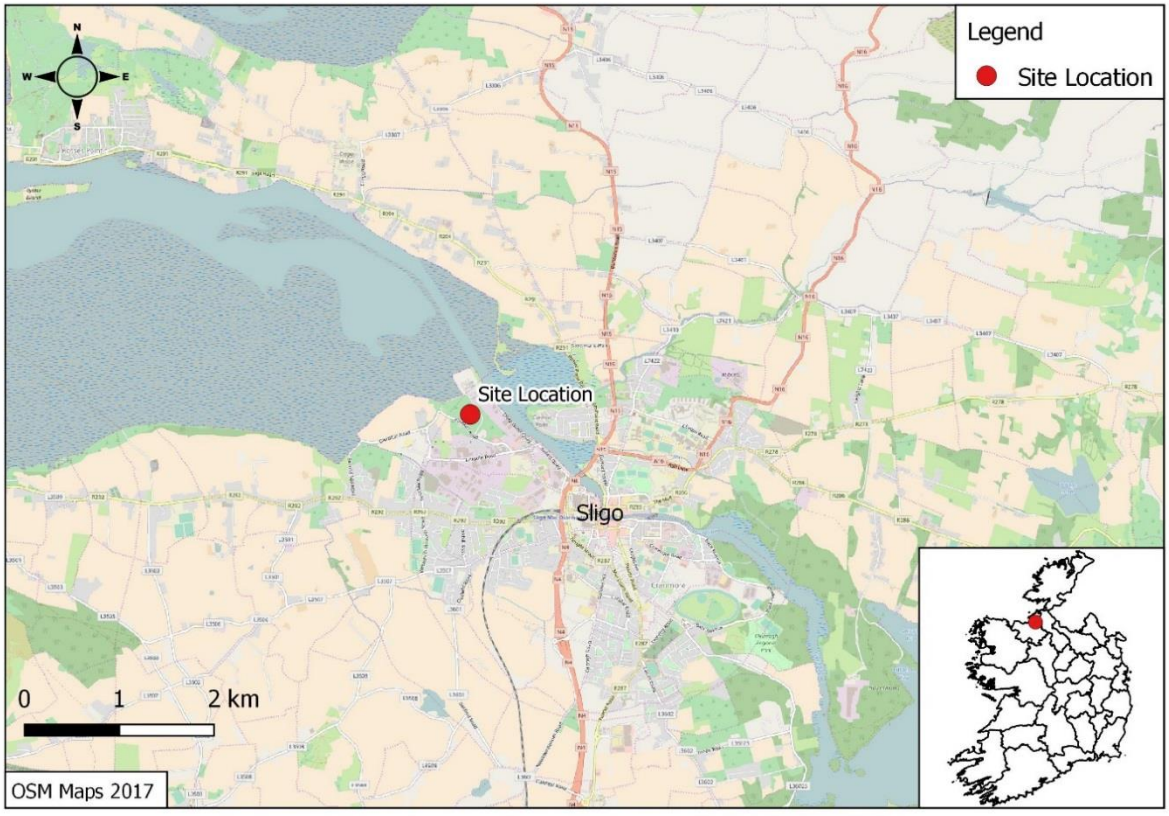
1.1 Background

Malone O'Regan (MOR) has prepared this Natura Impact Statement (NIS) on behalf of Sligo County Council (SCC) in regards to the proposed remediation and restoration project (the project) at the former Finisklin Landfill, Co Sligo (the Site). The regional site location is illustrated in Figure 1-1 (Grid reference: G 67732 37069).

The Environmental Protection Agency (EPA) identified the requirement for an NIS in a letter to SCC dated the 15th of December 2016 in regards to the application for a Certificate of Authorisation under the Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations, 2008 for the Site.

The objective of the NIS is to determine the likelihood of significant impacts on Natura 2000 sites arising from the project and in doing so determine the appropriateness, or otherwise, of the project in the context of the conservation objectives of Natura 2000 sites.

Figure 1-1 Site Location



1.1 Regulatory Context

This Natura Impact Statement (NIS) was prepared in accordance with Article 33 of the Planning and Development Regulations 2001 and in compliance with the following legislation:

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as "The Habitats Directive" provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and

Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC as amended 2009/149/EC) (better known as "The Birds Directive").

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement):

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public"*

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the Appropriate Assessment (AA) process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

1.2 Stages of the Appropriate Assessment

There are four distinct stages to undertaking an AA as outlined in current EU and DOEHLG guidance:

Stage 1: Screening

This process identifies the potential impacts of a plan or project on a Natura site, either alone or in combination with other plans and projects, and considers whether these impacts are likely to be significant. If potential significant impacts are identified the plan or project cannot be screened out and must proceed to stage 2.

Stage 2: Appropriate Assessment

Where potential significant impacts are identified, an assessment of the potential mitigation of those impacts is required; this stage considers the appropriateness of those mitigation measures in the context of maintaining the integrity of the Natura 2000 sites. If potential significant impacts cannot be eliminated with appropriate mitigation measures, the assessment must proceed to stage 3.

Stage 3: Assessment of Alternatives Solutions

This process examines alternative ways to achieve the objectives of the plan or project that avoid adverse impacts on the integrity of the Natura 2000 site if mitigation measures are deemed insufficient.

Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)

Assessment where no alternative solution exists for a plan or project and where adverse impacts remain. This includes an assessment of compensatory measure where in the case of projects or plans which can be considered to be necessary for IROPI.

This report has been prepared to inform the relevant authority with regard to Stage 1 (Screening) and Stage 2 (Appropriate Assessment) of the project through the research and interpretation of available scientific, geographic and engineering knowledge. This assessment seeks to determine whether the project will, on its own or in combination with other plans/projects have a significant effect on Natura 2000 sites within a defined radius of the subject Site.

2 METHODOLOGY

2.1 Desk Based Studies

A desk-based review of information sources was completed, which included the following:

- The National Parks and Wildlife Service (NPWS) website was consulted in regards to current conservation objectives for the Natura 2000 sites relevant to this assessment (National Parks and Wildlife Service , 2017);
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions (NBDC, 2017);
- The Bird Watch Ireland website was consulted with regard to The Irish Wetland Bird Survey (I-WeBS) data (Bird Watch Ireland , 2017);
- The EPA Envision website was consulted to obtain details about watercourses in the vicinity of the Site (EPA, 2017); and,
- Previous ecology studies prepared for the Site (BES, 2012).

2.2 Field Based Studies

Field surveys were undertaken by a Senior MOR Ecologist on the 21st February 2017 and on the 20th June 2017 to supplement the findings of the previous 2011 survey (BES, 2012). The scope of the surveys was determined by the findings of the desk based studies.

A habitat survey was undertaken to assess the habitats at the Site and adjoining areas in terms of their importance to species for which the identified SAC / SPA sites are designated.

The field surveys also included a targeted bird survey and marine mammal survey aimed at identifying any marine mammals mostly notable common Seal using the area for which the Cummeen Strand / Drumcliff Bay SAC is designated.

2.2.1 Bird Survey

A targeted bird count was undertaken for birds which the SPA is designated (See Table 4-4). The key objective was to establish whether any species or populations of conservation importance made regular use of the Site or adjacent areas, or the airspace above the Site. The survey was in line with the methodology employed in 2011 and consisted of a vantage point survey of the area of the bay to the north of the Site. The survey lasted 3 hours and encompassed high tide, which allows for birds to come close and generally group into more distinct flocks, making counting and identification easier. The vantage point selected provided a full view of the area of the bay adjoining the Site. Following the completion of the vantage point survey, a walked transect along the estuary to the north east of the Site was completed, which noted areas in which waders and wetland birds were feeding.

2.2.3 Marine Mammal Survey

A survey for marine mammal was also undertaken from the rock armour along the northern portion of the Site which provided a good vantage point across the bay.

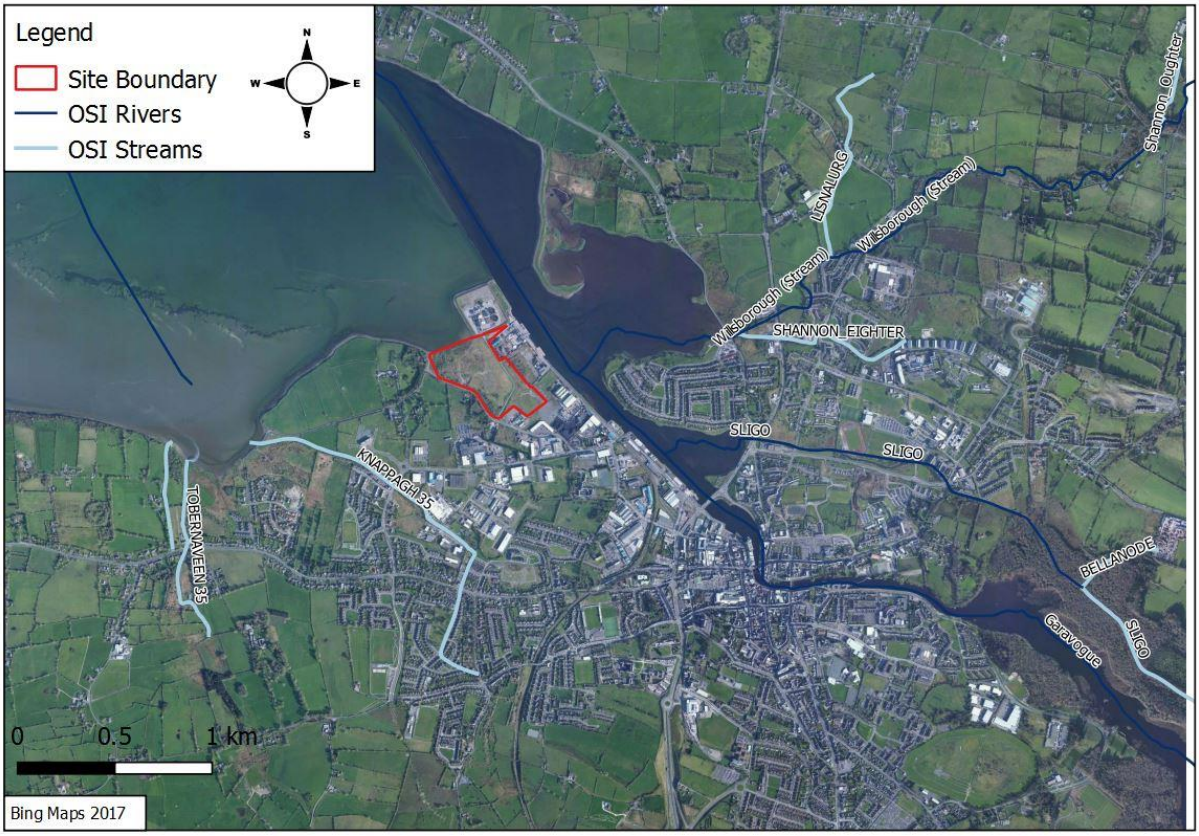
3 DESCRIPTION OF THE PROJECT

3.1 Site Context and Description

The Site is a closed landfill located approximately 1.5km north west of Sligo City Centre an area of approximately 13 hectares (ha) on the southern shores of the Garavogue River / Estuary The site is bordered to the north by Sligo Harbour/Garavogue Estuary and the Wastewater Treatment Plant (WWTP), to the east by commercial / industrial facilities located on Deepwater Berths Road, to the south by commercial/industrial facilities and to the west by Finisklin Road and Far Finisklin cul-de-sac along which there are residential properties.

The Knappagh Stream is located approximately 600m southwest of the Site and is the closest hydrological feature to the Site. The stream flows in a northerly direction, entering the Garavogue Estuary 880m southwest of the Site. The Garavogue River flows in a westerly direction before joining the Estuary and Sligo Bay. The location of the key surface water features in the vicinity of the Site are illustrated in Figure 3-1.

Figure 3-1 Key Surface Water Features Location



3.2 Project Details

The proposed project comprises of landfill remediation and restoration works at the Site; the scope and rationale for the remediation and restoration are set out below. All remediation works will be supervised onsite by appropriately qualified and competent persons on behalf of SCC.

SCC will undertake the programme of remediation and restoration works in the later part of 2017. Remedial works are required based on the findings of the Tier 3 environmental risk assessment for the Site (MOR, 2017) and will address the potential risk of offsite landfill gas migration from the waste materials at the Site to offsite properties to the northeast and northwest of the Site. As the volumes of gas being generated at the Site are low, a passive

venting system i.e. the Virtual Curtain technology is considered to be the most appropriate for the specific requirements at the Site.

In accordance with the land zoning and local area development plan for the Site, the northern portion of the Site will be developed as a local amenity area with particular emphasis on nature conservation, ecological enhancement and education in accordance with the guidance set out in the EPA Landfill Manuals: Restoration and Aftercare (EPA, 1999). The landscape design for the Site takes account of the environmental setting of the Site, the landfill gas remediation strategy as well as identified ecological constraints (e.g. invasive species: Japanese Knotweed). Importantly, as the overall landfill gas remediation strategy takes account of the fact that gas passively vents to the atmosphere via the landfill ground surface where the capping material is of variable/high permeability or absent, the surface cover will not be altered significantly and no additional soil will be imported as part of the landscape works. The overall design ethos for the landscape design was to enhance the existing amenity and make it available for the community with an emphasis on education and ecological enhancement.

3.2.1 Virtual Curtain

Virtual Curtain, is a proprietary remediation system used widely at both active and historical landfills. The system consists of vent nodes constructed of a gas-permeable geocomposite material installed to the base of the fill material at 1 m centres. A horizontal gas collection duct located within a shallow, gravel-filled trench connects the nodes. A prefabricated vent bollard, which vents the diluted landfill gases to the atmosphere, is installed every 10m along the horizontal gas collection duct. The Virtual Curtain system will be installed along 165m of the northeast Site boundary and also along an 85m length of the northwest boundary.

The construction works of the Virtual Curtain system will consist of the following:

- Gas dispersal units will be installed at 1m centres along the 165m installation at the northeast and 85m installation at the northwest boundaries;
- A shallow trench will be excavated the length of the installation system and a starter hole will then made at the 1m centres at the location of each vertical vent node using a steel rod. If obstructions are encountered when making the starter holes, a mini-excavator will be used to remove the obstruction before continuing with the installation of the starter holes;
- The vertical vent nodes at 1m centres, which are rectangular in section and are made of a gas permeable geocomposite material, will be vibro-inserted to the base of the waste material using high frequency vibration unit;
- A 25 – 50mm thick granular layer will be added to the base of the shallow trench and the vent nodes trimmed flush with this bedding layer;
- A geotextile cover will be placed over the bedding layer;
- A horizontal gas collection and dilution duct encapsulated in geotextile will be installed on the bedding layer and over the tops of the vent nodes at an invert of approximately 0.65m depth;
- Manifolds and prefabricated vent bollard bases will be installed every 10m along the horizontal gas collection duct;
- The remainder of the trench will be backfilled with soils generated during exaction of the trench; and,
- Approximately 3m tall vent terminations with diluted gas outlets will be installed to the vent bollard bases.

The layout and Schematic diagram of the Virtual Curtain system being installed are provided in Appendices A & B.

3.3 Landscaping

As part of the project a Landscape Plan has been prepared (Refer to Appendix C). This Plan includes the main areas of landscaping works.

This design style is based on a sensitive enhancement of the Site, using a controlled spatial arrangement, and a visual sequence of directing focus and attention within the area. This visually entices focus into the central wildflower grassland area and to the sea and mountain views after progressing through contrasting areas of semi enclosed Willow scrub upon entering the amenity area. Spatial differentiation and view-point direction is achieved through the use of focal point nodes for punctuation within the design and the creation of clearly defined circulation routes offering a sequence of views to the best of the sites natural attributes. Interpretive signage will also be located at points and views of interest throughout the area and will be based on local flora and fauna.

The principal objectives of the landscape proposals are:

- To create a layout which provides a visually and aesthetically pleasing context for exploration of the existing regenerating vegetation, which creates a distinct character and maximises views to the adjacent seascape and distant scenic landscape;
- To provide a low key natural and contextual area which maximises the existing stands of rejuvenating Willow and Gorse scrub to best effect in conjunction with existing on-site features such as a natural wetland / pool area and extensive wildflower grassland areas; and,
- To optimize the subtle nature of the circulation route and resting nodes to emphasize pleasant views from the site and to ensure that negative views where possible are visually softened and integrated into pleasant surrounds.

The aim is that the landscape layout will add to and positively reinforce the naturalized character of the lands. The key elements of the Landscape plan are:

- Footpath network with considered key nodes forming focal point resting and viewing areas;
- self-compacting low key hoggin or water bound macadam surface footpaths, providing a suitable surface for pedestrians, children's buggies etc;
- Designated entrance space to link with a continuation of the southern boundary roadside footpath;
- Retention of existing regenerating vegetation and stands of Salix (Willow) throughout the site;
- Tree maintenance works including the clearance of overgrown dense Willow / scrub in order to aid enticement, movement and direction into the open amenity area, along with management works resulting in a lower level vegetated approach; and,
- As part of the ongoing implementation of the works and subsequent management, a knotweed control programme will be implemented in order to control the stands of knotweed on the Site at locations identified during the ecological survey.

3.4 Sensitive Design

As part of the design phase for the project, specialist ecological input was taken into consideration to ensure that the remediation works and the design / layout of the landscaping

works will be sensitive to valued ecological features that occur within the Site and the surrounding landscape. Most notably:

- The layout of the footpath has been designed to fit into the existing landscape so as to minimise vegetation and ground clearance; and,
- The layout of the footpath has also been designed and sited to avoid impacts on sensitive ecological receptors within the site such as the existing pond and also the stands of Japanese knotweed.

3.5 Standard Construction Control Measures

The construction works will be temporary and short-term in nature. The works will not involve any significant vegetation clearance or earthworks. Regardless, during the construction works methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the works. Although the construction phase impacts will be of a short-term duration and localised in nature, the impacts will be reduced as far as practicable through compliance with current construction industry guidelines.

A detailed Construction Environmental Management Plan (CEMP) will be prepared and submitted to the council in advance of the works. The following Construction Industry Research and Information Association (CIRIA) guidance will be referred to and followed during the construction phase of the project to prevent water pollution;

- *C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors* (Construction Industry Research and Information Association (CIRIA), 2001).
- *C584 – Coastal and Marine Environmental Site Guide for protection of water quality and in turn aquatic life, during the construction phase of the works (Construction Industry Research and Information Association (CIRIA), 2001).*

The project will take place in Q3/Q4-2017 and will take approximately 6 to 8 weeks onsite to complete.

3.6 Monitoring

An experienced Ecological Clerk of Works (ECoW) will inspect the Site in advance of works commencing and supervise all works as required to ensure that they will be completed in line with the mitigation measures stipulated within the CEMP.

4 IDENTIFICATION OF NATURA 2000 SITES

In accordance with the European Commission Methodological Guidance (EC, 2001), a list of European sites that can be potentially affected by the project has been compiled. The reference document 'Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government' (DoEHLG, 2009) states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are: the physical distance from the project to the site; the sensitivities of the ecological receptors; and, the potential for in-combination effects. Adopting the precautionary principle, all SACs (Special Areas of Conservation) and SPA (Special Protection Areas) sites within a 10km radius of the Site have been identified.

Eleven Natura 2000 designated sites were identified within 10km of the Site (Table 4-1).

Table 4-1 Natura 2000 Designated Sites within 10km of the Site

Site Name	Code	Distance (km)	Direction
Special Areas of Conservation			
Cummeen Strand / Drumcliff Bay SAC	000627	Adjacent	N
Ballysadare Bay SAC	000622	6.6km	SW
Ben Bulben, Gleniff and Glenade Complex SAC	000623	6.7km	NE
Unshin River SAC	001898	7.4km	SW
Lough Gill SAC	001976	1.6km	SE
Union Wood SAC	000638	7.4km	SE
Special Areas of Protection			
Cummeen Strand SPA	004035	Adjacent	N
Drumcliff Bay SPA	004013	3.7km	NW
Ballysadare Bay SPA	004129	6.6km	SW
Sligo / Leitrim Uplands SPA	004187	6.7km	NE
Ballintemple and Ballygilgan SPA	004234	6.85km	NW

The boundaries of the Ballysadare Bay SAC, Ben Bulben, Gleniff and Glenade Complex SAC, Unshin River SAC, Lough Gill SAC, Union Wood SAC, Drumcliff Bay SPA, Ballysadare Bay SPA, Sligo / Leitrim Uplands SPA and Ballintemple and Ballygilgan SPA are located within the 10km radius of the Site boundary. However, given the nature and scale of the project, the lack of hydraulic connectivity (Refer to Figure 4-1) and the distance separating the sites, it is considered highly unlikely that these European Designated Sites or any of their qualifying features of interest could be affected by the project. These sites have therefore been screened out and will not be considered further as part of this assessment.

However, the Site is located directly adjacent to to both the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA, and therefore further consideration will be given to these sites to assess potential impacts resulting from the project.

Figure 4-1 Site Location and Natura 2000 Sites within 10km

4.1 Cummeen Strand / Drumcliff Bay SAC (Site Code 000627)

Cummeen Strand / Drumcliff Bay SAC is a coastal site and extends from Cullamore in the north-west to Killaspug in the south-west, and from Sligo City in the south-east to Drumcliff village in the northeast. It is comprised of two large, shallow bays, Drumcliff Bay and Sligo Harbour, and both Ardboline and Horse Island. Sand dunes and sand hills at Rosses Point, Killaspug, Yellow Strand and Coney Island are included, as are grasslands at Ballintemple and Ballygilgan (Lissadell), along with a variety of other habitats such as woodland, saltmarsh, sandy beaches, boulder beaches, shingle, fen, freshwater marshes, rocky sea cliffs and lakes.. The site is largely underlain by Carboniferous limestone, but acidic rocks are also found on the Rosses Point peninsula (NWPS, 2013).

Species rich habitats (Annex I of the EU Habitats Directive) including Estuaries, Tidal Mudflats and Sandflats, Embryonic Shifting Dunes, Marram Dunes, Fixed Dunes, Juniper Scrub, Orchid-rich Calcareous Grassland and Petrifying Springs can be found within this SAC.

This SAC is of considerable conservation significance for multiple reasons.

- Ornithological importance: Both Drumcliff Bay and Cummen Strand have been designated as SPA under the E.U. Birds Directive and supports wintering waterfowl along with important bird populations listed in Annex I of the E.U Birds Directive, including Golden Plover, Dunlin, Lapwing, Bar-Tailed Godwit, Oystercatcher and Ringed Plover; and,

- This SAC supports multiple species listed on Annex II of the E.U Habitats Directive, including Narrow-mouthed Whorl Snail, Sea and River Lamprey and Common (Harbour) Seal.

Table 4-2 Qualifying Annex I Habitats for Cummeen Strand / Drumcliff Bay SAC

Qualifying Habitats (*denotes Priority Habitat)	Code	Site Specific Conservation Objective
Estuaries	1130	Maintain favourable conservation condition
Mudflats and Sandflats not covered by seawater at low tide	1140	Maintain favourable conservation condition
Embryonic shifting dunes	2110	Maintain favourable conservation condition
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	2120	Restore favourable conservation condition
Fixed coastal dunes with herbaceous vegetation (grey dunes)	2130	Restore favourable conservation condition
Juniperus communis formations on heaths or calcareous grasslands	5130	Restore favourable conservation condition
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	6210	Maintain favourable conservation condition
Petrifying springs with tufa formation (*Cratoneurion)*	7220	Maintain favourable conservation condition

Table 4-3 Qualifying Annex II Species for the Cummeen Strand / Drumcliff Bay SAC

Qualifying Species	Species Name	Code	Site Specific Conservation Objective
Mammals listed on Annex II of the Habitats Directive	Harbour Seal *(Phoca vitulina)*	1365	Maintain favourable conservation condition
Molluscs listed on Annex II of the Habitats Directive	Narrow-mouthed Whorl Snail (*Vertigo angustior*)	1014	Maintain favourable conservation condition
Fish listed on Annex II of the Habitats Directive	Sea Lamprey (*Petromyzon marinus*)	1095	Restore favourable conservation condition
	River Lamprey (Lampetra fluviatilis)	1099	Maintain favourable conservation condition

4.2 Cummeen Strand SPA (Site Code 004035)

The Cummeen Strand SPA is a large shallow bay which extends from Sligo Bay westwards to Coney Island. It is one of three estuarine bays within Sligo Bay and is situated between Drumcliff Bay to the north and Ballysadare Bay to the south. The Garavogue River flows into the bay and forms a permanent channel.

At low tide, extensive sand and mud flats are exposed and support a diverse macro-invertebrate fauna which provide the main food supply for the wintering waterfowl. This includes Lugworm (*Arenicola marina*), Ragworm (*Hediste diversicolor*), and Cockles

(*Cerastoderma edule*). The estuarine and intertidal flat habitats are of conservation significance and are listed on Annex I of the E.U. Habitats Directive.

This SPA is of significant ornithological importance and the site supports wintering waterfowl along with internationally and nationally important bird populations listed in Annex I of the E.U Birds Directive including populations of Light-bellied Brent Goose, Golden Plover and Bar-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. This SPA is important as a component of the much larger Sligo Bay complex and is also a Ramsar Convention site (NPWS, 2013).

Table 4-4 Qualifying Annex I Species for the Cummeen Strand SPA

Common Name	Scientific name	Code	Season
Light-bellied Brent Goose	*Branta bernicla hrota*	A046	Wintering
Oystercatcher	*Haematopus ostralegus*	A130	Wintering
Redshank	*Tringa totanus*	A162	Wintering
Wetland and Waterbirds		A999	Wintering

5 STUDY RESULTS

5.1 Bird Survey

Desk Study

The desk study revealed records of all the target species occurring within 2km of the Site boundary.

Table 5-1 NBDC Target Species within 2km of the Site

Common Name	Date of last record	Designation
Light-bellied Brent Goose	31/12/2011	Wildlife Acts 1976 / 2000, EU Birds Directive Annex II, Section II Bird Species Birds of Conservation Concern Amber List
Oystercatcher	09/11/2016	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section II Bird Species Birds of Conservation Concern Amber List
Redshank	31/12/2011	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex I, Annex II Section II and Annex III and Section III Bird Species Birds of Conservation Concern Red List

The target bird species were not identified in the 2011 survey within the areas closest (within approximately 350m) to the Site (BES, 2012).

Vantage Point Survey Results

None of the target species were recorded within the area of the Sligo Harbour/Garavogue Estuary closest to the Site during the vantage point surveys.

Impacts on Birds

Species of birds for which the SPA is designated were not observed at the Site or within the immediate areas adjoining the Site during the survey. Large numbers of feeding birds were noted along the central channel and scattered on the open flats, most notably on the large expanses of intertidal sandflats towards Coney Island, located approximately 4km from the Site. It is therefore considered that there is potential for some temporary disturbance during the construction phase of the works and therefore further consideration will be given to potential impacts on the target species.

5.2 Marine Mammal Survey

Desk Study

Information obtained as part of the desk-top survey indicated the potential presence of Common (Harbour) Seal, which is a species for which the SAC is designated. It was therefore considered in order to comprehensively assess potential impacts on this species from the project that further site-specific surveys would be required.

Field survey

No seals were observed during the field surveys and no suitable haul out-areas were identified within close proximity to the Site during the survey.

Evaluation

The evaluation considers information about the characteristics of the species' population and its distribution, the availability of suitable habitats, and the findings of the field studies. This information has been interpreted using professional judgement in order to determine the potential value of the habitat for seal as a breeding/ resting site.

Common (Harbour) Seal Habitat Preference

Seals are predominantly found in coastal habitats such as harbours, sandy intertidal zones and estuaries and use rocks, reefs, and beach as haul out sites which they use for breeding, moulting, resting and engaging in social interaction.

Harbour seals commonly breed along the coast and inhabit its inshore and offshore waters and tend to select less remote locations such as inshore bays, coves and estuaries as haul-out sites. The breeding season typically runs from August to December and females give birth once a year during spring and summer, typically to a single pup, however multiple births are possible. Moulting occurs shortly after breeding (November to April), and is primarily spent onshore.

Harbour seals are carnivorous generalists and will forage in a variety of marine habitats. They have with a broad varied diet consisting of fish, shellfish, and crustaceans.

Habitat Suitability

The Site is considered unsuitable for the Common (Harbour) Seal. There was no evidence of seal activity at the Site or adjoining areas, and no suitable locations for haul-out areas in the vicinity of the Site. However, the wider estuary area provides suitable habitat for foraging seal along with a lower level of disturbance and greater potential for haul-out sites.

Impacts on Seal

The project will not require any works within the adjacent estuary bordering the Site. Furthermore, no haul-out sites were identified on or adjacent to the Site, and it is therefore considered unlikely that any impacts on seal will occur as a result of the project.

However, given that seals are likely to forage within the adjacent estuary, there is potential for this species to be temporarily disturbed during the construction phase of the works and therefore further consideration of potential impacts of on this species is required.

6 STAGE 1 SCREENING: IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS

6.1 Potential Impacts

Potential impacts, if any, on both the Cummeen Strand / Drumcliff Bay SAC and Cummeen Stand SPA are considered further in this section. A number of factors were examined at this stage and impacts dismissed due to the very low risk associated with them. Further details and rationale of the screening assessment undertaken for each of the qualifying interests of the Cummeen Strand / Drumcliff Bay SAC and Cummeen Stand SPA are presented in Tables 6-1, 6-2 and 6-3.

The designated habitats and/or species were accordingly screened in or out, based on whether it is concluded that they are likely to be affected by the project if no mitigation measures were applied. The rationale for these conclusions is, based on results from the aforementioned desk study and field survey.

Table 6-1 Screening Assessment: Annex 1 Habitats -Cummeen Strand/Drumcliff Bay SAC

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
Estuaries	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the Site, however the nearest habitat is located directly adjacent to the north of the Site, see Map 3 attached in Appendix D.	N/A	Given the absence of this habitat within the Site boundary and the small scale and nature of the works, it is considered highly unlikely that the works will have any significant negative impact on this habitat as a result of the project. No further assessment required.	**Screened out**
Mudflats and Sandflats not covered by seawater at low tide	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the Site, however the nearest habitat is located directly adjacent to the north of the Site, see Map 4 attached in Appendix D.	N/A	As Above.	**Screened out**
Embryonic shifting dunes	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the immediate vicinity of the Site. The nearest habitat is located approximately c.5.5km south-west of the Site, see Map 6 attached in Appendix D.	N/A	Given the absence of this habitat within the Site boundary and the distance separating the two sites along with the small scale and nature of the works, it is considered highly unlikely that the works will have any significant negative impact on this habitat from the project. No further assessment required.	**Screened out**
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the immediate vicinity of the Site. The nearest habitat is located approximately c.6.2km west of the Site, see Map 6 attached in Appendix D.	N/A	As Above.	**Screened out**

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
Fixed coastal dunes with herbaceous vegetation (grey dunes)	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the immediate vicinity of the Site. The nearest habitat is located approximately c.5.6km south-west of the Site, see Map 6 attached in Appendix D.	N/A	As Above.	**Screened out**
Juniperus communis formations on heaths or calcareous grasslands	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the immediate vicinity of the Site. The nearest habitat is located approximately c.4.45km north-west of the Site, see Map 7 attached in Appendix D.	N/A	As Above.	**Screened out**
Petrifying springs with tufa formation	The Conservation Objectives Report (NWPS, 2013) and the field survey show that this habitat is not present within the immediate vicinity of the Site. The nearest habitat is located approximately c.1.85km north-west of the Site, see Map 7 attached in Appendix D	N/A	As Above.	**Screened out**

Table 6-2 Screening Assessment: Annex 2 Species -Cummeen Strand/Drumcliff Bay SAC

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
Harbour Seal	The NWPS holds records for Harbour Seal within the Cummeen Strand / Drumcliff Bay SAC (NWPS, 2013), however, there are no recent records held by	Disturbance during construction works	It is considered highly unlikely that the project will have any impact on seal haul out sites or breeding success. However, there is potential (be it limited) for the construction works to cause disturbance to	**Screened In**

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
	NBDC for the species within a 2km boundary of the Site (NBDC, 2017). The Conservation Objectives Report (NWPS, 2013) and the field survey did not identify any suitable haul out sites on the Site. The Conservation Objectives Report identify the nearest breeding and resting sites as being located approximately c.5.25km and c.6.5km north-west of the Site respectively. Refer to Map 7 attached in Appendix D for details. It is considered likely that seal forage and travel up and down this section of the estuary.		seals foraging and utilising the area of the estuary within close proximity to the Site. Further assessment will be required in order to determine the potential significance of this disturbance.	
Narrow-mouthed Whorl Snail	The NWPS holds records for Narrow-mouthed Whorl Snail within the Cummeen Strand / Drumcliff Bay SAC (NWPS, 2013), however, there are no records held by NBDC for the species within a 2km boundary of the Site (NBDC, 2017). The nearest record of this species is located c.6.4km west of the Site (NWPS, see Map 7 attached in Appendix D). In the absence of confirmed / recent records, a precautionary approach has been adopted and presence has been assumed in all areas of suitable habitat.	Disturbance during construction works	Given the absence of this qualifying interest species from the SAC within a 2km boundary of the Site, no likely significant effects are considered during the project. Furthermore, given the absence of onsite habitats considered suitable for these species, and the small scale and nature of the works, it is considered highly unlikely that the works will have any significant negative impact on this species. No further assessment required	**Screened Out**
Sea Lamprey	The NBDC holds no records for Sea Lamprey within the Cummeen Strand / Drumcliff Bay SAC (NBDC, 2017). In the absence of confirmed / recent records, a precautionary approach has been adopted and	Pollution / release of suspended solids	This species of fish is very sensitive to water quality and any impacts on water quality could adversely impact this species. However, given the small scale and nature of the works, and the absence of this qualifying species within 2km boundary of the Site, it is considered highly unlikely that the works will have	**Screened out**

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
	presence has been assumed in all areas of suitable habitat.		any significant negative impact on this species during the project No further assessment required.	
River Lamprey	The NBDC holds no records for Sea Lamprey within the Cummeen Strand / Drumcliff Bay SAC (NBDC, 2017). In the absence of confirmed / recent records, a precautionary approach has been adopted and presence has been assumed in all areas of suitable habitat	Pollution / release of suspended solids	As Above	**Screened out**

Table 6-3 Screening Assessment: Cummeen Strand SPA (Site Code 004035)

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
Light-bellied Brent Goose	The National Biodiversity Data Centre (NBDC) holds no records for the Light-bellied Brent Goose within the River Cummeen Strand SPA close to the Site. Recent records (2011) for this species exist within a 2km boundary of the Site (NBDC, 2017). This species was not recorded during the bird survey conducted in 2017. However, NBDC and I-webs both have records for this species within the estuary, A precautionary approach has been adopted and presence of this wintering bird has been assumed in all areas of suitable habitat.	Disturbance during construction works	This bird species is known to occur within the area and utilise the estuary for foraging and shelter. However, it is unlikely that the habitats within the Site boundary are of significant important for this species in terms of nesting and foraging. Nonetheless, considering that this species is known to occur within the estuary and the close proximity of the Cummeen Strand SPA, there is potential for the species to be adversely impacted by the localised disturbance caused during the construction phase of the project; albeit temporarily. It is considered that, in the absence of adequate mitigation measures, this species may be temporarily displaced during the construction phase of the works. Further assessment will be required in order to determine the potential significance of this disturbance.	**Screened In**
Oystercatcher	The National Biodiversity Data Centre (NBDC) holds several records for the Oystercatcher within the Cummeen Strand SPA close to the Site. Recent records (2016) for this species exist within a 2km boundary of the Site (NBDC, 2017). This species was not recorded within areas close to the Site during the bird survey conducted in 2017. It was however noted feeding within the estuary.	Disturbance during construction works	As Above	**Screened In**
Redshank	The National Biodiversity Data Centre (NBDC) holds several records for Redshank within the	Disturbance during	As Above	**Screened in**

Qualifying Feature of Interest	Baseline	Potential Impacts	Screening Rationale	Screening Conclusion
	Cummeen Strand SPA close to the Site. Recent records (2011) for this species exist within a 2km boundary of the Site (NBDC, 2017). This species was not recorded within areas close to the Site during the bird survey conducted in 2017. It was however noted feeding within the estuary.	construction works		
Wetlands & Waterbirds	Wetland habitats suitable for waterbirds are present directly adjacent to the Site.	Disturbance during construction works	Furthermore, there is potential for waterbird species to be adversely impacted by the localised disturbance caused during the construction phase of the project; albeit temporarily. It is considered that, in the absence of adequate mitigation measures, this species may be temporarily displaced during the construction phase of the works. Further assessment will be required in order to determine the potential significance of this disturbance.	**Screened in**

6.2 Habitat Loss and Disturbance

The project is not located within a Natura 2000 site, thus development works will be entirely outside the SAC and SPA boundaries. It comprises semi-improved agricultural grassland (GS1), scrub / transitional woodland (WS) and areas of hardstanding (BL3) - none of these are comparable to habitats of European importance (Annex I of the EU Habitats Directive), nor are they habitats for which the Natura 2000 sites have been designated.

It is considered that based on the nature of the works the project will not result in any direct or indirect loss or disturbance to any of the habitats for which the SAC is designated (listed in Table4-2).

6.3 Screening Conclusion

Of the qualifying species of interest for both the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA, the following species have been brought forward for consideration due to potential impacts on these species resulting from disturbance; Harbour Seal, Light-Bellied Brent Goose, Oystercatcher, Redshank and wetland birds.

7 STAGE 2 APPROPRIATE ASSESSMENT: ASSESSMENT OF POTENTIAL IMPACTS

The conclusion of the screening exercise was that in the absence of adequate mitigation during the construction stage, the project has the potential to impact on both Annex I and Annex II species for which the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA are designated. In this context, the following potential impacts on the qualifying interests of the Natura 2000 site were identified in the absence of adequate mitigation:

- Potential impairment of water quality during the construction works;
- Disturbance to common seal;
- Disturbance to birds during construction works; and,
- Potential spread of invasive species (i.e. Japanese Knotweed).

7.1 Potential Impairment of Water Quality During Construction Works

Should run-off of potential pollutants from the project reach the surface water or groundwater and flow into the adjoining Garavogue Estuary, this could adversely affect the water quality within the waterbodies and subsequently impact both protected habitats and species within the protected Natura 2000 site. Potential pollutants resulting from the construction works could include raw or uncured concrete and grouts, fuels, lubricants and hydraulic fluids for equipment used during the site works, suspended solids and / or diesel leaks or spills. In addition, waste material may also be encountered during the ground works. If allowed to enter watercourses, any of these materials would have deleterious effects on fish, plants and invertebrates. In addition, any impacts on fish populations could potential adversely impact predatory species feeding on fish within the Garavogue Estuary.

Although the Site is directly adjacent to the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA, it is considered that the proposed project will not give rise to any significant impacts on any of the qualifying species or habitats of interest for the SAC / SPA during the site works. This assumption is based on the localised and small-scale nature of the project, construction methodology and the setback distance of 5m from the Garavogue Estuary and works areas of the Virtual Curtain and landscape areas. Furthermore, there will be no direct discharges to receiving waters of the Garavogue Estuary and mitigation measures will be implemented to provide protection of the watercourse from suspended solids and other potential contaminants. In addition, all works will be undertaken in accordance with all recognised best practice guidelines as outlined in Section 7.2 below.

Furthermore, there will be no significant change to the surface water and groundwater flow regime at the Site following implementation of the project. It is, therefore, considered there will be no adverse impacts on the water quality of the watercourses in close vicinity to the Site or the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SAC as result of the operation of the project.

It can therefore be concluded that the restoration works and operational activity at the Site will not have any impact on either the surface water or groundwater quality within the Garavogue Estuary adjacent to the Site.

7.2 General Mitigation and Best Practice Measures

A site-specific CEMP incorporating method statements will be implemented for the site works taking cognisance of key guidance including 'Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors' (CIRIA, 2001). The ECoW will inspect the Site in advance of works commencing and supervise all works as required to ensure that they are completed in line with the mitigation measures stipulated within the CEMP.

The following specific potential impacts will be dealt with as follows to ensure that there will be no significant impacts on water quality and interdependent ecological receptors;

7.2.1 Reduction and Prevention of Impairment of Water Quality

All construction works within close proximity to the Estuary will be planned and executed to prevent the risk of negative impacts on the water quality from suspended solids and contaminant pollution. Nevertheless, measures will be put in place to ensure that suspended solids and contaminant pollution in any runoff into the Garavogue Estuary from the works area, or any other land based source will be kept to minimum. These measures will include the following:

- Existing vegetation will be retained where possible;
- Within the works area, the ground stripped of existing cover / vegetation will be kept to the absolute minimum required for the works;
- Eroded sediments will be retained onsite with erosion and sediment control structures such as sediment traps and silt fences if required;
- Run-off will be diverted away from stripped areas;
- Temporary fills or stockpiled material located in close proximity to the Garavogue Estuary will be covered to prevent run-off entering the watercourse;
- The existing haul road on Site will be used, which will help prevent erosion of fines and / or rutting by Site traffic;
- A 5m exclusion zone will be established along the Garavogue Estuary to eliminate non-essential plant and personnel from encroaching on the coastline;
- Fuels, lubricants and hydraulic fluids for equipment used in the Site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice (Enterprise Ireland BPGCS005);
- Appropriate spill control equipment, including oil booms and oil soakage pads, will be kept within the Site / vehicles to deal with any accidental spillage;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the Site and disposed of in accordance with all relevant waste management legislation;
- No vehicle or equipment maintenance work will take place within the Site;
- Prior to works commencing within close proximity to the Garavogue Estuary, all equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;
- Measures will be implemented to minimise waste and ensure correct handling storage and disposal of waste; and,
- Emergency response procedures will be put in place.

All concrete works will be in line with one of the following mitigation measures;

- Hydrophilic grout and quick-setting mixes or rapid hardener additives will be used, to promote the early set of concrete located near the estuary.

7.2.2 Construction Phase Monitoring

Ecological monitoring will be undertaken during the construction phase to ensure that there are no impacts on water quality or features of ecological interest.

7.3 Disturbance to Common Seal

There is potential for seals to enter / forage within the section of the estuary directly adjacent to the Site and therefore potentially seals may be affected in the short term during the construction works. However, the marine mammal survey did not identify any suitable habitat or evidence of Common (Harbour) Seal activity within close proximity to the Site. The survey also did not identify any suitable haul out areas onsite or within close proximity to the Site. Furthermore, the conservation objectives for the Cummeen Strand / Drumcliff Bay SAC (NWPS, 2013) does not identify any breeding or haul out sites for common seal within Sligo Harbour/Garavogue Estuary. The document does however identify a number of breeding and resting sites located within Drumcliff Bay with the nearest suitable breeding and resting sites located 5.25km and 6.5km north west of the Site (respectively) (Refer to Appendix D, Map 8). Drumcliff Bay is however at its nearest point over 3.65km away from the Site is separated, and therefore well screened from the Site. In addition, the NBDC (NBDC, 2017) does not hold any records of seal within this area.

It was also noted during the surveys that there is an elevated ambient noise level within the area associated with the industrial units and road from within the surrounding area. It is therefore considered that any species including the common seal that would be potentially active within this area will be somewhat habituated to increased ambient noise levels resulting from existing human related activities within the area.

Nonetheless, to avoid any disturbance on common seal potentially active close to the Site before any noisy works (e.g. vibro-insertion) commence the area of the Garavogue Estuary closest to the Site will be checked for the presence of seals. In the unlikely event that any seals are identified, in accordance with best practice, the noisy works will be gradually ramped up to encourage any seals away. Therefore, any short term localised disturbance will not result in any significant or long terms impacts on any nearby seals.

7.4 Disturbance to Birds during Construction Works

Given the proximity of the Site in relation to the Cummeen Strand SPA there is potential for the construction works to result in small-scale temporary displacement of birds potentially using the area of the SPA within close proximity to the Site. However, it is not considered likely that any sort term temporary displacement of these birds would result in any significant impacts in terms of survival or reproductive success. This is based on the availability of both similar habitat and large expanses of mudflats and suitable feeding areas within the Harbour and the absence of a suitable breeding habitat within the areas closest to the Site.

Furthermore, both the bird surveys undertaken in 2011 and 2017 did not identify any of the target bird species using the Site or adjoining areas of Sligo Harbour/Garavogue Estuary. Large numbers of wading birds were noted feeding along the central channel and scattered on the open flats, most notably on the large expanses of intertidal sandflats towards Coney Island.

In addition, as noted above, the area is subject to elevated ambient noise levels as a result of existing human related activities. It is therefore considered that species actively using the area close to the Site will have become somewhat habituated to the elevated noise levels from human activity within the area.

However, the following precautionary mitigation measures will be employed to protect breeding birds, these include:

- An inspection for any target species will be undertaken in advance of site works commencing;
- Construction works will be limited to daylight hours in the vicinity to further reduce any disturbance to bird species within the area and allow species to forage at dawn, dusk and during the night; and,
- The works are scheduled to be undertaken in the latter part of 2017 and therefore any required tree and scrub clearance will take place outside of the nesting bird season, typically considered to be between the 1st March to 31st August (weather dependant). Regardless the areas of vegetation to be cleared will be checked by the ECoW for the presence of nesting birds.

It can therefore be concluded that the project will not have any significant impact on the species of birds for which the SPA is designated.

7.5 Potential spread of Japanese Knotweed Spread of invasive species

The invasive species Japanese Knotweed was recorded within the Site during the surveys (See Figure 7-1).

Should either the project works result in the spread of Japanese Knotweed into either the SAC or SPA, not only would this constitute a breach of wildlife legislation relation in relation to invasive species, but it could cause significant damage to the designated habitats. It should be noted that the saline conditions within the harbour will act to limit the spread of this species to some degree, however tidal movements and the activity of birds building nests both have the ability to cause further spread of this species.

The main impact in terms of Japanese Knotweed in relation to the designated habitats would be in terms of out-competing native plant communities, thereby resulting in the development of large single species stand of Japanese Knotweed and resulting in a reduction in local plant biodiversity. This would also result in a negative impact on the biodiversity of the fauna using these areas.

In addition, Japanese Knotweed can also cause damage to buildings, hard surfaces and infrastructure by growing through concrete, tarmac and other hard surfaces.

Figure 7-1 Japanese Knotweed Distribution Map

7.5.1 Measure to prevent the spread of Japanese Knotweed

In order to mitigate and prevent any further spread of Japanese Knotweed on site, a Japanese Knotweed Control Programme will be implemented in order to control the stands of Japanese Knotweed on the Site.

As part of the Japanese Knotweed Control Programme appropriate best practice measures will be implemented to prevent the spread during all works, which include the following;

- All works will be conducted according to NRA Guideline 'The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' *(NRA, 2010)*;
- The contractor(s) will provide details of the extent of the works area and prior to commencement. All works areas, site compounds and access routes will be sited a minimum of 7m away from any identified Japanese Knotweed stand, and all areas will be re-surveyed to ensure that no new stands have become established. If found, additional appropriate mitigation strategies will need to be devised and implemented;
- All stands of Japanese Knotweed within areas that can be impacted by the works will be cleared demarcated, including a 7m buffer zone;
- No works will take place in areas where Japanese Knotweed is present, all areas within 7m of visible above ground growth will be avoided and clearly demarcated;
- If work is required in areas infested with Japanese Knotweed (including any area within 7m if visible, above ground growth) an appropriate Japanese Knotweed Mitigation Strategy will need to be devised and implemented to prevent spread;
- All vehicles, machinery and any other equipment that may be used for the works will be washed using high-pressure steam cleaning with water >40 degrees Celsius, in

advance of being used on the Site. If it is not possible to steam clean the equipment, a normal power hose will be used. Before machinery or equipment is unloaded at the Site equipment will be visually inspected to ensure that all adherent material and debris has been removed. Any vehicles and machinery that are not clean will be sent off-site for cleaning;

- No plant or machinery will be tracked within 7m of areas containing Japanese Knotweed and all vehicles leaving the Site will be cleaned thoroughly at a designated location and a visual inspection of the vehicle should also be carried out; and,
- In advance of works, all site personnel will receive a toolbox talk which will include reference to mitigation measures in relation to invasive species, including Japanese Knotweed.

7.6 Analysis of 'In-Combination' Effects

The Habitats Directive requires that due consideration needs to be given to any plan or project which is likely to have a significant effect alone or in combination with other plans and projects. As described above, the project alone is unlikely to have any direct or indirect significant effects on the Natura 2000 sites.

Due to the large size of both the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA, there are numerous projects and activities which have the potential to affect the conservation interests of both sites, most notably the Sligo WWTP to the north of the Site.

However, taking the above into account, and considering the size and nature of the project at the Site, and the mitigation measures which will be implemented, it is concluded that there will not be any significant in-combination contribution by the project to possible adverse effects on the interests of either the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA.

8 CONCLUSIONS

A detailed assessment of the layout and nature of the project, the methods to be employed and the overall activities that will occur at the Site has been carried out and the potential for impacts on Natura 2000 European sites and qualifying features of interest within a 10km radius of the Site has been examined in detail.

Of the eleven Natura 2000 sites identified within a 10km radius, Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA were identified to require further detailed consideration due to their proximity to the Site.

It is considered reasonable to conclude that the project will not result in any significant impacts on the SAC or SPA on the basis that the Site currently provides limited opportunities for protected or notable species and that best practice measures will be implemented. Specifically, the construction works will be undertaken to avoid the potential for water pollution and will ensure that there will be no significant impact on the Annex I or II species for which these sites are designated. Furthermore, the project provides a number of opportunities for biodiversity enhancement including the enhancement of existing vegetated areas and with additional planting within Site boundaries.

In terms of significance with regard to impacts on Natura 2000 sites, the NPWS Guidance (2009) uses an EC definition as follows:

> *"Any element of a plan or project that has the potential to affect the conservation objectives of a Natura 2000 Site, including its structure and function, should be considered significant (EC, 2006)".*

It can be concluded that the project, alone or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of the Cummeen Strand / Drumcliff Bay SAC and Cummeen Strand SPA.

Accordingly, progression to Stage 3 of the Appropriate Assessment process (i.e. Assessment of Alternatives Solutions) is not required for this project.

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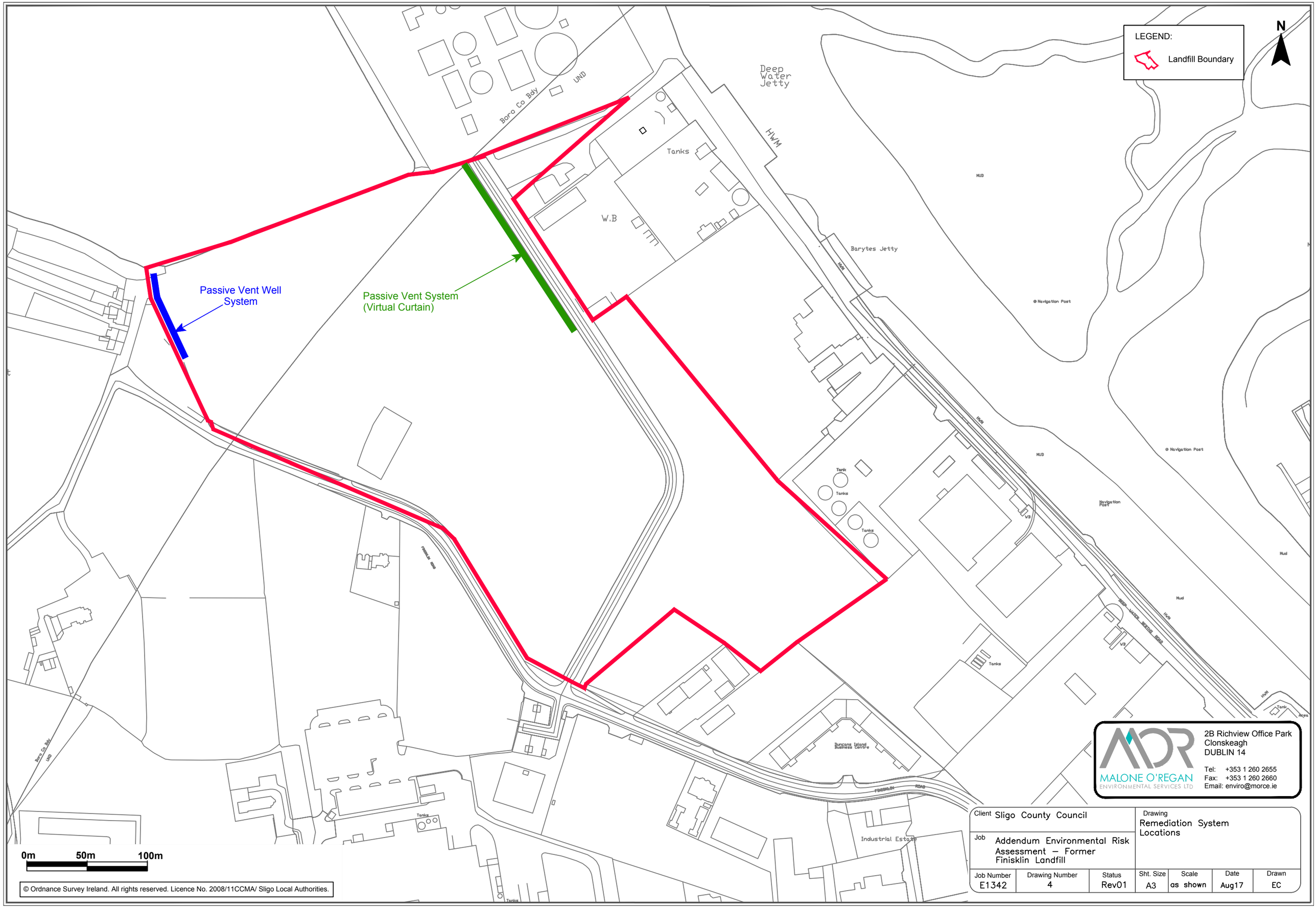
APPENDIX A



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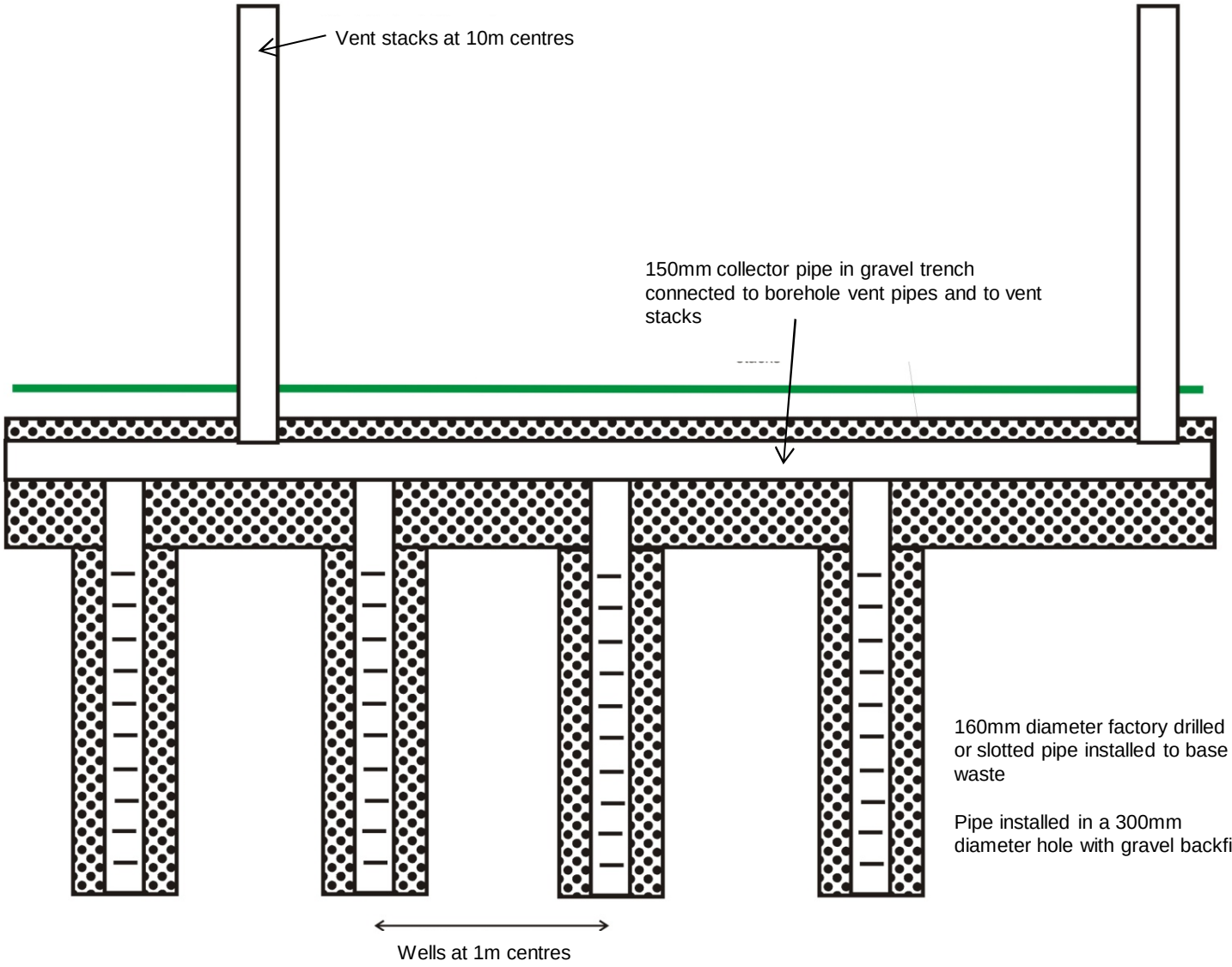
Client: Sligo County Council			Drawing: Remediation System Locations			
Job: Addendum Environmental Risk Assessment – Former Finisklin Landfill						
Job Number	Drawing Number	Status	Sht. Size	Scale	Date	Drawn
E1342	4	Rev01	A3	as shown	Aug17	EC

APPENDIX B



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Client: Sligo County Council			Drawing: Schematic of Passive Vent Well System			
Job: Former Finisklin Landfill Certificate of Authorisation Application Addendum						
Job Number: E0861	Drawing Number: 5	Status: Final	Sht. Size: A4	Scale: NTS	Date: May 12	Drawn: JA

APPENDIX C

Landscape Design Rationale

VAT No. 9555975 V

Ref : Landscape Layout Proposals / Recommendations for former landfill site at Finisklin, Sligo.

July 25th, 2017.

Please find attached rationale, design considerations and factors in relation to the landscape proposals for the proposed amenity area at Finisklin former Landfill, Sligo.

Please read in conjunction with attached Landscape Masterplan(Drawing 17/MOR/FL/001)

Objectives :

The principal objectives of the landscape proposals are :

- To create a layout which provides a visually and aesthetically pleasing context for exploration of the existing regenerating vegetation, which creates a distinct character and maximizes views to the adjacent seascape and distant scenic landscape.

- To provide a low key natural and contextual area which maximizes the existing stands of rejuvenating Willow and Gorse scrub to best effect in conjunction with existing on-site features such as a natural wetland / pool area and extensive wildflower grassland areas.

- To optimize the subtle nature of the circulation route and resting nodes to emphasize pleasant views from the site and to ensure that negative views where possible are visually softened and integrated into pleasant surrounds.

The aim is that the landscape layout will add to and positively reinforce the naturalized character of the lands.

Design Ethos and Educational Aspects

This design style is based on a sensitive enhancement of the site, using a controlled spatial arrangement, and a visual sequence of directing focus and attention within the area. This visually entices focus into the central wildflower grassland area and to the sea and mountain views after progressing through contrasting areas of semi enclosed Willow scrub upon entering the amenity area. Spatial differentiation and view-point direction is achieved though the use of focal point nodes for punctuation within the design and the creation of clearly defined circulation routes offering a sequence of views to the best of the sites natural attributes.

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Educational aspects form a key part of the proposal. Based on the re-use of the landfill for amenity purposes interpretive signage will highlight points of interest based on local natural amenity, ecology and the scenic setting.

Interpretive signage will be located at points and views of interest throughout the area and will be based on flora and fauna such as : Fauna -Common frog, Common Sea, Grey Mullet, Birds - Light-bellied Brent Goose, Oystercatcher, Redshank, Greenshank, Curlew, Wigeon, Snipe, Shelduck, Heron, Knot, Dunlin, Bar-tailed Godwit, Flora- Bulrush, Common orchid, Flag Iris, Soft rush, Gorse, Goat willow, Red clover, White clover, Silver weed, Ragwort.

Other educational proposals include developing habitat piles (hibernacular) to be built from the cleared Willow. The pond in the northern area will be enhanced with the installation clay and a small berm, and will be used to re-house any fauna from other wet areas of the remainder of the site if developed.

The key elements in the attached plan are :

- The objective is to superimpose a low key footpath network with considered key nodes which allow for exploration and appreciation of the scenic landscape and the expanse of regenerating native and naturalized vegetation.

- The intention is to form a considered network of defined circulation routes which harmonise with the existing regenerating landscape and which offers the user a sequence of landscape experiences as they progress through the site.

- Key nodes form focal point resting and viewing areas. These have been strategically placed based on a considered review and analysis of the site (see analysis insert attached)

- The resting nodes act as key pivot points offset from the circulation pathway within the natural open area, each offering a distinct focus and offering key views to the distant landscape and the bay.

- The existing regenerating vegetation is retained throughout the site. The mid sized randomly distributed clusters of Ulex and juvenile Salix scrub provide partial spatial definition and aids in the creation of a sequence of exploratory experiences throughout the site.

- Existing retained stands of Salix (Willow) provide vertical punctuation within the space. The irregular nature of the space creates interest coupled with the gradation in topography, gradually leads visitors along the footpath network to the north western corner of the site for key waterscape views.

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- A designated entrance space is proposed to link with a continuation of the southern boundary roadside footpath. Budget depending, this recessed entrance zone is proposed to be framed by a circular stone wall and stone pier features. Incorporated into the space is an interpretive guide / sign together with a possible themed flagpole to highlight the entrance area.

- Upon entering the site from the public road, the initial area which the proposed pathway passes through is currently overgrown with dense Willow. It is proposed to clear of Willow / scrub in a meandering area offset 10 meters each side of the pathway to aid enticement, movement and direction into the open amenity area. Its is proposed that scrub establishment will be minimized in this are by future ongoing management resulting in a lower level vegetated approach.

- It is proposed to surface the footpaths in a low key hoggin or water bound macadam surface. Based on a mixtures of grit and fines, this self compacting surface will be unobtrusive on the landscape and will provide a suitable surface for pedestrians, children's buggies etc..

- As part of the ongoing implementation of the works and subsequent management, a knotweed control programme will be implemented in order to control the stands of knotweed on the site at locations identified during previous ecological studies. Precise footpath locations to be modified on site, following on-site verification of knotweed locations on the ground.

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Finisklin Amenity Area

Outline recommendation for footpath surfaces :

Footpaths to consist of a self binding gravel finish.

Footpath network to follow routes as outlined on attached plan. Footpaths to be generally 2.0 metres wide.

Excavate to min 200mm depth to achieve gently graded pathways (excavations will be deeper in places to facilitate gentle gradations)

Import and fill with 100mm clause 804 hardcore. Compact and grade to falls.

Surface with self binding gravel layer which is suitable for many leisure uses such as urban or rural walkways, canal towpaths, cycle ways, bridle paths, golf pathways etc..

It is recommended that the self binding gravel is laid at a finished compacted thickness of 35-40mm. The approximate coverage is 10m2 per tonne.

The pathways will be slightly sunken (50mm) in relation to surrounding ground levels, thereby creating a slight sloping side which will frame and provide definition for the pathway edges. Create gentle falls with existing topography to allow for water runoff with exit points to adjacent lower level ground at 3-5 metre intervals

Self binding natural material quarried from selected limestone and graded approximately 6mm to fines; the fines content being naturally occurring marl which acts as the self setting agent when the material is watered and rolled to fullest compaction in the manner described below.

The Type 1 Sub Base should be laid and rolled to a flat finish with a roller of suitable weight, i.e. minimum 1.5 tonnes. On smaller areas a pedestrian roller may be used, however it is vital that the self binding gravel is rolled sufficiently to achieve fullest compaction prior to water rolling.

The material should be spread onto the prepared foundation using a flat board or the back of a rake. Do not use the prongs of a rake as this may pull the coarse components of the gravel up to the surface. Spread the material out to a depth of no more than 60mm in order to achieve a finished compacted thickness of 40mm.

The surface must then be rolled using a roller of similar type to that used for compacting the foundation with the vibratory action of the roller switched on and the area should be continually rolled until fullest compaction is achieved. It is imperative that the material is laid to a cross fall or camber in order to shed surface water. To give some indication, an adequate fall on a pathway would be 1-55 to 1-60.

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Once a uniform appearance has been achieved the second stage can be undertaken. This is the water rolling of the material for which the vibratory action of the roller must be switched off. By using a water roller, water is automatically sprayed onto the drum of the roller. The fundamental aim is to have a film of water covering the whole surface The object of water rolling this material is to float sufficient fines to the top surface to obtain a well-bonded finish.

If there are any lines or grooves in the gravel left by the weight of the roller, a soft wide broom can be used to gently pass over the surface whilst still wet – this will remove any lines and leave a perfect surface finish.

The area should then be allowed to dry out before being opened up to general use, the length of time to allow is dependant on weather conditions.

Long continuous fall over sloping ground can be minimised by the formation of 3 no railway sleeper steps at intervals where water is diverted to the side to reduce the risk of ruts occurring through the action of flowing storm water. It is envisaged this work will be carried out in Phase 2 when the required locations can be more accurately pinpointed.

On completion, the appearance of self binding gravel is a very smooth and even finish but over time with weathering and trafficking the surface will scarify, giving a loose dressing of chippings on the surface whilst maintaining a solid base.

All disturbed areas adjacent to footpath construction to be reinstated, graded, stone raked and seeded with No 2 lawn seed.

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Amenity Area Layout

Landscape recommendations in relation to Amenity area at Finisklin, Sligo.

Landscape Proposals for enhancement and usage of designated amenity area on former landfill site.

Landscape Rationale

The principal elements in the Proposals are :

- The objective is to superimpose a low key footpath network with considered key nodes which allow for exploration and appreciation of the scenic landscape and the expanse of regenerating native and naturalized vegetation.
- The intention is to form a considered network of defined circulation routes which harmonise with the existing regenerating landscape and which offers the user a sequence of landscape experiences as they progress through the site.
- Educational aspects form a key part of the proposal. Based on the re-use of the landfill for amenity purposes interpretive signage will highlight points of interest based on local natural amenity, ecology and the scenic setting.
- Key nodes form focal point resting and viewing areas. These have been strategically placed based on a considered review and analysis of the site (see analysis insert attached)
- The resting nodes act as key pivot points offset from the circulation pathway within the natural open area, each offering a distinct focus and offering key views to the distant landscape and the bay.
- The existing regenerating vegetation is retained throughout the site. The mid sized randomly distributed clusters of Ulex and juvenile Salix scrub provide partial spatial definition and aids in the creation of a sequence of exploratory experiences throughout the site.
- Other educational proposals include developing habitat piles (hibernacular) to be built from the cleared Willow. The pond in the northern area will be enhanced with the installation clay and a small berm, and will be used to rehouse any fauna from other wet areas of the remainder of the site if developed.
- Existing retained stands of Salix (Willow) provide vertical punctuation within the space. The irregular nature of the space creates interest coupled with the gradation in topography, gradually leads visitors to the north western corner of the site for key waterscape views.
- A designated entrance space is proposed to link with a continuation of the southern boundary roadside footpath. Budget depending, this recessed entrance zone is proposed to be framed by a circular stone wall and stone pier features. Incorporated into the space is an interpretive guide / sign together with a possible themed flagpole to highlight the entrance area.
- Upon entering the site from the public road, the initial area which the proposed pathway passes through is currently overgrown with dense Willow. It is proposed to clear of Willow / scrub in a meandering area offset 10 meters each side of the pathway to aid enticement, movement and direction into the open amenity area. Its is proposed that scrub establishment will be minimized in this are by future ongoing management resulting in a lower level vegetated approach.

Note :

Knotweed eradication programme to be implemented in advance and in tandem with proposed works.
Precise footpath routes subject to on-site modification following on-site verification of knotweed locations on the ground

Suggested Elements :

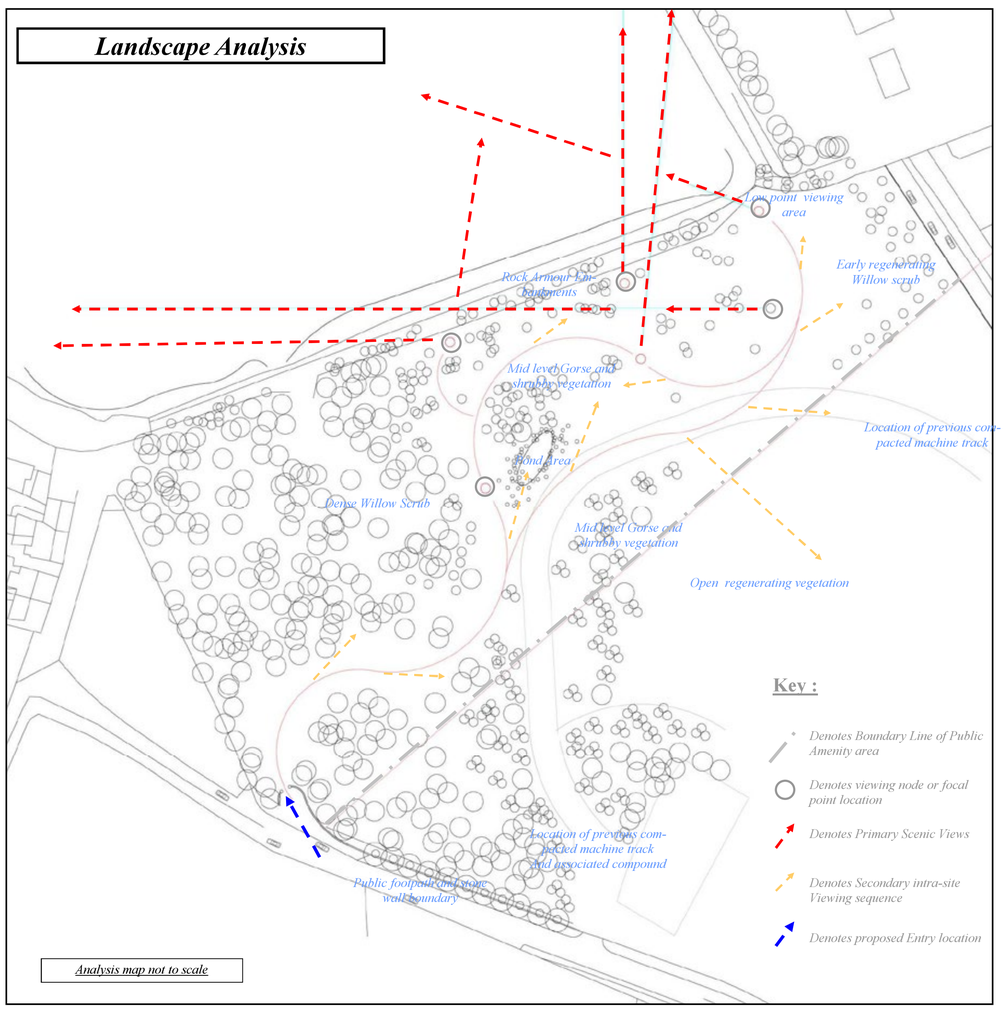
Habitat Piles created from cleared Willow

Low key interpretative signage strategically placed at locations shown

Local stone informal wall seating area each Node

Hoggin / 10mm to dust water bound macadam pathways

Landscape Analysis



Analysis map not to scale

Area for proposed extension to existing public footpath to new entry point to amenity area

Optional continuation of stone wall and pathway. Stone wall to form curved entrance / reception space

Existing track way outside of amenity area boundary. Proposed buffering with transplanted Willows at upper end to minimise views

View to industrial building swill be visually softened over time as juvenile Willow scrub matures

Selected Ulex and Willow scrub cleared from upper level rock armour area to facilitate key views

Key view to scenic bay from Node C.

Existing wildflower areas allowed to progress and develop unhindered.

Open view to establishing grassland / wildflower area and distant scenic views incorporated to best effect within amenity area layout

Key view to scenic bay from Node D. Selected Ulex Mid level Ulex scrub vegetation retained to create spatial definition through pathway network.

Key scenic view from area on higher level ground in the vicinity of Node F

Existing pond / wetland area retained within the site and used as a focal point at pathway divide. Associated interpretive signage to explain pond ecology

Selected view to northwest captured from mid level Node B

Scale 1 : 500 @A0

Drawing No: 17/MOR/FL/001/Rev A

Landscape Recommendations in relation to Finisklin Landfill Amenity Area
July 2017

Suggested Styles for Viewing / Resting Nodes.

Locally contextual natural stone finishes

Budget Dependent

Design by Anthony Ryan, B. Agr. Sc. L.Hort. M.L.A

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APPENDIX D

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC 000627

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta

Department of
Arts, Heritage and the Gaeltacht

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Citation:

NPWS (2013) Conservation Objectives: Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC 000627. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

000627	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC
1014	Marsh Snail *Vertigo angustior*
1095	Sea Lamprey *Petromyzon marinus*
1099	River Lamprey *Lampetra fluviatilis*
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1365	Harbour seal *Phoca vitulina*
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*
5130	*Juniperus communis* formations on heaths or calcareous grasslands
7220	Petrifying springs with tufa formation (Cratoneurion)*

Please note that this SAC overlaps with Drumcliff Bay SPA (004013), Cummeen Strand SPA (004035), Ardboline Island and Horse Island SPA (004135) and Ballintemple and Ballygilgan SPA (004234). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping sites as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1990
Title :	1989 survey of breeding herds of common seal (*Phoca vitulina*) with reference to previous surveys
Author :	Harrington, R.
Series :	Unpublished report to Wildlife Service
Year :	2004
Title :	Summary of National Parks & Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003
Author :	Lyons, D.O.
Series :	Irish Wildlife Manual No. 13
Year :	2007
Title :	A Survey of Intertidal Mudflats and Sandflats in Ireland
Author :	Aquatic Services Unit
Series :	Unpublished report to NPWS
Year :	2009
Title :	Coastal Monitoring Project 2004-2006
Author :	Ryle, T.; Murray, A.; Connolly, C.; Swann, M.
Series :	Unpublished report to NPWS
Year :	2011
Title :	Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland
Author :	Moorkens, E.A.; Killeen, I.J.
Series :	Irish Wildlife Manual No. 55
Year :	2012
Title :	The Conservation Status of Juniper Formations in Ireland
Author :	Cooper, F.; Stone, R.E.; McEvoy, P.; Wilkins, T.; Reid, N.
Series :	Irish Wildlife Manual No. 63
Year :	2013
Title :	Conservation status assessment for petrifying springs
Author :	Lyons, M.D.; Kelly, D.L.
Series :	Unpublished report to NPWS
Year :	2013
Title :	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (site code 627) Conservation objectives supporting document- coastal habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2013
Title :	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (site code 627) Conservation objectives supporting document- marine habitats and species V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1980
Title :	An assessment of the status of the common seal (*Phoca vitulina vitulina*) in Ireland
Author :	Summers, C.F.; Warner, P.J.; Nairn, R.G.W.; Curry, M.G.; Flynn, J.
Series :	Biological Conservation 17: 115-123
Year :	1983
Title :	An assessment of the breeding populations of common seals (*Phoca vitulina vitulina* L.) in the Republic of Ireland during 1979
Author :	Warner, P.J.
Series :	Irish Naturalists' Journal 21: 24-26
Year :	2007
Title :	Interpretation manual of European Union habitats- EUR 27
Author :	DG Environment- European Commission
Series :	Published reference document
Year :	2008
Title :	The phytosociology and conservation value of Irish sand dunes
Author :	Gaynor, K.
Series :	Unpublished PhD thesis, National University of Ireland, Dublin
Year :	2011
Title :	Subtidal benthic investigations: Cummeen Strand/Drumcliff Bay cSAC (site code IE000627) Co. Sligo
Author :	Aquafact
Series :	Unpublished report to the Marine Institute and NPWS
Year :	2012
Title :	A survey of mudflats and sandflats in Ireland
Author :	Aquatic Services Unit
Series :	Unpublished report to the Marine Institute and NPWS

Spatial data sources

Year :	2010
Title :	EPA WFD transitional waterbody data
GIS Operations :	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1130 (map 3)
Year :	Interpolated 2013
Title :	Intertidal surveys, 2007 and 2010; subtidal survey, 2010
GIS Operations :	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
Used For :	1140, marine community types (maps 4 and 5)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
Used For :	Marine community types base data (map 5)
Year :	2009
Title :	Coastal Monitoring Project 2004-2006. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
Used For :	2110, 2120, 2130 (map 6)
Year :	Derived 2013
Title :	Internal NPWS files
GIS Operations :	Dataset created from spatial reference contained in files
Used For :	7220 (map 7)
Year :	2012
Title :	The conservation status of juniper formations in Ireland
GIS Operations :	Juniper survey centroids clipped to SAC boundary
Used For :	5130 (map 7)
Year :	2013
Title :	NPWS rare and threatened species database
GIS Operations :	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
Used For :	1014, 1365 (maps 7 and 8)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1365 (map 8)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 1258ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community and the Mytilidae-dominated community complex, subject to natural processes. See map 5	Based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012) and subtidal survey in 2010 (Aquafact, 2011). See marine supporting document for further information
Community structure: *Zostera* density	Shoots/m²	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	Estimated during intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012). See marine supporting document for further details
Community structure: *Mytilus edulis* density	Individuals/m²	Conserve the high quality of the Mytilidae-dominated community complex, subject to natural processes	Estimated during intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012) and subtidal survey in 2010 (Aquafact, 2011). See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal fine sand with *Peringia ulvae* and *Pygospio elegans* community complex; Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex; Fine sand with *Angulus* spp. and *Nephtys* spp. community complex; Sand to mixed sediment with amphipods community; Intertidal reef community. See map 5	Based on intertidal and subtidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012; Aquafact, 2011) and an intertidal walkover undertaken in 2013. See marine supporting document for further information

1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated using OSi data as 2288ha
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community and the Mytilidae-dominated community complex, subject to natural processes. See map 5	Based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012). See marine supporting document for further information
Community structure: *Zostera* density	Shoots/m²	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	Estimated during intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012). See marine supporting document for further details
Community structure: *Mytilus edulis* density	Individuals/m²	Conserve the high quality of the Mytilidae-dominated community complex, subject to natural processes	Estimated during intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012). See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal fine sand with *Peringia ulvae* and *Pygospio elegans* community complex; Estuarine mixed sediment to sandy mud with *Hediste diversicolor* and oligochaetes community complex; Fine sand with crustaceans and *Scololepis* (*Scololepis*) *squamata* community complex; Fine sand with *Angulus* spp. and *Nephtys* spp. community complex. See map 5	Based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012). See marine supporting document for further information

2110 Embryonic shifting dunes

To maintain the favourable conservation condition of Embryonic shifting dunes in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Coney Island - 0.67ha, Rosses Point - 32.27ha, Strandhill - 0.18ha, Yellow Strand - 0.83ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature. It was recorded at four sub-sites, giving an estimated total area of 33.95ha. NB further unsurveyed areas maybe present within this SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009). Additional dune habitats noted to occur at Lissadell Strand and on Maguin's Island. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. There are coastal protection works at both Strandhill and Rosses Point. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). At Rosses Point, saltmarsh habitats occur in association with sand dune habitats. See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded from this SAC. See coastal habitats supporting document for further details

2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Coney Island - 0.46ha, Rosses Point - 0.17ha, Strandhill - 0.10ha, Yellow Strand - 0.47ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature. It was recorded at four sub-sites, giving an estimated total area of 1.20ha. NB further unsurveyed areas maybe present within this SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009). Additional dune habitats noted to occur at Lissadell Strand and on Maguin's Island. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram grass (*Ammophila arenaria)* reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. There are hard coastal protection works at both Strandhill and Rosses Point. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). At Rosses Point, saltmarsh habitats occur in association with sand dune habitats. See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria)* and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species; species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded from this SAC. See coastal habitats supporting document for further details

2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)

To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Coney Island - 15.06ha; Rosses Point - 21.89ha; Strandhill - 40.14ha; Yellow Strand - 19.16ha. See map 6	Based on data from Coastal Monitoring Project (CMP) (Ryle et al., 2009). Habitat was recorded at four sub-sites, giving an estimated total area of 96.26ha. NB further unsurveyed areas maybe present within this SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009). Additional dune habitats noted to occur at Lissadell Strand and on Maguin's Island. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. There are coastal protection works at both Strandhill and Rosses Point. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). At Rosses Point, saltmarsh habitats occur in association with sand dune habitats. See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes	Based on data from Gaynor (2008) and Ryle et al. (2009). At both Yellow Strand and Coney Island, overgrazing and rabbit burrowing have contributed to creating large areas of bare sand. See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008) and Ryle et al. (2009). Vegetation is quite rank in places at Strandhill and Rosses Point due to undergrazing, while at Coney Island and Yellow Strand, overgrazing is an issue. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species (including *Hippophae rhamnoides*)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded from this SAC. The main negative indicators recorded are creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*), ragwort (*Senecio jacobaea*) and perennial rye grass (*Lolium perenne*) (Ryle et al., 2009). See coastal habitats supporting document for further details

Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from Ryle et al. (2009). At Strandhill, pine trees planted at low density occur within the fixed dune habitat. Isolated individual sycamore (*Acer pseudoplatanus*) trees are present in the northern part of the fixed dunes at Rosses Point. See coastal habitats supporting document for further details

5130 *Juniperus communis* formations on heaths or calcareous grasslands

To restore the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Formation area	Hectares	Area stable or increasing, subject to natural processes	Four areas of juniper vegetation were identified within the SAC (three at Rosses Point and one at Knocklane- SO01, SO04, SO08, SO16) by a national juniper survey (Cooper et al., 2012), although not all are classified as formations (see below). NB Further unsurveyed areas maybe present within the SAC
Habitat distribution	Occurrence	No decline. Known locations shown on map 7	Map shows sites identified in Cooper et al. (2012)- SO01, SO04, SO08, SO16. NB Further unsurveyed areas maybe present within the SAC
Juniper population size	Number	At least 50 plants per population	To classify as a juniper formation, at least 50 plants should be present (Cooper et al., 2012). Further work is required to confirm which sites, identified by Cooper et al. (2012) at Rosses Point, should be classified as formations. These three sites probably form a single breeding population (J. Cross, pers. comm.). The Knocklane population (SO04) is not currently classified as a formation (Cooper et al., 2012)
Formation structure: cover and height	Percentage and metres	Well-developed structure with an open to closed cover of juniper up to or exceeding 0.45m in height with associated species	The populations in the SAC are composed mainly of low-growing (0.2-0.7m high) plants of sub-species *nana* (Cooper et al., 2012)
Formation structure: community diversity and extent	Hectares	Appropriate community diversity and extent	See Cooper et al. (2012) for further details
Formation structure: cone-bearing plants	Percentage	At least 10% of plants bearing cones	Target based on Cooper et al. (2012). 55% of the SO01 population was bearing cones at time of survey (Cooper et al., 2012)
Formation structure: seedling recruitment	Percentage	At least 10% of juniper plants within the formation are seedlings	Target based on Cooper et al. (2012). 21% of the SO01 population were seedlings according to Cooper et al. (2012)
Formation structure: amount of each plant dead	Mean percentage	Mean percentage of each juniper plant dead not more than 10%	Target based on Cooper et al. (2012)
Vegetation composition: typical species	Occurrence	A variety of typical native species with a minimum of 10 species present (excluding negative indicator species	According to Cooper et al. (2012), juniper stands within the SAC fall into either vegetation group 4 (*Calluna vulgaris-Erica cinerea* group) or 5 (*Galium verum-Pilosella officinarum* group). See Cooper et al. (2012) for typical species
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Non-native cotoneaster (*Cotoneaster integrifolius*) was recorded at Rosses Point by Cooper et al. (2012)

7220 Petrifying springs with tufa formation (Cratoneurion)

To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	The area of this habitat at Ballincar is recorded as 150m2 along c.200m of cliff (internal NPWS files). NB futher areas of the habitat may occur within this SAC
Habitat distribution	Occurrence	No decline. See map 7 for recorded location	This habitat occurs along a seepage line in low (generally less than 10m in height) clay sea cliffs near Ballincar (internal NPWS files). Lyons and Kelly (2013) recognise three main subtypes of spring. This site falls into the coastal springs subtype (the other two being woodland springs and inland non-wooded springs) NB further areas of the habitat may occur within this SAC
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	The hydrological regime is currently unknown at this site. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources. This site appears to be fed from water seeping through clay sea cliffs (internal NPWS files)
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	Water chemistry is currently unknown for this site. Characteristically, petrifying spring water has high values for pH, alkalinity and dissolved calcium and is oligotrophic (Lyons and Kelly, 2013)
Vegetation composition: typical species	Occurrence	Maintain typical species	The bryophytes *Palustriella commutata* (*Cratoneuron commutatum*) and *Eucladium verticillatum* are diagnostic of this habitat (EC, 2007). Both are found at the location described above (internal NPWS files). Other bryophyte species listed here are *Didymodon tophaceus* and *Trichostomium crispulum* (internal NPWS files)

1014 Marsh Snail *Vertigo angustior*

To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There is one known location for this species in this SAC (which overlaps two 1km squares). See map 7	From Moorkens and Killeen (2011) (site code Va CAM21)
Presence on transect	Occurrence	Adult or sub-adult snails are present in four of the grassland zones on the transect where optimal or sub-optimal habitat occurs (minimum 5 samples)	Transect established as part of condition assessment monitoring at this site (Moorkens and Killeen, 2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Presence	Occurrence	Adult or sub-adult snails are present in at least 6 other places at the site with a wide geographical spread (minimum of 8 sites or 75% of sites sampled)	From Moorkens and Killeen (2011)
Transect habitat quality	Metres	At least 75m of habitat along the transect is classed as optimal and 150m of habitat along the transect is classed as sub-optimal or optimal	From Moorkens and Killeen (2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Transect optimal wetness	Metres	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for more than 130m along the transect	From Moorkens and Killeen (2011)
Habitat extent	Hectares	12-15ha of the site optimal and a further 11-14ha sub-optimal. Optimal habitat is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra*), with sparse marram grass (*Ammophila arenaria*), lady's bedstraw (*Galium verum*), eyebright (*Euphrasia* sp.), mouse-ear-hawkweed (*Pilosella officinarum*) and other low growing herbs. Vegetation height 10-30cm. Habitat growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is defined as for optimal but either vegetation height is less than 10cm or between 30 and 50cm; or the vegetation contains mounds of moss or willow (*Salix* spp.) scrub; or the soil is dry and sandy; or the thatch is wetter with a denser structure	From Moorkens and Killeen (2011)

1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of estuary accessible	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	This SAC only covers marine/estuarine habitat and it is not anticipated that it contains suitable spawning or nursery habitat. Migrating adult lamprey pass through the site en route to/from the Garavogue River, which flows out of Lough Gill. Lough Gill SAC (site code: 1976), which is adjacent to this SAC, encompasses the freshwater elements of sea lamprey habitat. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g. oxygen depletion or discharge of noxious pollutants

1099 River Lamprey *Lampetra fluviatilis*

To maintain the favourable conservation condition of River Lamprey in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of estuary accessible	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	This SAC only covers marine/estuarine habitat and it is not anticipated that it contains suitable spawning or nursery habitat. Migrating adult lamprey pass through the site en route to/from the Garavogue River, which flows out of Lough Gill. Lough Gill SAC (site code: 1976), which is adjacent to this SAC, encompasses the freshwater elements of river lamprey habitat. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g. oxygen depletion or discharge of noxious pollutants

1365 Harbour seal *Phoca vitulina*

To maintain the favourable conservation condition of Harbour Seal in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 8	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition. See map 8	Attribute and target based on background knowledge of Irish breeding populations, review of data summarised by Summers et al. (1980), Warner (1983), Harrington (1990), Lyons (2004), and unpublished NPWS records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition. See map 8	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), Cronin et al. (2004), and unpublished NPWS records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004) and unpublished NPWS records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

MAP 1:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

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SITE CODE: SAC 000627; version 3
County Sligo

0 1 2 3 km

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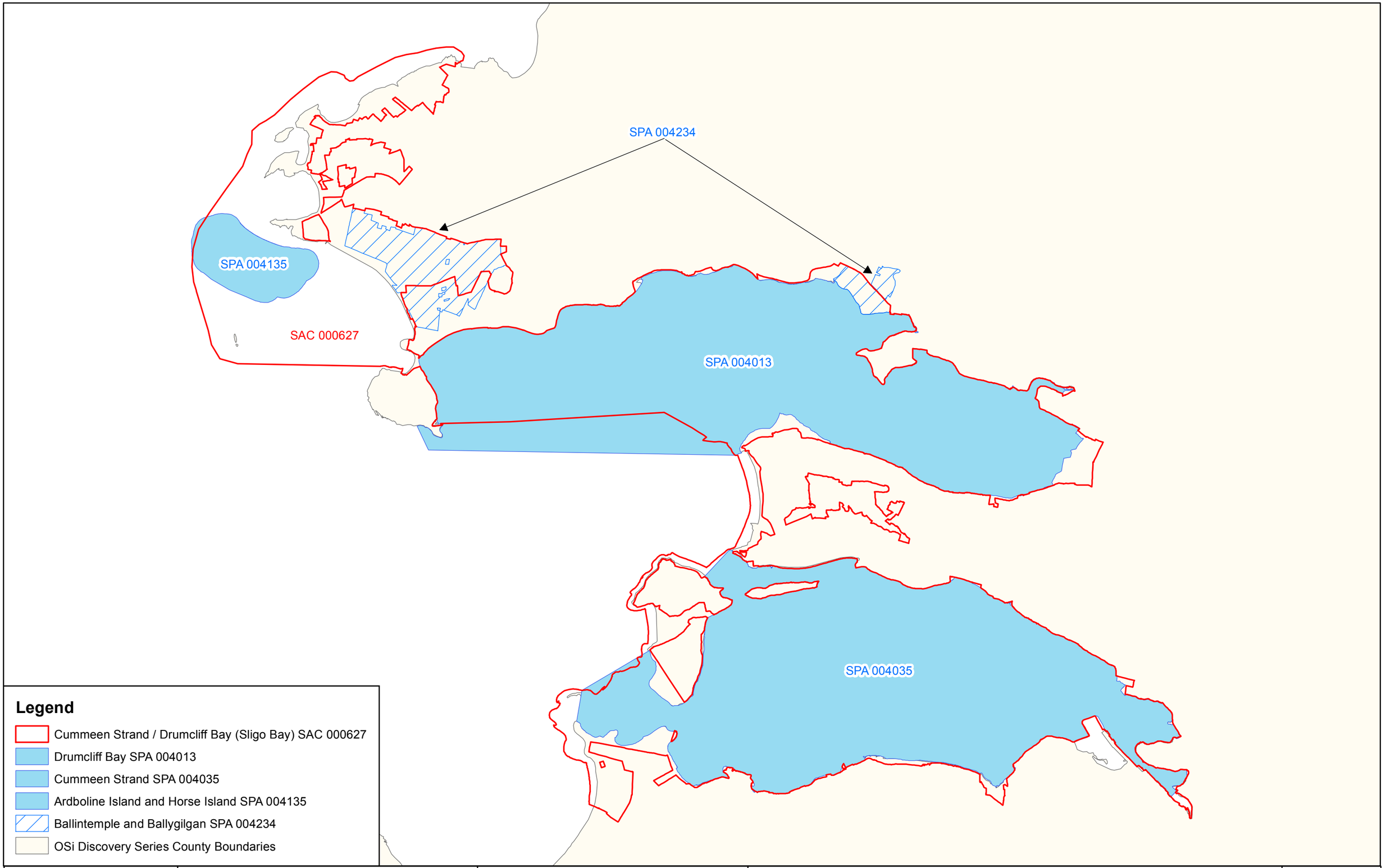
Map Version 1
Date: Aug 2013



Legend

- Cummeen Strand / Drumcliff Bay (Sligo Bay) SAC 000627
- Drumcliff Bay SPA 004013
- Cummeen Strand SPA 004035
- Ardboline Island and Horse Island SPA 004135
- Ballintemple and Ballygilgan SPA 004234
- OSi Discovery Series County Boundaries

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MAP 2:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
ADJOINING / OVERLAPPING DESIGNATIONS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 000627; version 3
SPA 004013 CO.SLIGO; version 2.02 SPA 004035 CO.SLIGO; version 1.03
SPA 004135 CO. SLIGO; version 2 SPA 004234 CO. SLIGO; version 1

0 1 2 3 km

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Map Version 1
Date: Aug 2013

Legend

- SAC 000627
- 1130 Estuaries
- OSi Discovery Series County Boundaries

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Department of Arts, Heritage and the Gaeltacht

MAP 3:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
ESTUARIES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

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County Sligo

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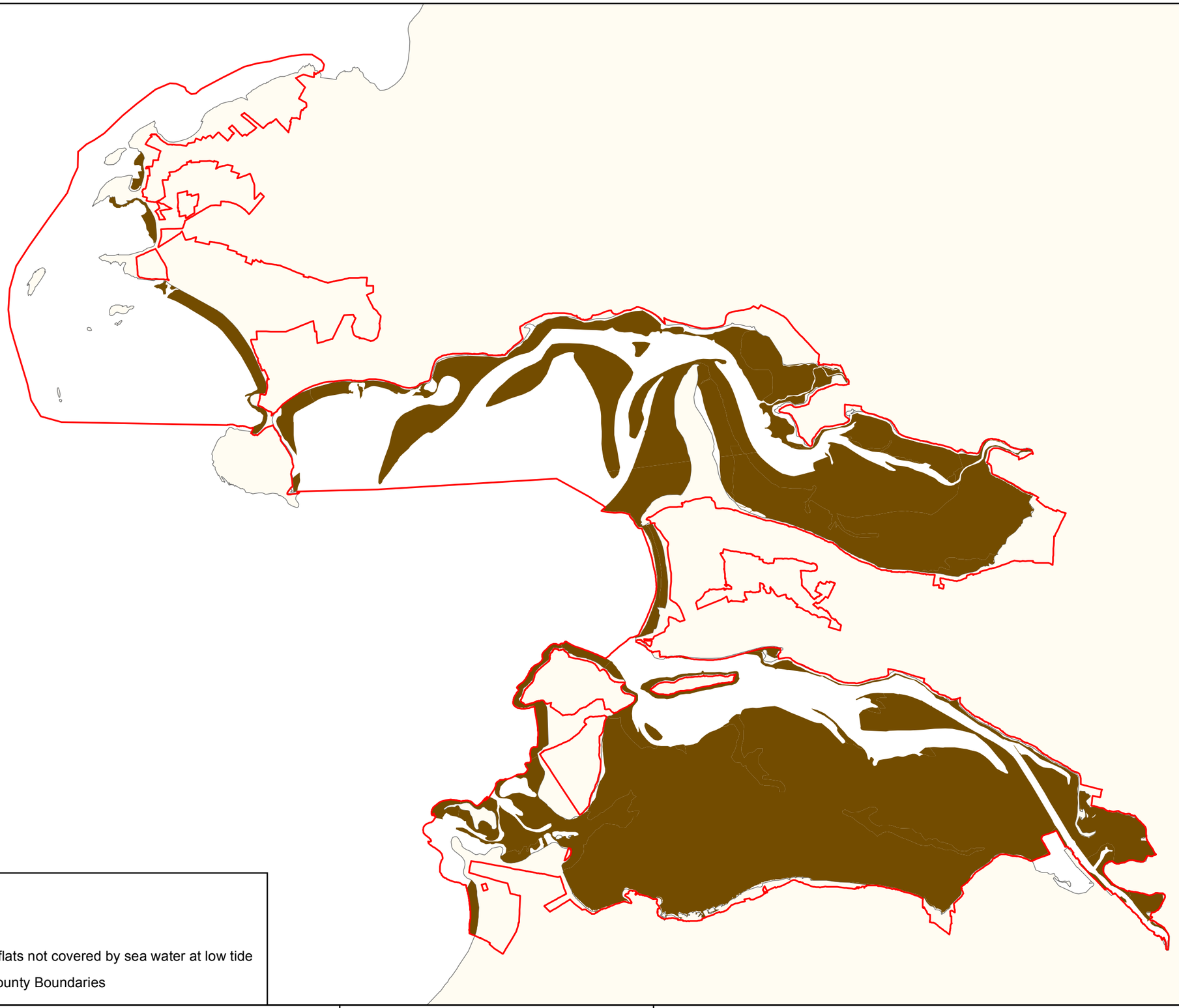
Map Version 1
Date: Aug 2013



Legend

- SAC 000627
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSi Discovery Series County Boundaries

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MAP 4:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
TIDAL MUDFLATS AND SANDFLATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

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County Sligo

0 1 2 3 km

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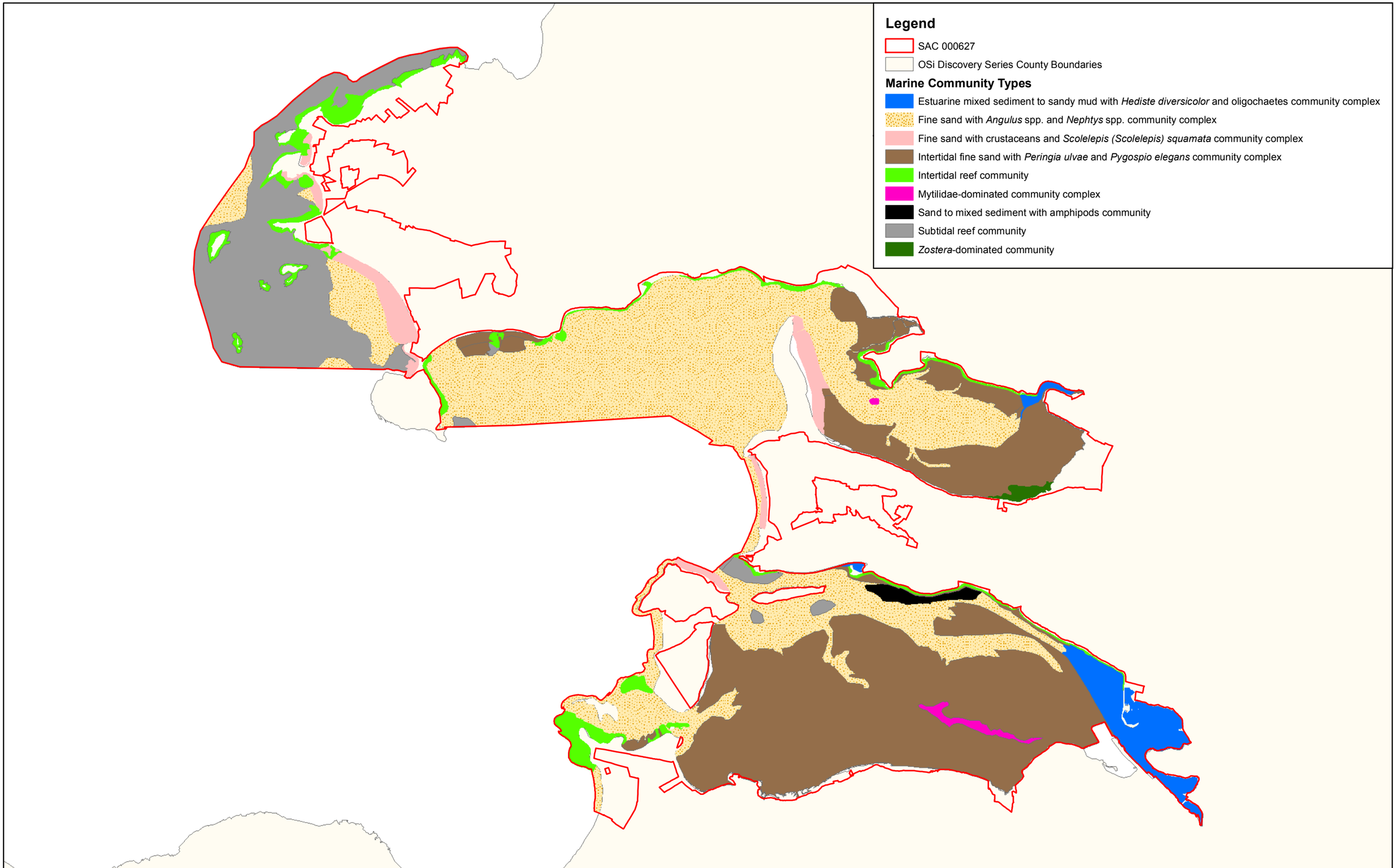
Map Version 1
Date: Aug 2013



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MAP 5:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

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Map Version 1
Date: Aug 2013

CMP: 136

CMP: 135

CMP: 134

CMP: 133

Legend

SAC 000627

OSi Discovery Series County Boundaries

CMP:135 Coastal Monitoring Project Site Codes

Sand Dune Habitats

Qualifying Interests

2110 Embryonic shifting dunes

2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')

2130 *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

Non-Qualifying Interests

1210 Annual vegetation of drift lines

1220 Perennial vegetation of stony banks

2170 Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae)

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MAP 6:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
SAND DUNE HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

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County Sligo

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N

Map Version 1
Date: Aug 2013

SO04

SO08

SO01

Legend

- SAC 000627
- 5130 *Juniperus communis* formations on heaths or calcareous grasslands Survey Sites
- 7220 *Petrifying springs with tufa formation (Cratoneurion)
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- OSi Discovery Series County Boundaries

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MAP 7:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
NARROW-MOUTHED WHORL SNAIL, PETRIFYING SPRINGS & JUNIPER FORMATIONS
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 000627; version 3
County Sligo

0 1 2 3 km

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Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059212)

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Date: Aug 2013

Legend

- SAC 000627
- 1365 Harbour Seal - *Phoca vitulina* Breeding Sites
- 1365 Harbour Seal - *Phoca vitulina* Resting Sites
- 1365 Harbour Seal - *Phoca vitulina* Habitat
- OSi Discovery Series County Boundaries

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MAP 8:
CUMMEEN STRAND / DRUMCLIFF BAY (SLIGO BAY) SAC
CONSERVATION OBJECTIVES
HARBOUR SEAL

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 000627; version 3
County Sligo

0 1 2 3 km

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Map Version 1
Date: Aug 2013

APPENDIX E

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Cummeen Strand SPA 004035

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Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,

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Citation:

NPWS (2013) Conservation Objectives: Cummeen Strand SPA 004035. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

004035	Cummeen Strand SPA
A046	Brent Goose *Branta bernicla hrota*
A130	Oystercatcher *Haematopus ostralegus*
A162	Redshank *Tringa totanus*
A999	Wetlands

Please note that this SPA overlaps with Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (000627) and is adjacent to Drumcliff Bay SPA (004013) and Ballysadare Bay SPA (004129). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2013
Title :	Cummeen Strand SPA (site code 4035) Conservation objectives supporting document V1
Author :	NPWS
Series :	Conservation objectives supporting document

Conservation Objectives for : Cummeen Strand SPA [004035]

A046 Brent Goose *Branta bernicla hrota*

To maintain the favourable conservation condition of Light-bellied Brent Goose in Cummeen Strand SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by light-bellied brent goose, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Cummeen Strand SPA [004035]

A130 Oystercatcher *Haematopus ostralegus*

To maintain the favourable conservation condition of Oystercatcher in Cummeen Strand SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by oystercatcher, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part four of the conservation objectives supporting document

A162 Redshank *Tringa totanus*

To maintain the favourable conservation condition of Redshank in Cummeen Strand SPA, which is defined by the following list of attributes and targets:

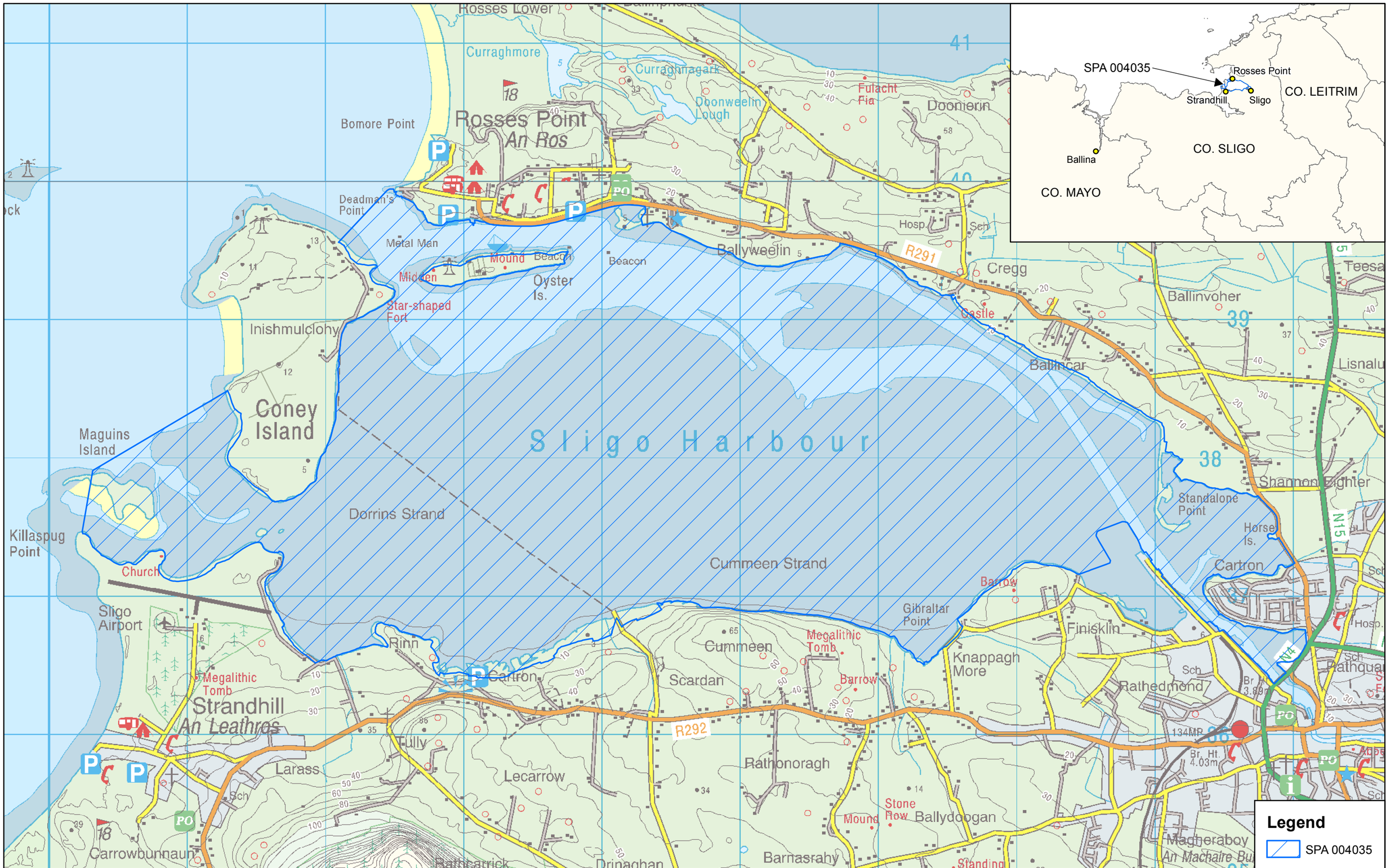
Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by redshank, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Cummeen Strand SPA [004035]

A999 Wetlands

To maintain the favourable conservation condition of wetland habitat in Cummeen Strand SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than 1732 hectares, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 1732ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



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Department of Arts, Heritage and the Gaeltacht

MAP 1: CUMMEEN STRAND SPA CONSERVATION OBJECTIVES SPA DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SPA 004035; version 1.03
County Sligo

0 0.25 0.5 0.75 1 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059212).

Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059212)

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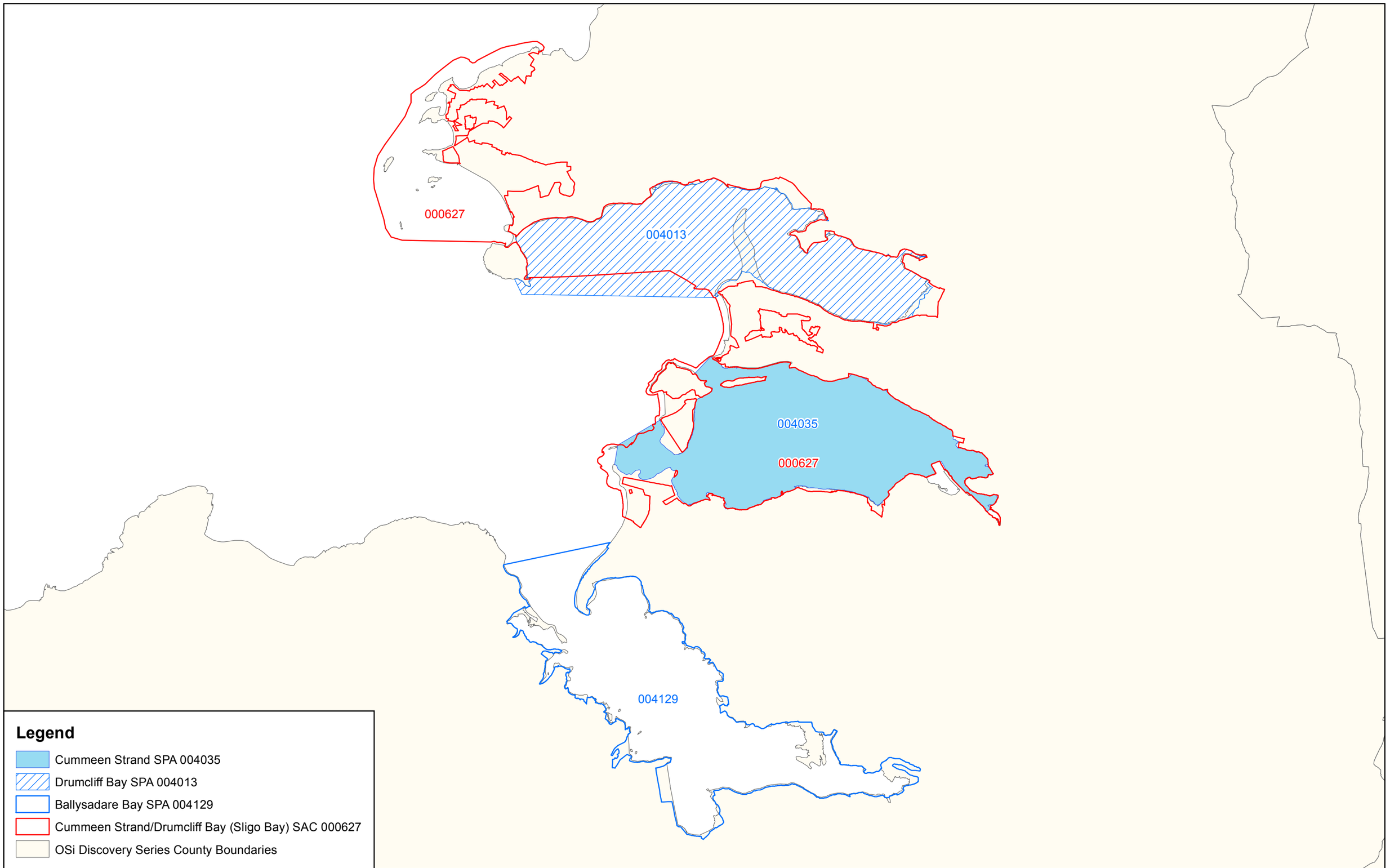
Map Version 1
Date: June 2013



Legend

- Cummeen Strand SPA 004035
- Drumcliff Bay SPA 004013
- Ballysadare Bay SPA 004129
- Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC 000627
- OSi Discovery Series County Boundaries

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MAP 2:
CUMMEEN STRAND SPA
CONSERVATION OBJECTIVES
ADJOINING, OVERLAPPING & NEARBY DESIGNATIONS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SPA 004035; version 1.03
SPA 004013; version 2.02, SPA 004129; version 1.03,
SAC 000627; version 3

0 1 2 3 4 km

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Map Version 1
Date: June 2013