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TIER 3

ENVIRONMENTAL RISK ASSESSMENT

OF A

FORMER MUNICIPAL LANDFILL

BALLYRAGGET,

COUNTY KILKENNY

VOL 2 APPENDICES

Prepared For: -

Kilkenny County Council

Prepared By: -

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December 2017

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APPENDIX 1

Tier 1 Risk Assessment and Tier 2 Risk Assessment Reports

TIER 1 RISK ASSESSMENT

For

Shermans's Site,
Donnaghmore,
Ballyragget,
Kilkenny.

Class A – High Risk Site

Prepared in accordance with the EPA's Code of Practice for Environmental Risk Assessment for Unregulated Waste Disposal Sites.

Prepared by: Michael Nugent
Environment Section
Kilkenny County Council

25/06/2010
(rev.2)

Contents

SUMMARY

Introduction

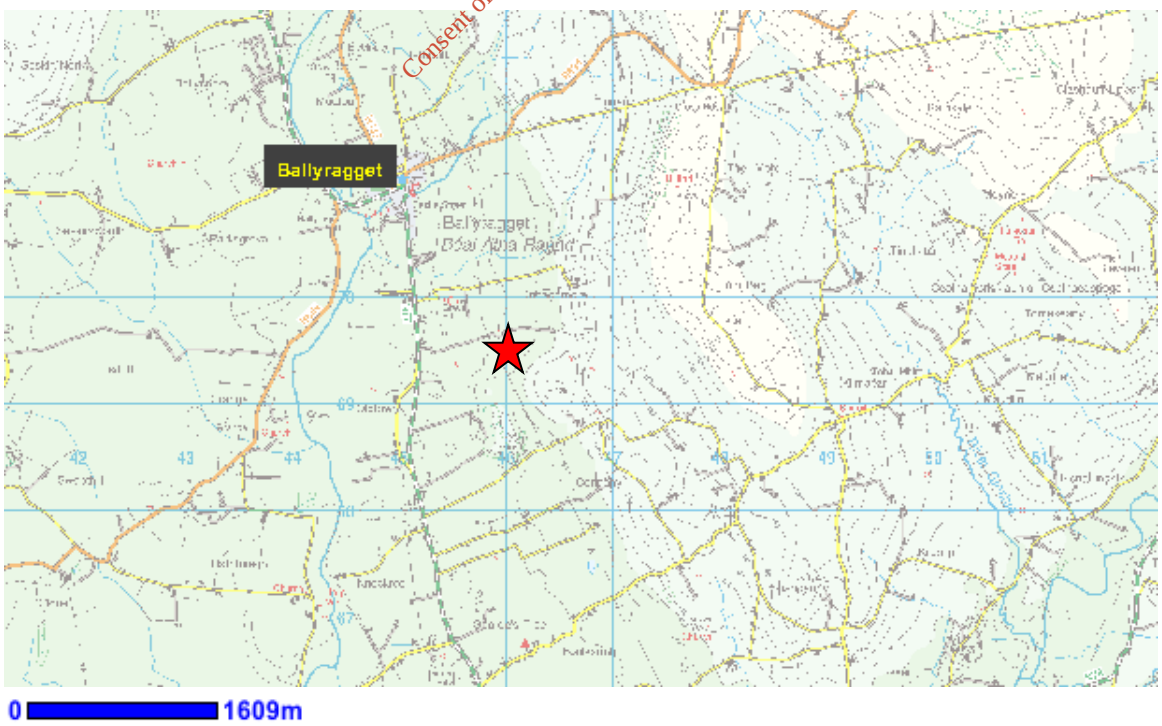
Sherman's landfill is located at Donaghmore, Ballyragget, Co. Kilkenny at coordinates X: 245863, Y: 169526 off the N77 road from Kilkenny to Ballyragget. The site was used by Kilkenny County Council for the disposal of municipal waste between March 1987 and May 1989. The site originally consisted of two gravel pits separated by a ditch. The council filled the pits and covered the site with soil. The site is owned by Timothy Sherman, Donaghmore, Ballyragget. Mr Sherman held a Waste Facility Permit ref: WMP 24/2005 under which he imported soil and stone to level the site. This permit expired in March 2008.

Walkover

The site is currently not in use, the surface is uneven and rough. The surrounding fields are used for agriculture namely tillage. The site is approximately 1.7 hectares in area. The land falls in a north westerly direction. There is a new house built 145m down gradient from the site. There are no wells within 250m of the site. There are no surface water features in the vicinity of the site. There are no visible sources of contamination. There are no visible signs of impact to the environment.

Desk study

The closest surface water feature is a river 642m north of the site. There is a protected area, SAC, 1.2km west of the site. There is a public water supply in Ballyragget 1.8km north west of the site. The vulnerability in the area is extreme. The aquifer is regionally important and karstified. The subsoil is mainly gravel derived from limestone.



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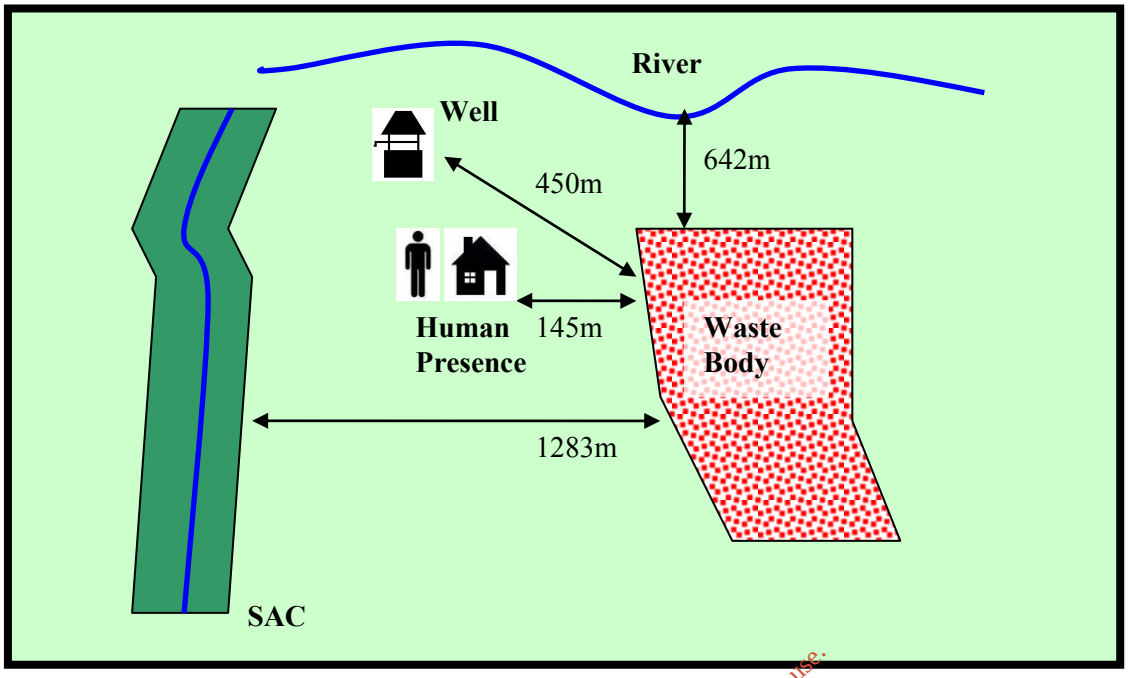
PHOTOGRAPHS

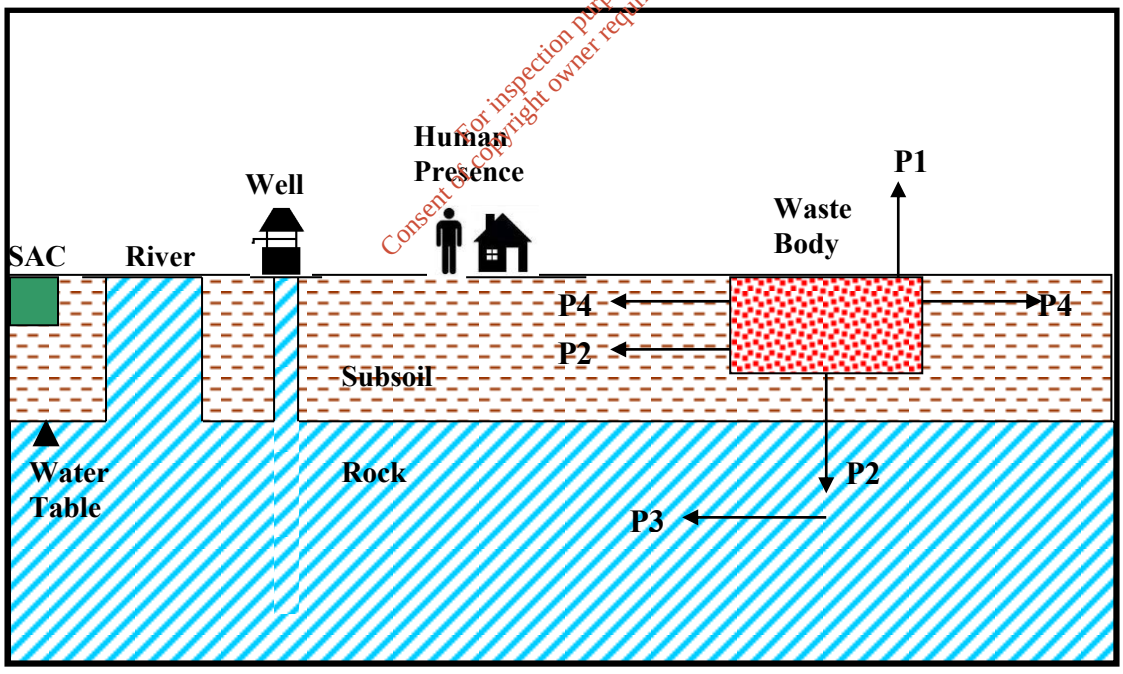
Site outlined in red.

Site outlined in red.

CONCEPTUAL MODEL



Plan



Cross Section

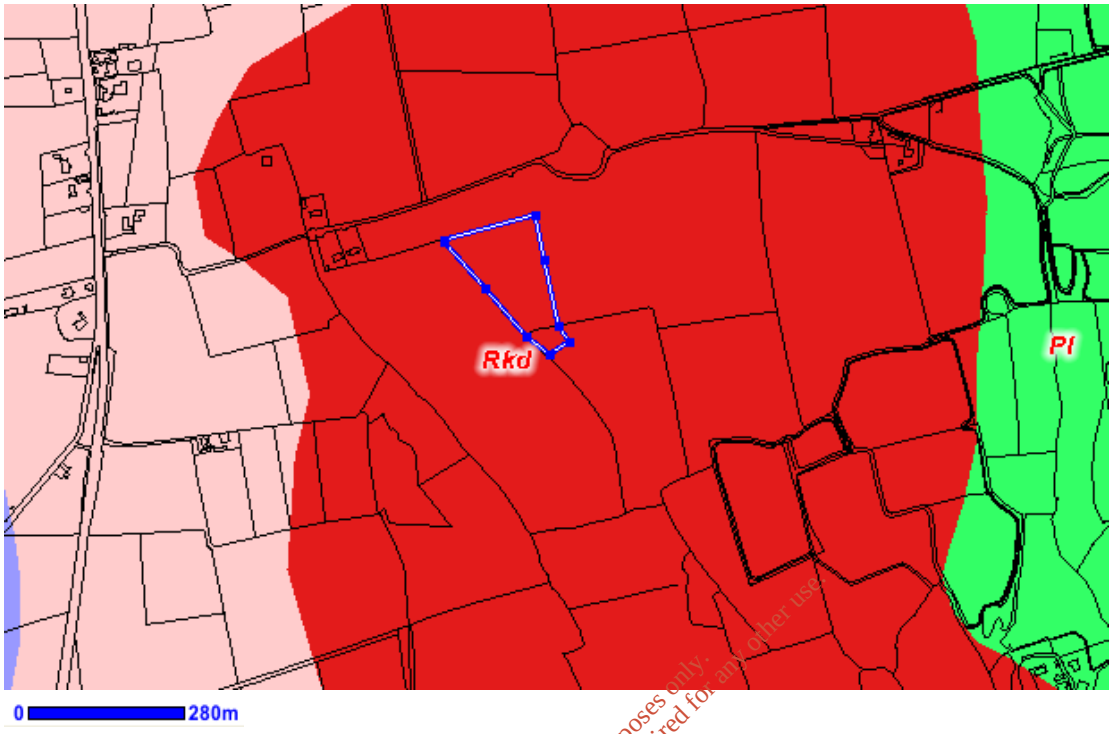
P1 – Landfill Gas
P2 – Leachate Migration – unsaturated zone
P3 – Leachate Migration – saturated zone
P4 – Landfill Gas Migration.

WALKOVER SURVEY CHECKLIST

Information	**Checked**	**Comment** (include distances from site boundary)
1. What is current Land Use?	✓	Not used
2. What are the neighbouring Land Uses?	✓	Farming- tillage
3. What is the size of the site?	✓	1.7ha
4. What is the topography?	✓	Sloping to NW
5. Are there potential receptors (if yes, give details)?	✓	
• Houses	✓	145m
• Surface water features (if yes, distance and direction of flow)	✓	River 642m
• Any wetland or protected areas	✓	SAC 1283m
• Public Water Supplies	✓	1800m
• Private Wells	✓	? >250m
• Services	✓	No
• Other buildings	✓	None in immediate area
• Other	✓	
6. Are there any potential sources of contamination (if yes, give details)?	✓	
• Surface waste (if yes, what type?)	✓	No
• Surface ponding of leachate	✓	No
• Leachate seepage	✓	No
• Landfill gas odours	✓	No
7. Are there any outfalls to surface water? (If yes, are there discharges and what is the nature of the discharge?)	✓	No
8. Are there any signs of impact on the environment? (If yes, take photographic evidence)	✓	No
• Vegetation die off, bare ground	✓	No
• Leachate seepages	✓	No
• Odours	✓	No
• Litter	✓	No

Information	**Checked**	**Comment** (include distances from site boundary)
• Gas bubbling through water	✓	No
• Signs of settlement, subsidence, water logged areas	✓	Rough ground – hard to tell
• Drainage or hydraulic issues	✓	No
• Downstream water quality appears poorer than upstream water quality	✓	Not tested
9. Are there any indications of remedial measures? (Provide details)	✓	
• Capping	✓	Capped with subsoil.
• Landfill gas collection	✓	No
• Leachate collection	✓	No
10. Describe fences and security features (if any)	✓	None
Any other relevant information?		Closed since 1991
		Landowner complained of gas when working on site 4 years ago.

AQUIFER



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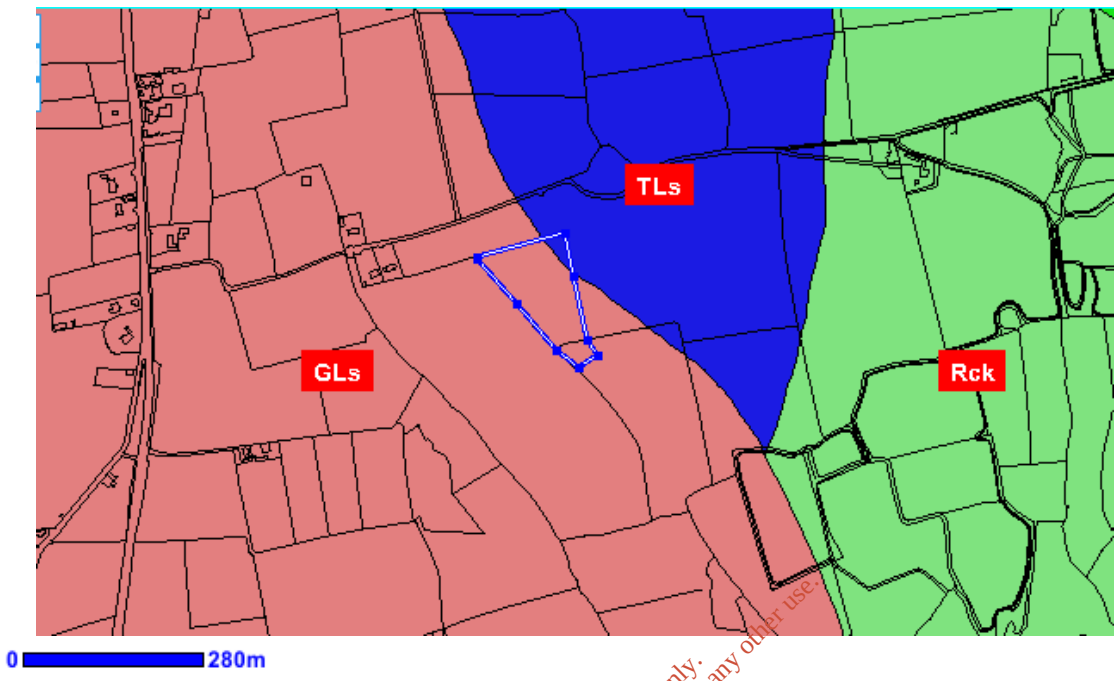
Aquifer type – Rkd – Regionally important karstified aquifer.

SUBSOIL



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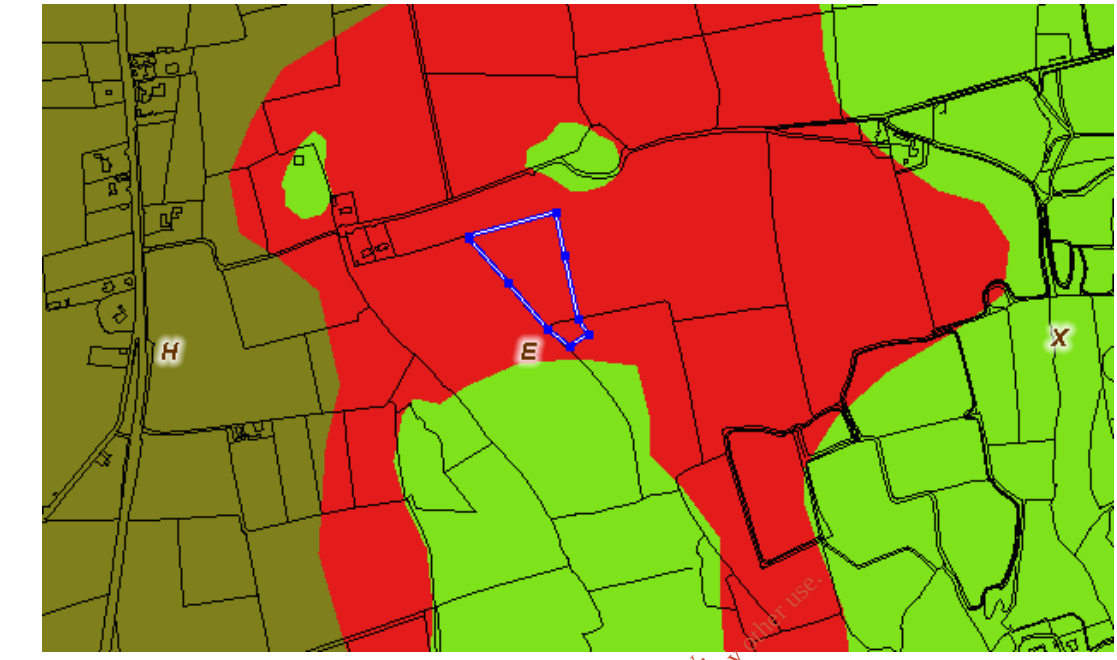
Subsoil – GLS – Gravel from limestone.

GROUNDWATER VULNERABILITY



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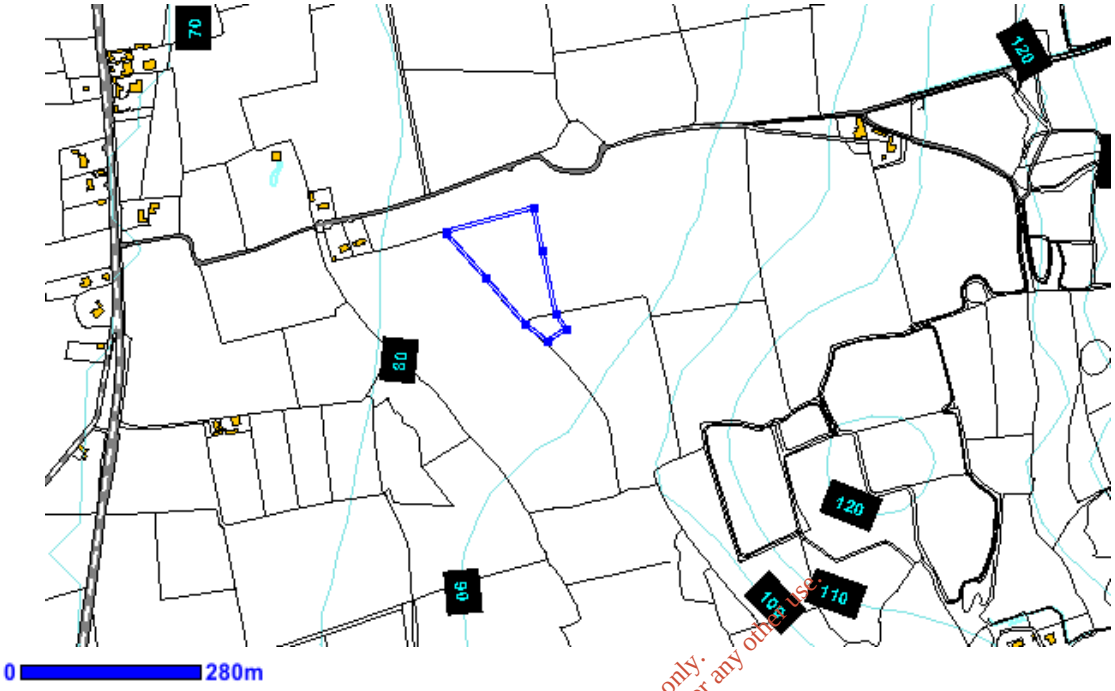
Vulnerability - Extreme

HEIGHT CONTOURS



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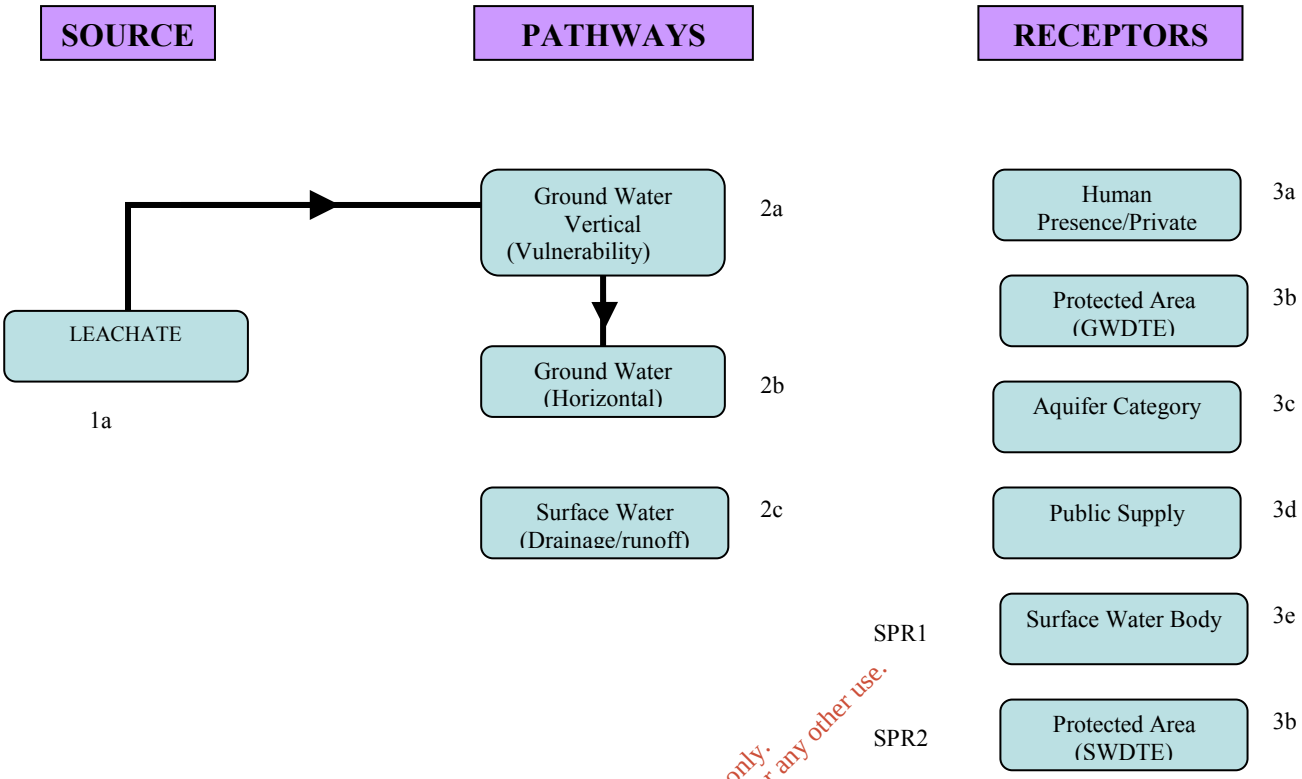
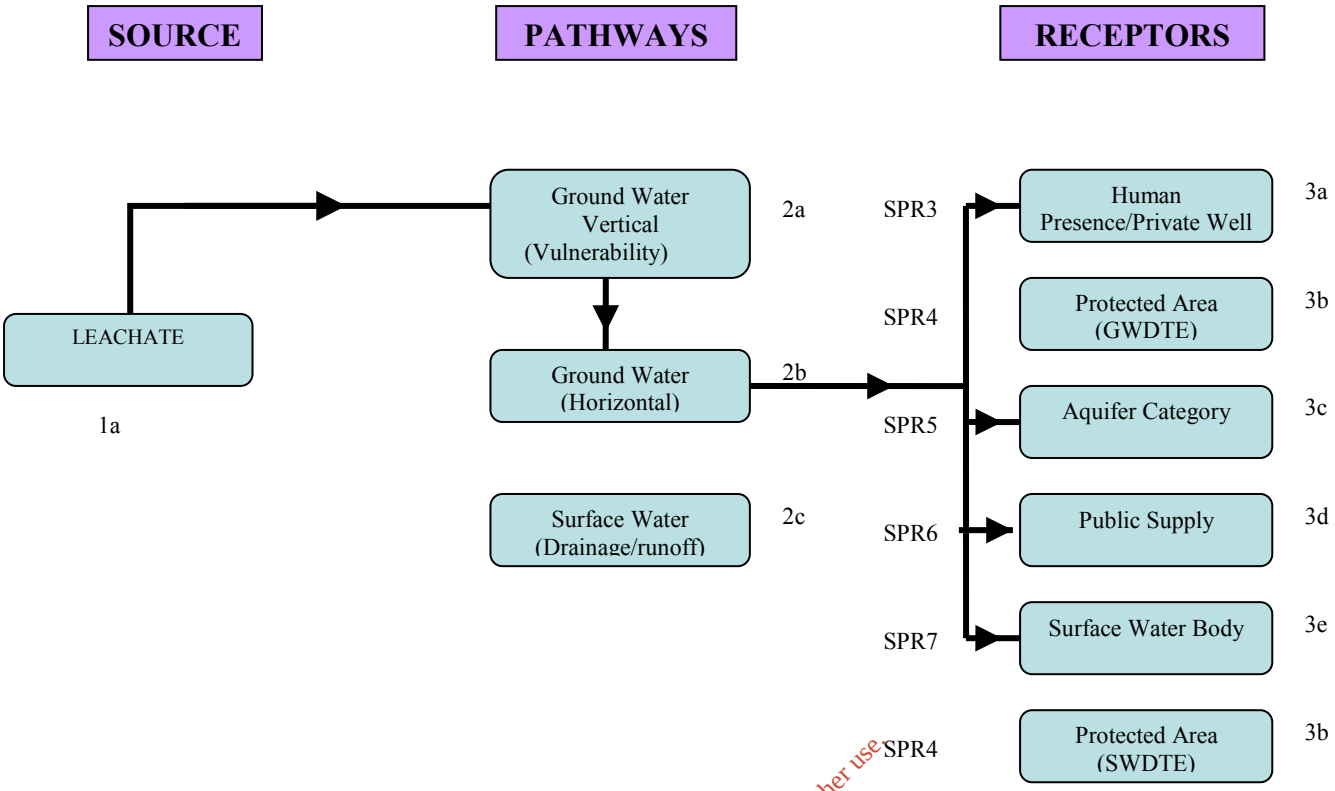
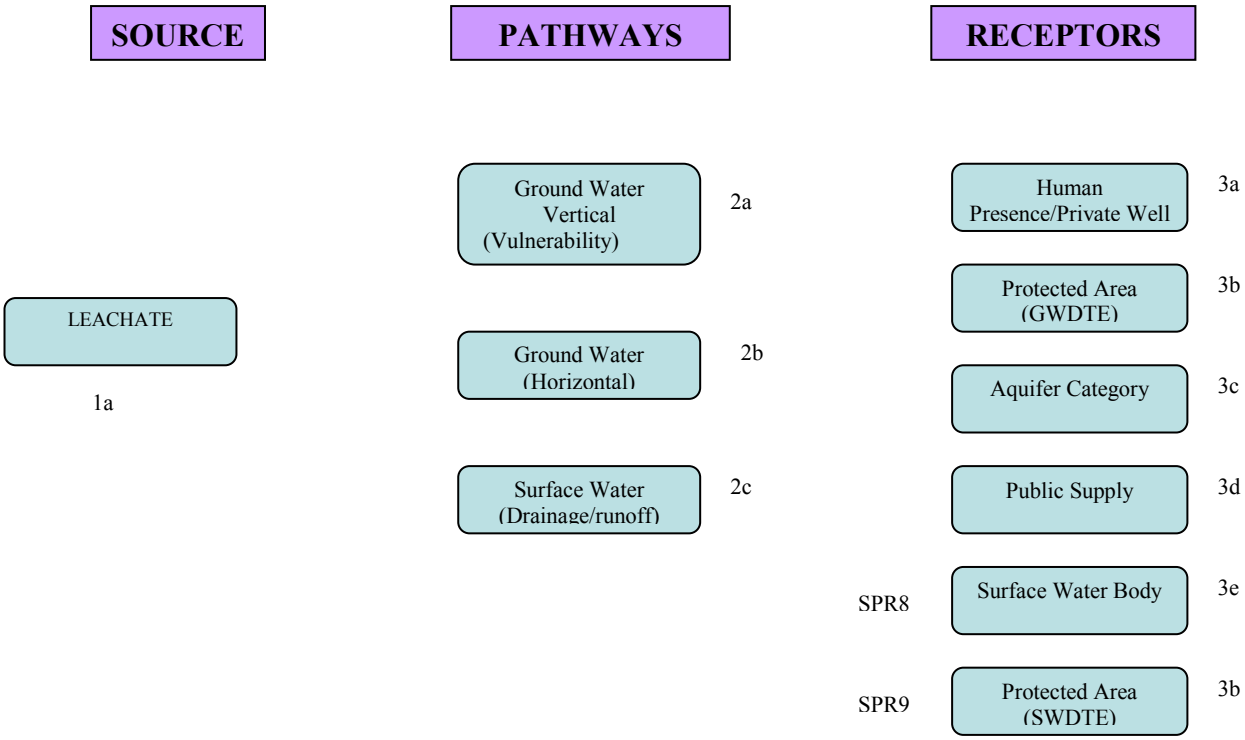
Site slopes in a North Westerly direction.



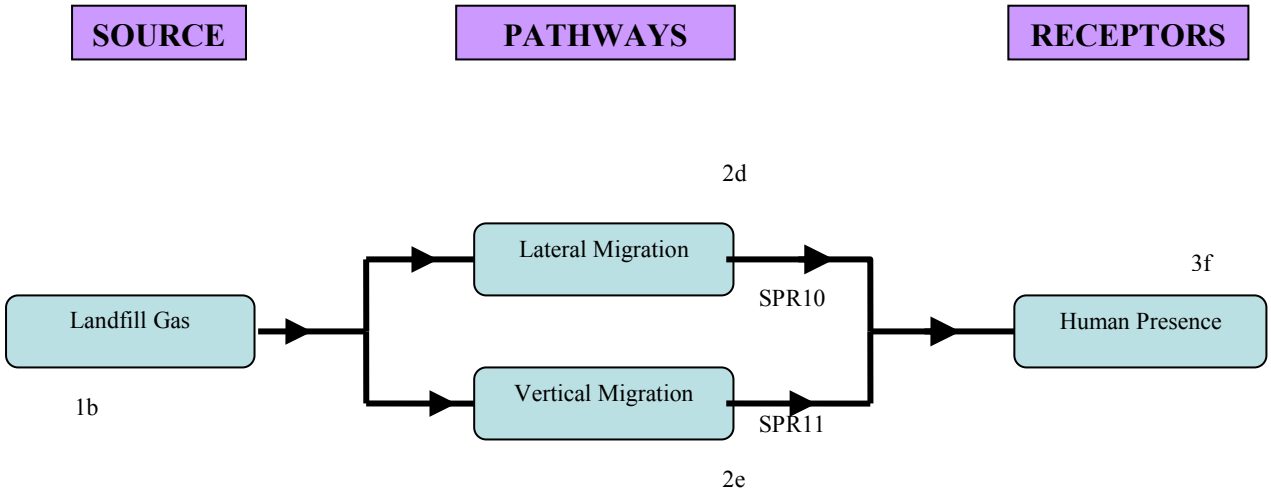
Network Diagram for Leachate Migration through combined groundwater and surface water pathways



Network Diagram for Leachate Migration through groundwater pathways



Network Diagram for Leachate Migration through surface water pathways



Network Diagram for Landfill Gas Migration (Lateral and Vertical)

RISK SCORING MATRICES

Source

Table 1a: LEACHATE: SOURCE/HAZARD SCORING MATRIX

WASTE TYPE	WASTE FOOTPRINT (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	> 5 ha
C&D[20]	0.5	1	1.5
Municipal[21]	5	7	10
Industrial[22]	5	7	10
Pre 1977 sites[23]	1	2	3
		MAX	10

Table 1b: LANDFILL GAS: SOURCE/HAZARD SCORING MATRIX

WASTE TYPE	WASTE FOOTPRINT (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	> 5 ha
C&D[20]	0.5	0.75	1
Municipal[21]	5	7	10
Industrial[22]	3	5	7
Pre 1977 sites[23]	0.5	0.75	1
		MAX	10

Pathways

Table 2a: LEACHATE MIGRATION: *PATHWAYS*

Parameters	Points available
GROUNDWATER VULNERABILITY (Vertical pathway)	
Extreme Vulnerability	3
High Vulnerability	2
Moderate Vulnerability	1
Low Vulnerability	0.5
High – Low Vulnerability	2

Table 2b: LEACHATE MIGRATION: *PATHWAYS*

Parameters	Points available
GROUNDWATER FLOW REGIME (Horizontal pathway)	
Karstified Groundwater Bodies (Rk)[25]	5
Productive Fissured Bedrock Groundwater Bodies (Rf and Lm)[25]	3
Gravel Groundwater Bodies (Rg and Lg)[25]	2
Poorly Productive Bedrock Groundwater Bodies (Ll, Pl, Pu)[25]	1

Rk Regionally Important Karstified Aquifers
Rf Regionally Important Fissured Bedrock Aquifers
Rg Regionally Important Extensive Sand/Gravel Aquifers
Ll Locally Important Sand/Gravel Aquifers
Lm Locally Important Bedrock Aquifers - Generally Moderately Productive
Lg Locally Important Bedrock Aquifers - Moderately Productive only in Local Zones
Pl Poor Bedrock Aquifers – Generally Unproductive except for Local Zones
Pu Poor Bedrock Aquifers – Generally Unproductive

Table 2c: LEACHATE MIGRATION: *PATHWAYS*

Parameters	Points available
SURFACE WATER DRAINAGE[26] (surface water pathway)	
Is there a direct connection between drainage ditches associated with the waste body and adjacent surface water body? Yes	2
If no direct connection	0

Table 2d: LANDFILL GAS: PATHWAY assuming receptor within 250m of source

Parameters	Points available
LANDFILL GAS LATERAL MIGRATION POTENTIAL	
Sand and Gravel, Made ground, urban, karst	3
Bedrock	2
All other Tills (including limestone, sandstone etc – moderate permeability)	1.5
All Namurian or Irish Sea Tills (low permeability)	1
Clay, Alluvium, Peat	1

Table 2e: LANDFILL GAS: PATHWAY assuming receptor located above source.

Parameters	Points available
LANDFILL GAS VERTICAL (UPWARDS) MIGRATION POTENTIAL	
Sand and Gravel, Made ground, urban, karst	5
Bedrock	3
All other Tills (including limestone, sandstone etc – moderate permeability)	2
All Namurian or Irish Sea Tills (low permeability)	1
Clay, Alluvium, Peat	1

Receptors

Table 3a: LEACHATE MIGRATION: *RECEPTORS*

Parameters	Points available
HUMAN PRESENCE (presence of a house indicates potential private wells)	
On or within 50m of the waste body	3
Greater than 50m but less than 250m of the waste body	2
Greater than 250m but less than 1km of the waste body	1
Greater than 1 km of the waste body	0

Table 3b: LEACHATE MIGRATION: *RECEPTORS*

Parameters	Points available
PROTECTED AREAS (SWDTE or GWDTE)	
Within 50m of the waste body	3
Greater than 50m but less than 250m of the waste body	2
Greater than 250m but less than 1km of waste body	1

Greater than 1 km of the waste body	0
Undesignated sites[27] within 50m of site of the waste body	1
Undesignated sites[27] greater than 50m but less than 250m of the waste body	0.5
Undesignated sites[27] greater than 250m of the waste body	0

Table 3c: LEACHATE MIGRATION: *RECEPTORS*

Parameters	Points available
AQUIFER CATEGORY [28](resource potential)	
Regionally Important Aquifers (Rk, Rf, Rg)	5
Locally Important Aquifers (Ll, Lm, Lg)	3
Poor Aquifers (Pl, Pu)	1

Rk Regionally Important Karstified Aquifers
Rf Regionally Important Fissured Bedrock Aquifers
Rg Regionally Important Extensive Sand/Gravel Aquifers
Ll Locally Important Sand/Gravel Aquifers
Lm Locally Important Bedrock Aquifers - Generally Moderately Productive
Lg Locally Important Bedrock Aquifers - Moderately Productive only in Local Zones
Pl Poor Bedrock Aquifers – Generally Unproductive except for Local Zones
Pu Poor Bedrock Aquifers – Generally Unproductive

Table 3d: LEACHATE MIGRATION: *RECEPTORS*

PUBLIC WATER SUPPLIES (other than private wells)	
Within 100m of site boundary	7
Greater than 100m but less than 300m or within Inner SPA (SI) for GW supplies	5
Greater than 300m but less than 1km or within Outer SPA (SO) for GW supplies	3
Greater than 1km (karst aquifer)	3
Greater than 1km (no karst aquifer)	0

Table 3e: LEACHATE MIGRATION: *RECEPTORS*

Parameters	Points available
SURFACE WATER BODIES	
Within 50m of site boundary	3
Greater than 50m but less than 250m	2
Greater than 250m but less than 1km	1
Greater than 1km	0

Table 3f: LANDFILL GAS: *RECEPTOR*

Parameters	Points available
HUMAN PRESENCE	
On site or within 50m of site boundary	5
Greater than 50m but less than 150m	3
Greater than 150m but less than 250m	1
Greater than 250m	0.5

RISK SCREENING

SITE: Shermans - Ballyragget

RISK: High Risk

TABLE		SCORE	RATIONALE
Source			
Leachate Hazard	1a	7	1.7 ha, municipal
Landfill Gas Hazard	1b	7	1.7 ha
Pathways			
Leachate Migration – Ground Water Vulnerability	2a	3	Extreme Vulnerability
Leachate Migration – Ground Water Flow Regime	2b	5	Karstified GW body
Leachate Migration – Surface Water Drainage	2c	0	No direct connection
Landfill Gas – Lateral Migration	2d	3	Gravel
Landfill Gas – Vertical Migration	2e	5	Assuming receptor above.
Receptors			
Leachate Migration – Human Presence	3a	1	No wells within 250m of site
Leachate Migration – Protected Areas	3b	0	Greater than 1km – 1283m from site.
Leachate Migration – Aquifer Category	3c	5	Regionally important Aquifer
Leachate Migration – Public Water Supplies	3d	3	Greater than 1km – karst aquifer
Leachate Migration – Surface Water Bodies	3e	1	River 642m from site
Landfill Gas – Human Presence	3f	3	House 145m from site

SPR LINKAGE SCORE			MAX LINKAGE SCORE	NORMALISED SCORE
SPR 1	1a X (2a + 2b + 2c) X 3e *7(3+5+0)1*	56	300	18.66%
SPR 2	1a X (2a + 2b + 2c) X 3b (SWDTE) *7(3+5+0)0*	0	300	0%
SPR 3	1a X (2a + 2b) X 3a *7(3+5)1*	56	240	23.33%
SPR 4	1a X (2a + 2b) X 3b *7(3+5)0*	0	240	0%
SPR 5	1a X (2a + 2b) X 3c *7(3+5)5*	280	400	70%
SPR 6	1a X (2a + 2b) X 3d *7(3+5)3*	168	560	30%
SPR 7	1a X (2a + 2b) X 3e *7(3+5)1*	56	240	23.33%
SPR 8	1a X 2c X 3e *7(0)1*	0	60	0%
SPR 9	1a X 2c X 3b (SWDTE) *7(0)0*	0	60	0%
SPR 10	1b X 2d X 3f *7(3)3*	63	150	42%
SPR 11	1b X 2e X 3f *7(5)3*	105	250	42%

This site scored a maximum linkage score of 70%. This classifies the site as Class A High Risk.

This is due to the size and importance of the underlying aquifer, which is karstified and regionally important.

The presence of the house at 145m also raises the risk due to landfill gas.

Tier 2 Landfill Assessment

Sherman's Site, Ballyragget, Co. Kilkenny

22 February 2011
Final

Issue No 3
49341895

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CONTENTS

LIMITATIONS

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

Where assessments of works or costs required to reduce or mitigate any environmental liability identified in this Report are made, such assessments are based upon the information available at the time and are subject to further investigations or information which may become available. Costs may therefore vary outside the ranges quoted. No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made these are based upon measures which, in URS's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

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1. INTRODUCTION & OBJECTIVES

URS Ireland Ltd (URS) is pleased to present Kilkenny County Council (KCC) with this report summarising the results and findings from a Tier 2 assessment of a former unregulated landfill located at Sherman's Site, Donnaghmore, Ballyragget, Co. Kilkenny (the site).

The site location is presented in Figure 1 and the site boundary is shown outlined in red on Figure 2.

Regulations were introduced in 2008[1] to address a gap in the transposition of waste licensing legislation in that (pre 1996) Local Authorities were not required to have authorisation for their waste management activities. As a result, the Environmental Protection Agency (EPA) has prepared a code of practice (CoP)[2] to assist local authorities in meeting the requirements of these regulations. With regard to the EPA CoP, a Tier 1 risk assessment was completed by KCC[3]. The Tier 1 assessment identified the site as being *'Class A – High Risk Site'*, with the most significant source-pathway-receptor (SPR) linkages as follows:

- Environmental risk to the underlying aquifer via migration of leachate to groundwater; and
- Environmental risk to humans via lateral and vertical migration of landfill gas.

The works reported herein formed part of "Step 3" of the approach outlined in the EPA COP and consisted of an "exploratory investigation" (as outlined in Section 5.3.2 of the COP).

The objectives of the works reported herein were as follows:

- Confirm, through investigation, the preliminary conceptual site model (CSM) developed by KCC during the Tier 1 assessment, in particular to confirm the source-pathway-receptor (SPR) pollutant linkages identified;
- Characterise the waste body; and
- Collect data to inform a quantitative risk assessment (QRA) for the site should a Tier 3 assessment be required ("Step 4" of the EPA CoP).

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[1] S.I. No. 524 of 2008, *Waste Management (Certification of Historic Unlicenced Waste Disposal and Recovery Activity) Regulations 2008*

[2] Environmental Protection Agency, Office of Environmental Enforcement, *Code of Practice, Environmental Risk Assessment for Unregulated Waste Disposal Sites*, April 2007

[3] Kilkenny County Council, *Tier 1 Risk Assessment for Sherman's Site, Donnaghmore, Ballyragget, Kilkenny,* 25 June 2010, Rev 2

2. SCOPE OF WORKS

The scope of work undertaken by URS during the assessment included the following:

- Initial site walkover with KCC Engineer (Mr. Michael Nugent) the landowner (Mr. Tim Sherman) on 3 September 2010;
- Drilling of four (4) boreholes to depths ranging from 2m below ground level (bgl) to 10m bgl;
- Excavation of 13 trial pits to depths ranging from 1.1m bgl to 5.2m bgl;
- Collection of in-situ geotechnical data during drilling of boreholes;
- Collection of soil / waste samples at nominal 2m / 1m depth intervals during drilling / trial pitting;
- Screening of these samples using a photo ionisation detector (PID) and selection of samples for laboratory analysis;
- Completion of each of the four (4) boreholes as 50mm diameter dual purpose ground gas and groundwater monitoring wells;
- Collection of groundwater samples from two (2) of the installed monitoring wells (samples were not collected from the remaining two wells as they were dry);
- Monitoring of landfill gases at both the trial pit locations during trial pitting and in the dual purpose ground gas and groundwater monitoring wells.

Site works were carried out between 7 and 9 September 2010.

Soil / waste and groundwater samples were analysed by Jones Environmental Laboratories (JEL) at their laboratory in England. Water sample parameters with a short holding time (BOD, COD, coliforms) were analysed by Enfer Laboratories in Clonmel, Co. Tipperary. PSD analysis was undertaken by Testconsult Ireland Ltd in Portlaoise, Co. Laois.

Soil / waste samples were analysed for the following parameters:

Analyte	No. of Soil Samples	No. of Waste Samples
Particle size distribution (PSD)	3	0
TPH Criteria Working Group (CWG) Analysis	0	8
Benzene, toluene, xylene, ethylbenzene (BTEX) compounds	0	8

Analyte	No. of Soil Samples	No. of Waste Samples
Polycyclic Aromatic Hydrocarbons (PAHs)	0	4
Total Organic Carbon (TOC)	0	8
Metals*	0	8

* Metals include arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc

Groundwater samples were analysed for the following parameters:

Analyte	No. of Groundwater Samples	Analyte	No. of Groundwater Samples
TPH / BTEX	2	TOC	2
Metals[4]	2	Total Dissolved Solids	2
Speciated PAHs	2	Nitrate	2
Phenols	2	Nitrite	2
Total Cyanide	2	BOD	2
Chloride / Fluoride / Sulphate	2	COD	2
VOCs	2	Total Alkalinity (as $CaCO_3$)	2
SVOCs	2	Phosphorus	2
Field Parameters[5]	2	Dissolved Methane	2
Total Suspended Solids	2	OC/OP Pesticides	2
Ammonia (as N)	2	Herbicides	2
Total Oxidised Nitrogen (as N)	2	Faecal & Total Coliforms	2

[4] Metals in water to include Ca, Mg, Na, K, Fe, Mn, Mo, Se, Cd, Cr, Cu, Pb, Ni, Zn, As, B, Hg.

[5] Field parameters measured by field engineer included temperature, dissolved oxygen, pH, electrical conductivity and redox.

3. SITE DESCRIPTION AND ENVIRONMENTAL SITE SETTING

3.1 Site Setting

The landfill site is located southeast of the town of Ballyragget in the townland of Donnaghmore and occupies an area of approximately 1.7 hectares (17,000 m^2) (see Figure 1). The site is located in agricultural lands belonging to the owner of the site, Mr. Tim Sherman. Access to the site is via a private road across Mr. Sherman's land. There is no perimeter fence marking the site boundary.

3.2 Physical Setting

The physical setting of the site is summarised in the table below.

Physical Feature	Comments
Surface of Site	The surface of the site is covered by grass, which is understood to be cut and baled by the site owner. A hedge runs across the southern portion of the site. The landowner pointed out areas of distressed vegetation on the surface.
Topography	According to OSI Discovery Series 1:50,000 Map 60 the site lies at an elevation of approximately 80m above Ordnance Datum and slopes to the northwest. It is understood that a sand & gravel mound existed previously on the site, which was quarried out prior to the commencement of landfilling activities at the site. Following closure of the landfill in 1989, the site was re-instated in line with the surrounding topography. The north-western corner of the site is elevated as the site owner imported soil & stone under a Waste Permit from KCC in 2005.
Regional Geology	According to the GSI the geology beneath the site comprises glaciofluvial sands & gravels underlain by the Ballyadams Formation, which is described by the GSI as a classic 'Burren' limestone, with good karst features.
Regional Hydrogeology and Aquifer Classification	The aquifer beneath the site is classed by the GSI as regionally important and karstified, and is classed by the GSI as extremely vulnerable. It is understood that the field to the east of the site floods during winter months, which may be an indicator of groundwater level fluctuations beneath the site.
Nearby Surface Water Bodies	The nearest surface water bodies to the site are an un-named river approximately 900m to the north and the River Nore approximately 1.5km to the west. The River Nore is a designated Special Area of Conservation (SAC).
Nearby Surface Water Abstractions	There are no known surface water abstractions in the area.
Nearby Groundwater Abstraction Wells	According to KCC, the nearest groundwater abstraction well is located approximately 450m to the north west (downgradient) of the site. The use of this well is unknown.

Physical Feature	Comments
Inferred groundwater flow	Groundwater flow direction could not be determined based on the findings of this investigation as monitoring wells MW01 and MW04 were dry. It is considered that groundwater flow is likely to follow topography and flow to the north west; however this will need to be substantiated as part of any future works at the site.
Waste type	Information provided by KCC and the landowner suggests the landfilled material consists of municipal waste sourced from the surrounding areas. Hazardous materials such as batteries and hospital waste may also have been dumped in the site.

3.3 Adjacent Land Use

The land use adjacent to the site are summarised in the table below:

Site Boundary	Land Use
North	Agricultural.
South	Agricultural, beyond which lies a gravel quarry approximately 300m south of the site.
West	Agricultural.
East	Agricultural, with residential houses located approximately 145m from the site.

3.4 Protected Areas

According to the National Parks and Wildlife Service, the River Nore (located approximately 1.5km west of the site) is a Special Area of Conservation (SAC).

3.5 Site History

It is understood that the site originally consisted of two discrete gravel pits which, following quarrying, were used by KCC for the disposal of municipal waste between March 1987 and May 1989. The site operated on a dilute-and-disperse principle, with no impermeable membrane present between the waste body and the underlying sands and gravels. On completion of landfilling activities, it is understood that the site was capped with locally sourced sand and gravels. Based on the findings of the intrusive investigation, the approximate volume of the waste body is estimated at 40,000m^3.

It is also understood that the current landowner imported soil and stone to level the site under a waste permit from KCC between 2005 and 2008.

4. METHODOLOGY

The fieldwork was conducted under a site-specific health and safety plan and with reference to the information provided by GCC, the EPA COP[2], the EPA landfill manuals[6] and BS10175:2001[7]. All operatives were required to wear appropriate PPE as detailed in the health and safety plan.

4.1 Trial Pitting

A twelve tonne excavator was used to advance the trial pits. Excavation progressed at each location until natural materials were encountered or until the sides of the trial pit collapsed.

A field engineer supervised the excavation works. Each trial pit was one excavator bucket in width (nominal 750mm) and approximately 3m in length and the location was scanned using a cable avoidance tool prior to excavation. The field engineer logged, sampled and photographed each excavation as it progressed (photographs are presented in Appendix A). The excavations were backfilled with the excavated material before moving to the next location. The location of each excavation was recorded using a GPS.

Trial pit locations are presented on Figure 2.

4.2 Borehole Drilling and Monitoring Well Installation

Four (4) boreholes were drilled during the site works (MW01 – MW04). Three of the boreholes were excavated into natural ground on the periphery of the site to depths ranging from 6m bgl to 10m bgl. A fourth borehole (MW04) was advanced through the waste body to a depth of 2m bgl. This borehole was discontinued as the methane levels recorded during drilling were consistently above the 2% LEL Action Level specified in the URS Health & Safety Plan.

Drilling was undertaken using a combination of hollow stem auger and air rotary drilling techniques. Each location was scanned using a cable avoidance tool prior to drilling.

All four (4) boreholes were completed as dual purpose ground gas and groundwater monitoring wells, with a 50mm diameter HDPE standpipe with a 1mm slot size. The lower section of the well was screened across the gravels and weathered bedrock to allow ingress of groundwater for sampling. The screened section was surrounded by a washed gravel filter pack. A bentonite seal was placed at the surface to minimise the potential for surface water entry. Following installation, the wells were developed to remove any materials that may have been introduced during drilling. The wells were finished using upright metal covers.

Monitoring well locations are presented on Figure 2.

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[6] Environmental Protection Agency, *Landfill Manuals: Landfill Monitoring (2nd Edition)*, 2003

[7] British Standards Institution, *Investigation of Potentially Contaminated Sites – Code of Practice, BS10175:2001,* 2001

4.3 Soil / Waste Sampling

Soil / waste samples were collected from each investigation location and placed into laboratory supplied sample jars. The sample containers were labelled with a unique sample number and placed in a suitable container for transportation. The field engineer wore single-use disposable nitrile gloves for each sampling event.

The sampled material was visually examined for evidence of contamination and screened using a Photoionisation Detector (PID) for the presence of volatile compounds. Arisings were inspected for the presence of potentially hazardous materials. The field engineer noted the location on a plan and noted the sample depth and the sample number(s).

Three trial pits were also excavated for the purposes of delineating the waste body (TPNS1 – TPNS3). Samples were not collected from these locations.

4.4 Groundwater Sampling

Prior to sample collection a water level meter was used to monitor the depth to groundwater in each of the monitoring wells. Monitoring wells MW01 and MW04 were dry; therefore groundwater samples were not collected at these locations.

At least three well volumes were purged from each of the wells (MW02 and MW03) prior to sampling. The wells were purged using dedicated Waterra tubing and footvalves. The sampled water was placed directly into laboratory supplied sample containers appropriate to the proposed analytes (field filtered and with appropriate preservatives if required). In-situ water quality parameters (temperature, pH, electrical conductivity, redox potential and dissolved oxygen) were recorded both during purging and prior to sampling.

Standard environmental sampling techniques were adopted to minimise the risk of cross contamination between sampling locations and to ensure quality of samples upon receipt at the laboratory.

All sample bottles were labelled with a unique sample number for each monitoring well and placed in a cool box dedicated for water samples.

4.5 Landfill Gas Monitoring

All four (4) groundwater monitoring wells were sealed with a gas tap to allow for monitoring of landfill gases. Landfill gas composition (methane, carbon dioxide, oxygen and atmospheric pressure) was recorded at each of the wells using a portable landfill gas analyser (GA94) following the completion of each well. In addition, landfill gas measurements were made using the GA94 at the surface of each trial pit location upon completion and outside the nearest residential property to the west of the site.

4.6 Analytical Data Assessment Criteria

Soil laboratory results were compared against Stage 2 generic assessment criteria (GAC) protective of human health and controlled waters.

URS GAC are risk-based soil and groundwater concentrations that are protective of chronic risks to human health for a broad range of site conditions and different generic land-uses. They represent the first stage of assessment (also commonly called "screening values"). If applied correctly to a site with a broadly consistent conceptual exposure model, it is recommended that an exceedance of a URS GAC triggers a need for further assessment of some form, such as a re-evaluation of the applicability of the conceptual site model relative to the GAC, further site investigation, more detailed quantitative risk assessment (also known as a DQRA), and potentially remedial action, subject to tests of cost-benefit, practicability and reasonableness.

Central to the development of land-use specific conceptual exposure models (CEMs) is data contained within the UK Environment Agency's SC050021/SR3, which provides available data on UK exposure for four standard land-uses. These standard land uses take into account reasonable and typical land-use patterns in the UK, based on social studies and the professional judgement of policy makers to provide CEMs suitable for generic site conditions. Standard exposure pathways have been developed for residential (with and without plant uptake), commercial and allotment land-uses. It is assumed that typical land-use patterns assumptions for the UK are valid for Ireland.

Appropriate GAC for a particular site are collated with consideration of the general site conditions encountered (soil conditions such as soil-type and Total Organic Carbon content) and the generic land-use. In this case, commercial/industrial land-use was selected in the absence of a more appropriate generic land-use. For commercial land-use, it is assumed that the critical receptor is a female worker and the duration of exposure covers a working adult lifetime of 49 years. With regard to the site, it is expected that exposure duration will be significantly less than this and as such, selected GAC may be considered conservative given the current use of the site. Therefore, it is considered that assessment for onsite commercial users is suitably protective of users of the site and potential controlled waters receptors (such as groundwater).

Where concentrations of the analysed parameters in soil or water are found to be above the assessment criteria, the possible need for a quantitative risk assessment (QRA) is identified. This process is generally acceptable to the Irish EPA in the previous experience of URS.

For comparison with background levels the results for metals were also compared with background data (where available) for Irish soil published by the Environmental Protection Agency (EPA)[8]. The published data was based on test samples collected from across the Republic of Ireland and to remove the effect of statistical outliers, the 95th percentile values were used as the preliminary screening guidelines. It should be noted that this 95th-percentile guideline represents an Irish background level only and results exceeding these guidelines do not necessarily indicate environmental risk.

[8] Environmental Protection Agency, *Towards a National Soil Database (2001-CD/S2-M2)*, 2007

Groundwater analytical results were compared to the EPA Interim Guideline Values (IGVs)[9] and threshold values from the Groundwater Regulations 2010[10] that indicate the chemical status of a groundwater body.

The IGVs were developed using a number of existing water quality guidelines in use in Ireland including existing national Environmental Quality Standards (EQSs), proposed common indicators for the EU Groundwater Directive, Drinking Water Standards and GSI trigger values.

The groundwater regulations were developed to give effect to measures needed to achieve the objectives of the Water Framework and Groundwater Directives.

[9] Environmental Protection Agency, Towards setting guideline values for the protection of groundwater in Ireland (Interim Report).

[10] S.I. No. 9 of 2010, European Communities Environmental Objectives (Groundwater) Regulations 2010

5. RESULTS

Soil / waste results are presented in Tables 1 to 3 and groundwater analytical results are presented in Tables 4 to 12. Landfill gas measurements are presented in Table 13. The JEL laboratory reports are presented in Appendix B.

Field observations and a factual summary of the analytical results are presented below.

5.1 Field Observations

The materials encountered during the intrusive assessment are described in the logs presented in Appendix C. A cross section showing the typical profile observed beneath the site is presented in Figure 3.

Minimal engineering works had been undertaken on the landfill since closure, with no engineered cap (allowing percolation of rainwater vertically through the waste to form a head of leachate and also allowing the escape of landfill generated gas) or basal liner (allowing leachate to percolate vertically into the underling superficial deposits) in place.

The material covering the waste body comprised gravelly clay and clayey gravel, the base of which ranged in depth from 0.3m to 1.5m bgl. The waste was predominantly underlain by gravels. Bedrock was encountered in boreholes MW01 and MW02 at depths of 5m bgl and 7.5m bgl respectively.

The typical profile encountered beneath the site is as follows:

Depth to stratum (m bgl)	Geology
0 – 2.75	**Made Ground** comprising sandy clay and gravelly clay fill materials. It is likely that this material was used to cap the waste materials in parts of the site.
0.3 – 4.95	**Waste Body** comprising plastics and general waste materials mixed with sandy gravels. The breakdown of materials was found to be slow at some locations. Evidence of age of waste body (including newspapers and other dated items) was found that indicated that material was deposited between 1987 and 1989.
0 – 9.5	**Natural Ground** consisting of predominantly sandy gravels with cobbles with some gravelly clay in places.
4.8 – 9.5	**Weathered Limestone Bedrock**
5.0 -	**Limestone Bedrock**

No potentially hazardous materials (as defined by the EPA European Waste Catalogue and Hazardous Waste List 2002) were observed in the trial pit or borehole arisings.

The maximum depth of waste of 4.95m bgl was encountered in trial pit TP05 located in the central portion of the site, however it should be noted that the bottom of the waste was not encountered at all locations. Generally the waste body was found to be thickest across the central portion of the site.

Strong odours were observed by the field engineer wherever waste was encountered (i.e. in trial pits TP02, TP03, TP05, TP06, TP07, TP08, TP09 and TP10). The odours were described as 'sour' with no hydrogen sulphide odours noted.

Concentrations of landfill gases recorded during the intrusive works are presented in Table 13. Elevated methane / carbon dioxide readings were recorded at monitoring well MW04, with concentrations of 11.6% / 15.2% and 28.5% / 27.8% recorded from the gas tap installed on the top of the well on 8 September 2010 and 9 September 2010 respectively. Methane was not detected at any other monitoring point during the assessment. Minor concentrations of carbon dioxide (0.01%) were recorded at locations MW01 to MW03 and TP02.

Concentrations of volatile compounds were below 5ppm at all locations, with the exception of TP02 and TP03 where PID readings of 32.3ppm and 28.3ppm were recorded at a depth of 1.5m bgl.

Water strikes were encountered during the drilling of MW03 at 3.7m bgl and MW02 at 5.2m bgl. Shallow perched groundwater was observed during the excavation of trial pits TP02, TP06 and TP10 at depths of 3.1m, 1.7m and 3.2m bgl.

The groundwater level readings taken in each of the monitoring wells are presented in the following table.

Monitoring Well ID	9 September 2010 Water Level (m bTOC*)
MW01	Well dry
MW02	Well dry
MW03	7.525
MW04	5.645

Note: * reference point used to measure water levels was top of casing

The landowner reported that the field immediately to the east of the site floods during winter months. Given the observed depth of the waste body and the reported groundwater conditions, it is considered likely that the waste body is in direct contact with groundwater beneath the site during certain times of the year.

The results for the in-situ water quality parameters recorded during sampling of groundwater are presented in the Table 7. With the exception of electrical conductivity, all

water quality parameters recorded in the field (conductivity, pH, redox and temperature) were below their respective guideline values where available. The measured field parameters can be summarised as follows:

- Measured conductivity values ranged from 605µS/cm in MW02 to 1,268µS/cm in MW03. The conductivity value measured in MW03 was above the IGV of 1,000µS/cm and is considered to be indicative of leachate contamination.
- Measured pH values ranged from 6.8 to 6.91, indicating neutral groundwater beneath the site.
- Redox values ranged from 110.3mV to 120.7mV, indicating an oxygenated groundwater system.

5.2 Analytical Results

5.2.1 Soil / Waste Analytical Results

Soil analytical results are presented in Tables 1 to 3. The concentrations of all parameters analysed were below the GACs protective of human health. Results of the soil analysis are summarised below.

TPH

TPH concentrations in soil ranged from below the laboratory method detection limit (MDL) of 38mg/kg to 3,177mg/kg in sample TP05 4.9-5.2.

With the exception of sample TP05 2.0-2.2, all TPH concentrations were above the GAC protective of controlled waters for TPH.

BTEX & MTBE

BTEX concentrations ranged from 0.006mg/kg (TP08 1.2-1.4) to 0.819mg/kg (MW04 1.5).

Concentrations of benzene, toluene and xylene were found to exceed the GAC protective of controlled waters in sample MW04 1.5.

MTBE compounds were not detected above the MDL in the soil samples analysed, hence the GACs were not exceeded.

PAHs

PAHs were detected in two of the four soil samples analysed, with sum of 17 PAH compounds of 0.38mg/kg (TP02 1.3-1.5) and 2.39mg/kg (TP05 2.0-2.2) detected.

There were exceedances of the GACs protective of controlled waters for a number of PAH compounds amongst these samples.

Metals

There were exceedances of the GACs protective of controlled waters for several metals, including arsenic, cadmium, copper, mercury, nickel, selenium, zinc and molybdenum.

In addition, there were some exceedances of the EPA background (95 percentile) values for cadmium, copper, mercury, lead and zinc.

Concentrations of mercury and lead were found to be elevated in sample MW04 1.5.

PSD

Particle size distribution (PSD) analysis was carried out on three samples of the shallow capping material, as outlined in the following table. The PSD laboratory report is presented in Appendix B.

Location	Depth	Description
MW02	0.2-0.5	**Sand**
MW03	0.5-0.9	**Clay**
TPNS03	0.2-0.5	**Sand**

5.2.2 Groundwater Results

Groundwater analytical results are presented in Tables 4 to 12. The results of the groundwater analysis are summarised below.

TPH

TPH concentrations of 78µg/l and 106µg/l were detected in samples MW02 and MW03 respectively. The hydrocarbon compounds detected were in the aromatic C_{12}-C_{16} and C_{16}-C_{21} range. These concentrations were above the IGV for TPH of 10µg/l.

BTEX & MTBE

BTEX & MTBE compounds were not detected above the MDL in the groundwater samples analysed; hence the adopted guideline criteria were not exceeded.

PAHs

PAHs were not detected above the laboratory method detection limit (MDL) in any of the two groundwater samples analysed.

It should be noted that IGVs for some of the PAH compounds were less than the MDL for these compounds.

Metals

All metal concentrations were below their respective GAC.

Anions and Cations

There were exceedances of the GAC for phosphorus and manganese in samples from MW02 and MW03. In addition, concentrations of calcium and potassium were above the adopted criteria in sample MW03.

Concentrations of the other anions and cations analysed were below their respective GAC.

Nutrients

Ammonium concentrations of 1.41mg/l (MW02) and 0.39mg/l (MW03) were in excess of the IGV of 0.15mg/l.

Nitrate was detected at concentrations of 19.7mg/l and 3.4mg/l in samples MW02 and MW03 respectively. Both concentrations were below the IGV of 25mg/l.

Nitrite concentrations were elevated in sample MW02 with 2.08mg/l recorded, which was above the IGV of 0.1mg/l. A concentration of 0.09mg/l was detected in sample MW03.

Other Analytes

Cyanide, phenols and dissolved methane were not detected above the laboratory MDL.

Concentrations of VOCs, SVOCs, pesticides and herbicides were not detected above the laboratory MDL.

It should be noted that assessment criteria for some of these compounds were less than the MDL for these compounds.

Biochemical Oxygen Demand

BOD was recorded at 8mg/l and 3mg/l and COD at 68mg/l and 67mg/l in samples MW02 and MW03 respectively.

Coliforms were not detected in the groundwater samples analysed.

6. CONCEPTUAL SITE MODEL UPDATE

An update to each element of the SPR risk scoring matrix and SPR linkages are outlined below.

6.1 SPR Risk Scoring Matrix Update

Risk Screening	Input	Assessment Update
Leachate Source (Table 1a)	Age: 1987 - 1989 Type: Municipal Waste Footprint: 1.1ha	The intrusive assessment confirmed the waste type to be municipal. The approximate waste footprint was found to be 1.1ha. Hazardous materials were not observed within the waste body and the GACs protective of human health were not exceeded in any of the samples analysed. The soil / waste analysis indicated that there is a potential risk to controlled waters from hydrocarbon compounds, PAHs and some metals. Laboratory interpretation of the TPH chromatographs found the breakdown of hydrocarbons present in samples TP05 4.9-5.2 (3,177mg/kg) and TP06 2.4-2.6 (299mg/kg) to be consistent with lube oil. It is likely, however, that the hydrocarbon concentrations detected are due to the production of fatty acids from breakdown of the waste. Considering the condition of the waste materials encountered, the PAH and metal concentrations are considered to be low, with most metal concentrations (with the exception of the waste sample collected from MW04) either below or in line with EPA background soil concentrations. There were exceedances of the GACs protective of controlled waters for some of these compounds, which needs to be assessed further.
Landfill Gas Source (Table 1b)	Age: 1987 - 1989 Type: Municipal Waste Footprint: 1.1ha	As above. Methane gas concentrations greater than the lower explosive limit of 5% and less that the upper explosive limit of 15% were recorded in monitoring well MW04 installed in the waste body on the central portion of the site. This indicates that the waste body is generating landfills gases of a composition that are potentially explosive. Concentrations of methane were not detected at any other investigation location or at the site surface.

Risk Screening	Input	Assessment Update
Leachate Migration Pathways (Table 2a)	Groundwater Vulnerability (Vertical Pathway): Extreme	The assessment confirmed that groundwater beneath the site is extremely vulnerable to contaminants released from the former landfill due to the lack of engineered controls and the permeable nature of the sand and gravels overlying weathered and karstified limestone. Leachate generation is likely both from rainfall percolating through the waste body and from groundwater flow leaching contaminants from the waste.
Leachate Migration Pathways (Table 2b)	Groundwater Vulnerability (Horizontal Pathway): Extreme	As above.
Leachate Migration Pathways (Table 2c)	Surface Water Drainage: No Direct Connection	There were no surface water bodies identified in the vicinity of the site. The nearest surface water body is an un-named river located approximately 900m north of the site. There are likely to be small drainage ditches in the vicinity also.
Landfill Gas Pathways (Table 2d)	Landfill Gas Lateral Migration Potential: Sand and Gravel / Karst	The geology encountered beneath the site is expected to be continuous beneath the nearest residential property located 145m northeast of the site.
Landfill Gas Pathways (Table 2e)	Landfill Gas Vertical Migration Potential: Sand and Gravel / Karst	The only receptors located above the source are farm workers who occasionally visit the site and livestock that graze the area.

Risk Screening	Input	Assessment Update
Leachate Migration Receptors (Table 3a)	Human Presence (Potential for Private Wells): No wells within 250m of the site	There are understood to be no groundwater abstraction wells within 250m of the site. Groundwater flow direction was not confirmed during the investigation. If it is presumed that groundwater follows topography and flows to the northwest, the sampled monitoring wells MW02 and, in particular, MW03 could be considered to be downgradient of the waste body and therefore representative of contaminant concentrations moving off site, potentially towards a surface water body. Groundwater analytical results indicate that the former landfill site may be impacting on groundwater quality beneath the site. In particular, elevated electrical conductivity in monitoring well MW03 is indicative of impact from leachate. It is also considered that leachate could potentially be migrating off site in the direction of groundwater flow. There are also a number of parameters elevated above the adopted guideline criteria (including ammonium, phosphorus, manganese, potassium and nitrite) whose occurrence may be due to either impact from leachate or the application of fertilizer to the surrounding lands. Hydrocarbon concentrations were elevated in both groundwater samples. The source of hydrocarbons in groundwater is likely to be breakdown products from the decomposing waste body. There were no exceedances of the IGVs or groundwater regulations for PAHs, metals, VOCs, SVOCs, herbicides, pesticides or coliforms.
Leachate Migration Receptors (Table 3b)	Protected Areas: No protected areas within 1km of the site	There are understood to be no SWDTE or GWDTE within 1km of the site.
Leachate Migration Receptors (Table 3c)	Aquifer Category: Regionally Important Aquifer	The aquifer beneath the site is understood to be regionally important, with Avonmore Creamery understood to have a large groundwater abstraction in Ballyragget approximately 1.5km northwest of the site.
Leachate Migration Receptors (Table 3d)	Public Water Supplies: Greater than 1km (karst aquifer)	There are understood to be no public water supplies within 1km of the site, however bedrock aquifer is karstified.
Leachate Migration Receptors (Table 3e)	Surface Water Bodies: Greater than 250m but less that 1km	The nearest surface water body is understood to be 900m north of the site.

Risk Screening	Input	Assessment Update
Landfill Gas Receptors (Table 3f)	Human Presence: Greater than 50m but less than 150m	The nearest residential property is located 145m east of the site. Landfill gas was not detected during excavation of trial pits at the site and a reading at the nearest residence also detected no landfill gas. It is understood that local residents have not made any odour complaints in relation to the site. The landowner has reported feeling nauseous while cutting grass on site in the past.

6.2 SPR Linkage Update

SPR1 - Leachate=>Groundwater & Surface Water =>Surface Water Body

Given that there are no receptors within the vicinity of the site, the risk to surface water from the landfill is considered to be low. As will be outlined below (SPR5), a controlled waters QRA should be undertaken to assess the risks posed by the site to groundwater receptors. The risk to surface water receptors should also be considered as part of this QRA.

SPR2 - Leachate=> Groundwater & Surface Water => Protected Area

There is understood to be no surface water dependant terrestrial ecosystems (SWDTE) within the vicinity of the site, therefore it is considered that this risk does not need to be considered further.

SPR3 - Leachate => Groundwater => Human Presence

There are no known groundwater abstraction wells in the vicinity of the site, therefore the risk to potential receptors is considered low. The analytical results did indicate that groundwater quality may be impacted by leachate. Agricultural practices, such as fertilizer application and spreading of organic wastes, may also be a source of the contaminants detected. Given that there is a potential for the development of groundwater resources in the vicinity of the site in the future, it is considered that this risk should be assessed further as part of a controlled waters QRA. Confirmation of groundwater flow direction will also be required.

SPR4 - Leachate => Groundwater => Protected Areas

There is understood to be no groundwater dependant terrestrial ecosystems (GWDTE) within the vicinity of the site, therefore it is considered that this risk does not need to be considered further.

SPR5 – Leachate => Groundwater => Aquifer

The analytical results indicated that the quality of the groundwater aquifer beneath the site may be impacted by leachate. There is no impermeable cap on the surface and no impermeable basal liner beneath the site. There is also no confining layer beneath the waste body to prevent the migration of leached contaminants downward into the underlying aquifer. Given that the aquifer is considered by the GSI to be regionally

important, it is considered that the impact of the site on the aquifer should be considered further as part of a controlled waters QRA.

SPR6 – Leachate => Groundwater => Public Supply

There is understood to be no public water supply source within the vicinity of the site, therefore it is considered that this risk does not need to be considered further.

SPR 7 – Leachate =>Groundwater => Surface Water Body

Given that there are no receptors within the vicinity of the site, the risk to surface water from the landfill is considered to be low. The controlled waters QRA required as part of SPR5 above will consider this risk also.

SPR8 – Leachate =>Surface Water => Surface Water Body

There are no pathways or receptors for this linkage therefore it is considered that this risk does not need to be considered further.

SPR9 – Leachate =>Surface Water => Protected Area

There are no pathways or receptors for this linkage therefore it is considered that this risk does not need to be considered further.

SPR10 – Landfill Gas => Lateral Migration => Human Presence

The assessment found concentrations of landfill gas within the waste body that could potentially migrate laterally through permeable overburden and bedrock and impact on receptors. Given the distance to the nearest residential property the potential risk is considered to be moderate, however further assessment (including further assessment of landfill gas egress at surface) should be undertaken to quantify this risk.

SPR11 – Landfill Gas => Vertical Migration => Human Presence

The assessment found concentrations of landfill gas (methane concentrations ranging from 11.6% - 28.5% in MW04) within the waste body that could potentially migrate vertically through permeable capping materials and impact on receptors. Unsubstantiated anecdotal information provided by the site owner suggests that there may have been isolated incidents of nausea and effects on grazing animals at the site. There is visual evidence of vegetation distress on parts of the site.

Given these findings, it is considered that further assessment of this SPR linkage is required.

Overall, the assessment reported herein confirmed the CSM developed by KCC during the Tier 1 Assessment.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the Tier 2 assessment completed, URS has drawn the following conclusions:

- The observations and results from the investigation confirm the 'High Risk' classification given to the site by the KCC Tier 1 assessment.
- Hazardous materials were not observed within the waste body and the GACs protective of human health were not exceeded in any of the soil / waste samples analysed.
- The assessment confirmed that there is no impermeable cap on the surface and no impermeable basal liner beneath the site, meaning that there is a potential risk of leachate and landfill gas migration towards receptors.
- The soil / waste analysis indicated that there is a potential risk to controlled waters (in particular groundwater) from hydrocarbon compounds, PAHs and some metals.
- Groundwater analytical results indicate that the former landfill site may be impacting on groundwater quality beneath the site.
- The assessment found that the waste body is capable of producing landfill gases with a potential to pose a risk to receptors via lateral and vertical migration pathways.

7.1 Groundwater

Further assessment of the potential risks posed by leachate to controlled waters needs to be undertaken. URS recommends that (in compliance with the EPA CoP) a controlled waters detailed quantitative risk assessment (DQRA) be carried out. The proposed DQRA will involve inputting site-specific information (geological conditions, depth to groundwater, etc) from the site into a URS developed spreadsheet model, to quantify how contaminants identified in soil and groundwater could impact on local surface water and groundwater resources.

The risk assessment will be completed following UK guidance, with procedures following the "contaminant-pathway-receptor" methodology as defined in Part IIa of the UK Environmental Protection Act 1990.

This process is acceptable to the Irish EPA in the experience of URS.

The methods developed to quantify the risks are based on standard and approved methods, including the "Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources" (UK Environment Agency R&D Publication 20, 1999) for controlled waters.

The URS understanding of the site will be summarised under the headings of 'contaminant sources identified', 'contaminant migration pathways identified' and 'potential receptors of contamination identified'.

Quantitative risk assessment will be conducted for possible scenarios whereby a particular contaminant identified at the site could impact on a potential receptor off-site, via a defined pathway.

Groundwater flow direction will need to be determined prior to undertaking a DQRA. It is understood that KCC will undertake a topographic survey of the site including the groundwater monitoring wells and it is recommended that groundwater elevation in existing monitoring wells be assessed in Q1 of 2011. It is also recommended that another round of groundwater sampling should be undertaken in Q1 2011 to assess differing conditions at the site.

7.2 Landfill Gas

The Tier 1 CSM indicated that vertical and lateral migration of landfill gas were potential pollutant linkages. Tier 2 assessment and refinement of the CSM through limited gas monitoring has confirmed the CSM, but data are insufficient to asses the magnitude of any risk associated with landfill gas.

In order to further asses the risks associated with landfill gas migration at this site, it is proposed that an assessment of the vertical and lateral migration pathways be carried out via the monitoring gas emissions. It is recommended that this monitoring be carried out in accordance with the EPA *Landfill Monitoring Manual* (2003) and using a modified approach to that set out in UK Environment Agency, *Guidance on Monitoring Landfill Gas Surface Emissions* (2004b). Assessment of the lateral component of migration should in the first instance be carried out by internal gas monitoring at the nearest residential properties using both and FID and an infra red gas analyser.

The assessment of the landfill gas monitoring data will be structured as follows:

Stage 1 - Hazard Assessment, whereby the potential risks posed by ground gases are assessed qualitatively, followed by;

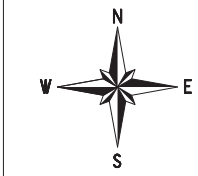
Stage 2 - Generic Quantitative Risk Assessment, which compares the measured gas concentrations for this site with published guidelines or standards appropriate for use.

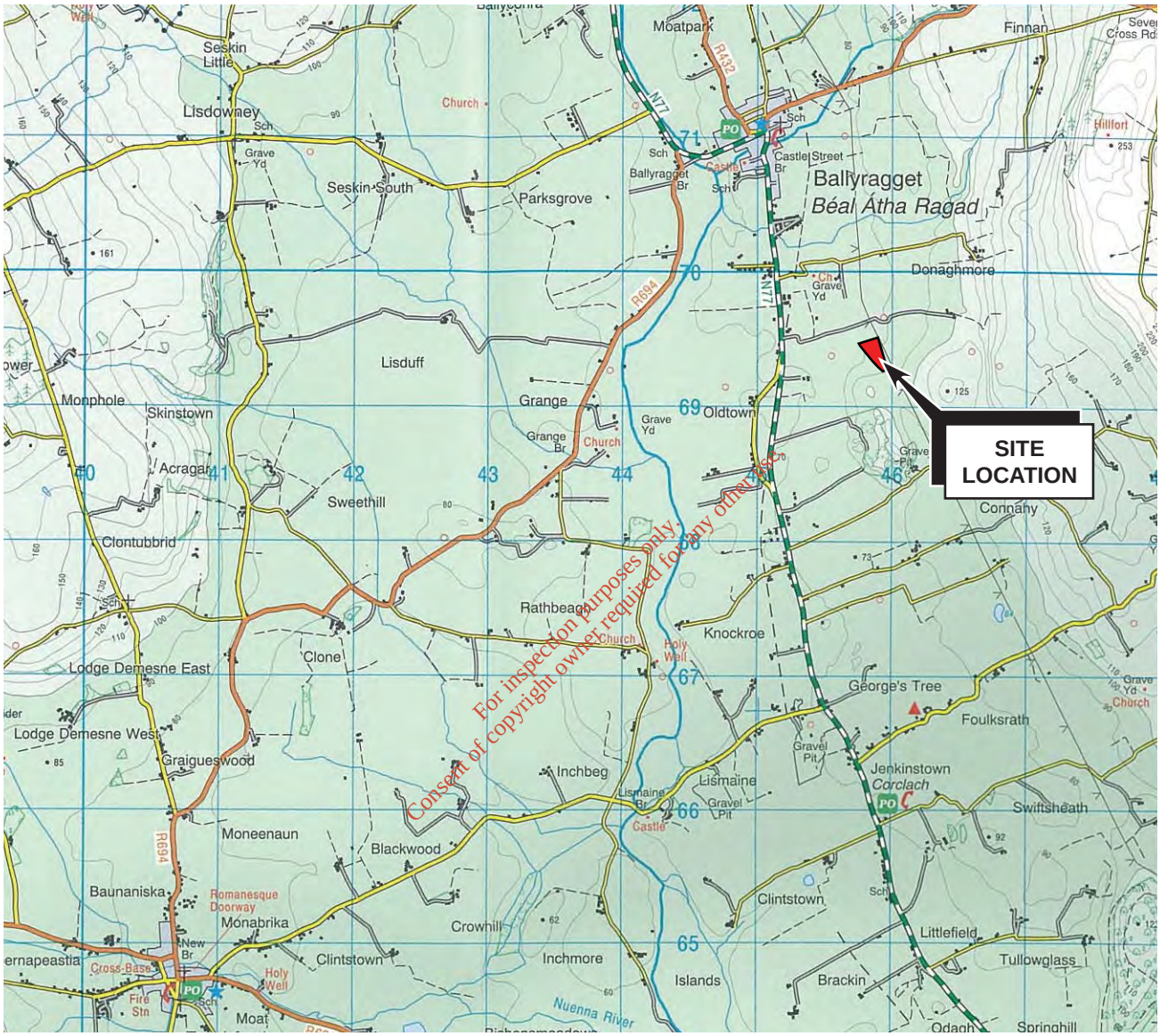
A further output of the assessment for vertical migration would be an estimated annual methane emission rates from the site, calculated in accordance with the guidance references above. This information can be used to further asses the likelihood of an explosive or asphyxiant atmosphere being present at the site.

If the risk assessment works outlined above identify the need for remediation of the site, then a remediation strategy report should be prepared for review by the EPA.

Figures

North





0 km 1 km 2 km 3 km

CLIENT
KILKENNY COUNTY COUNCIL

PROJECT LOCATION
SHERMAN'S SITE BALLYRAGGET, Co. KILKENNY.
TIER 2 ASSESSMENT OF FORMER LANDFILL SITE

DRAWING TITLE
FIGURE 1 - SITE LOCATION PLAN

ENVIRONMENTAL CONSULTANTS
URS
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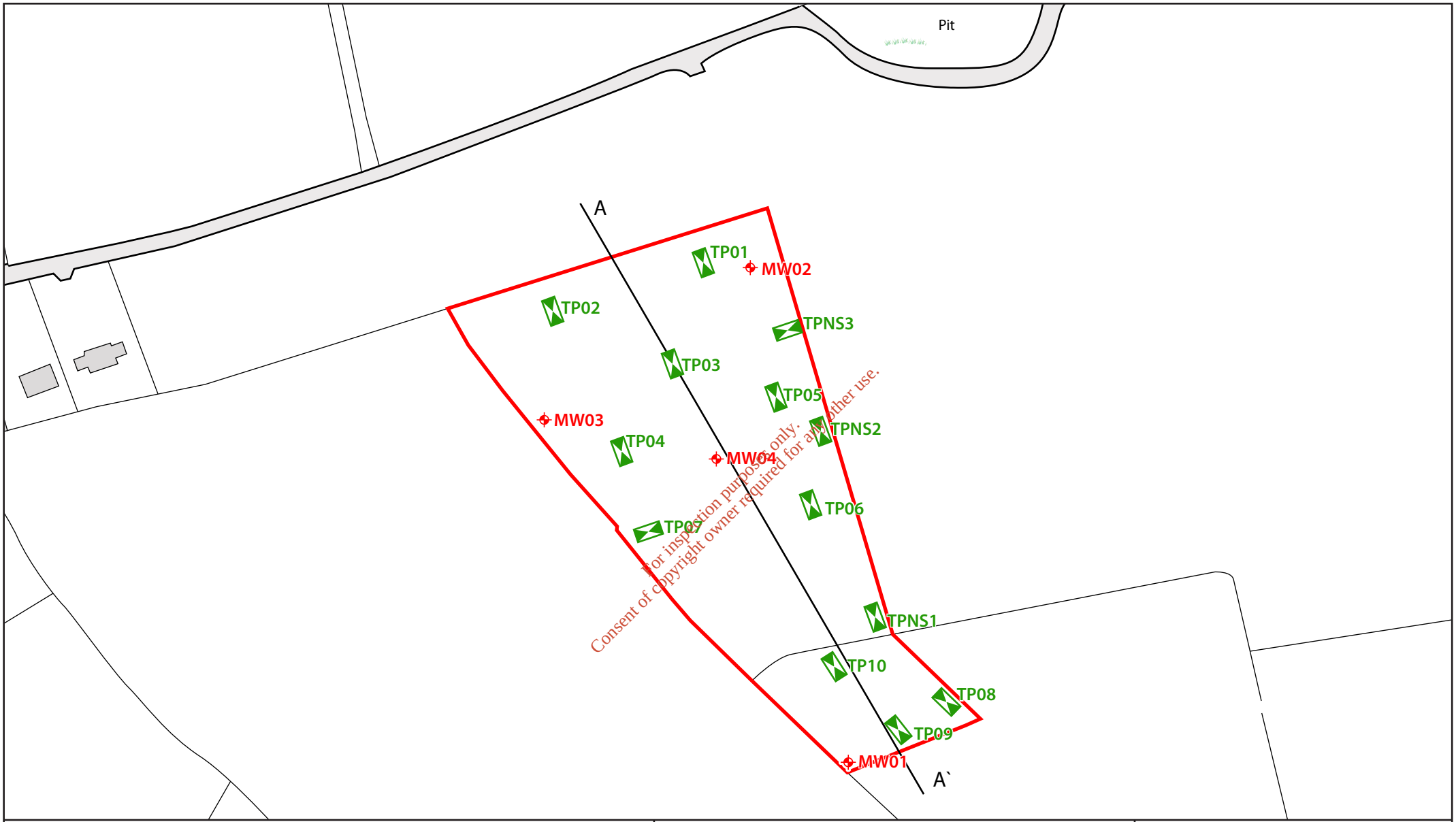
TEL +353 1 4155100 FAX +353 1 4155101

DRAWN	TRACED	CHECKED	APPROVED	DATE
SML		DM	DM/DUB	23.09.10
SCALE	Job No.			REV.
1:50,000	49341895			A



CLIENT	KILKENNY COUNTY COUNCIL
DRAWING TITLE	FIGURE 2 - MONITORING WELL AND TRIAL PIT LOCATION PLAN
PROJECT	BALLYRAGGET, COUNTY KILKENNY. TIER 2 ASSESSMENT OF FORMER LANDFILL

DRAWN	TRACED	CHECKED	APPROVED	DATE
SML		DM	DM/DUB	23.09.10

SCALE	Job No:	REV
AS SHOWN	49341895	A

Notes:

- SITE BOUNDARY LINE
- TRIAL PIT LOCATIONS
- MONITORING WELL LOCATIONS
- A↘A` CONCEPTUAL SITE MODEL ORIENTATION

STATUS: DRAFT

ENVIRONMENTAL CONSULTANTS

URS

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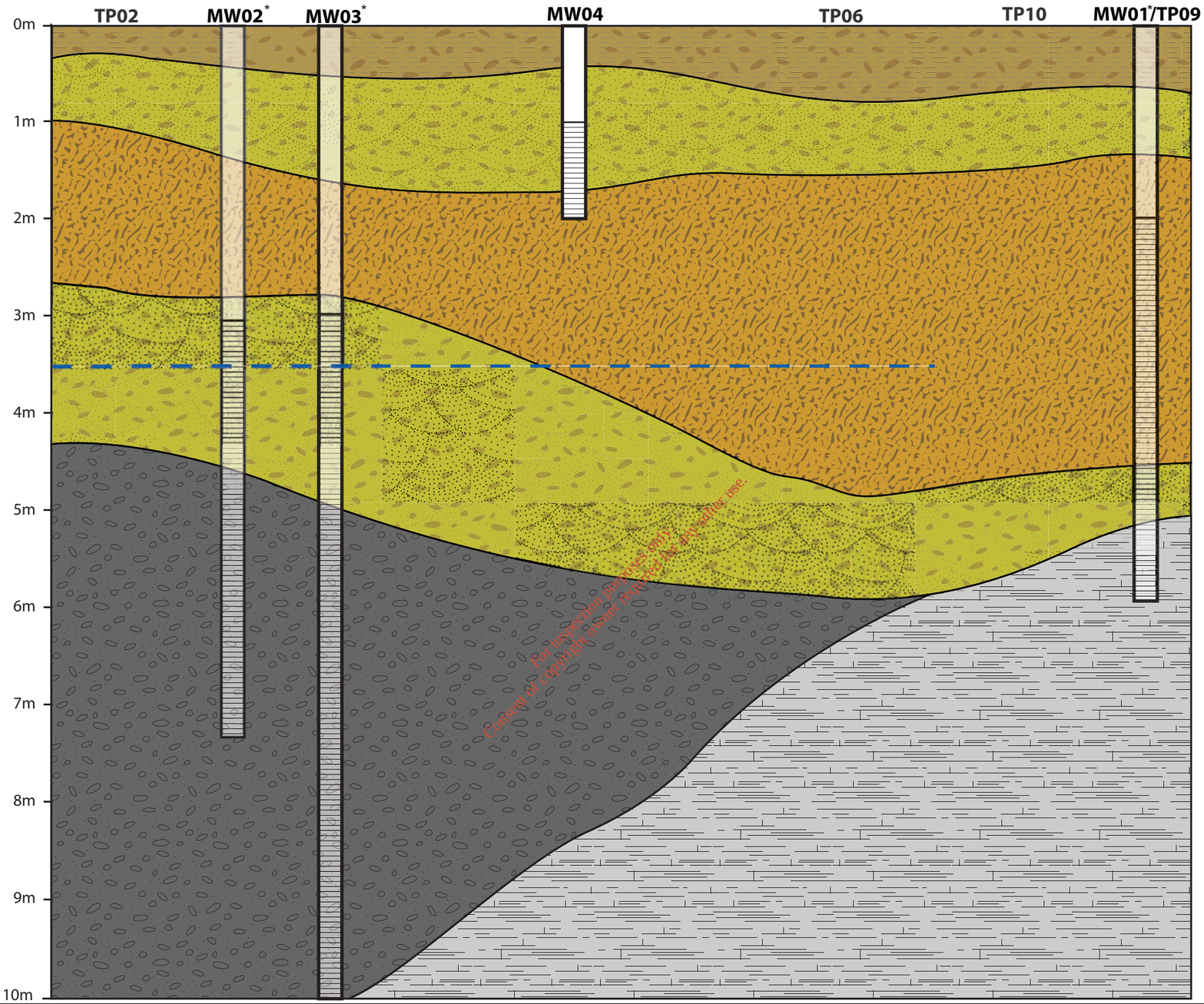
A

A`



*Note: Data from drilling of boreholes MW01, MW02 and MW03 used to construct this conceptual site model, however the Waste Body was not encountered at these locations.

CLIENT

KILKENNY COUNTY COUNCIL

PROJECT

TIER 2 ASSESSMENT OF FORMER LANDFILL SITE SHANNON SITE, BALLYRAGGET, Co. KILKENNY

DRAWING TITLE

FIGURE 3 _ CONCEPTUAL SITE MODEL - GEOLOGICAL CROSS SECTION A-A`

DRAWN	TRACED	CHECKED	APPROVED	DATE
SML		RC	DM/DUB	29.09.10
SCALE N.T.S	Job No: 49341895			REV A

KEY:

- SANDY GRAVEL
- BROWN GRAVELLY CLAY
- WASTE
- WEATHERED BEDROCK
- LIMESTONE BEDROCK
- APPROXIMATE GROUNDWATER TABLE

ENVIRONMENTAL CONSULTANTS

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Tables

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 1: Soil Analytical Results: Hydrocarbons
Land use: Commercial/Industrial

Sample Type					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID					TP02	TP03	TP05	TP05	TP06	TP08	TP10	MW04
Sample Depth					1.3-1.5	1.4-1.6	2.0-2.2	4.9-5.2	2.4-2.6	1.2-1.4	2.7-2.9	1.5
Date Sampled					8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	7-Sep-10
Parameters	**Units**	**MDL**	**Controlled Water GAC - Soil**	**Human Health GAC - Soil**								
Hydrocarbons												
Aromatics												
C5-C7	mg/kg	0.1	nv	49000	-	-	-	-	-	-	-	-
C7-C8	mg/kg	0.1	nv	118000	-	-	-	-	-	-	-	-
C8-C10	mg/kg	0.1	nv	10200	-	-	-	-	-	-	-	0.6
C10-C12	mg/kg	0.2	nv	30,400	-	-	-	-	-	-	-	29
C12-C16	mg/kg	4	nv	37,500	-	-	-	-	-	-	-	71
C16-C21	mg/kg	7	nv	28,400	13	-	-	17	12	18	39	114
C21-C35	mg/kg	7	nv	28,400	-	44	22	557	130	65	157	1095
Total Aromatics	mg/kg	19	nv	nv	-	44	22	574	142	83	196	1309
Aliphatics												
C5-C6	mg/kg	0.1	nv	6920	-	-	-	-	-	-	-	1.2
C6-C8	mg/kg	0.1	nv	21900	-	-	-	-	-	-	-	2.2
C8-C10	mg/kg	0.1	nv	6,240	-	0.5	0.1	-	0.5	-	0.7	1.1
C10-C12	mg/kg	0.2	nv	28,900	-	-	-	-	-	-	-	16
C12-C16	mg/kg	4	nv	85,100	-	-	-	4	-	-	-	-
C16-C21	mg/kg	7	nv	1,780,000	25	-	-	41	20	-	-	-
C21-C35	mg/kg	7	nv	1,780,000	-	-	-	2558	137	-	-	-
Total Aliphatics (MO)	mg/kg	19	nv	nv	25	-	-	2603	157	-	-	20
Total TPH	mg/kg	38	0.034	nv	38	44	-	3177	299	83	197	1329
BTEX												
Benzene	mg/kg	0.005	0.003	50.4	-	-	-	-	-	-	-	0.066
Toluene	mg/kg	0.005	0.103	118000	0.061	0.011	0.06	0.028	-	0.006	0.008	0.105
Ethylbenzene	mg/kg	0.005	0.224	37,700	-	-	0.009	-	0.007	-	-	0.158
Total Xylene	mg/kg	0.01	0.227	15500	-	-	0.036	-	0.027	-	0.014	0.49
BTEX	mg/kg	0.005	nv	nv	0.061	0.011	0.105	0.028	0.034	0.006	0.022	0.819
MTBE	mg/kg	0.005	0.052	11,300	-	-	-	-	-	-	-	-
TOC	%	0.2	nv	nv	7.4	11.8	1.2	1.1	2.1	7.3	13.4	16.6
PSD	%	0.2	nv	nv	7.4	11.8	1.2	1.1	2.1	7.3	13.4	16.6

xx	Exceeds Human Health Generic Assessment Criteria
xx	Exceeds Controlled Waters Generic Assessment
MDL	Method Detection Limit
-	Less than MDL
na	Not Analysed
nv	No Value

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 2: Soil Analytical Results: PAHs
Land use: Commercial/Industrial

Sample Type					Soil	Soil	Soil	Soil
Sample ID					TP02	TP05	TP08	MW04*
Sample Depth					1.3-1.5	2.0-2.2	1.2-1.4	1.5
Date Sampled					8-Sep-10	8-Sep-10	8-Sep-10	7-Sep-10
Parameters	**Units**	**MDL**	**Controlled Water GAC - Soil**	**Human Health GAC - Soil**				
PAHs								
Naphthalene	mg/kg	0.04	0.078	540	-	-	-	-
Acenaphthylene	mg/kg	0.03	nv	101,000	-	-	-	-
Acenaphthene	mg/kg	0.05	257.934	100,000	-	-	-	-
Fluorene	mg/kg	0.04	211.426	70,000	-	-	-	-
Phenanthrene	mg/kg	0.03	nv	22,500	0.09	0.11	-	-
Anthracene	mg/kg	0.04	0.028	541,000	-	0.04	-	-
Fluoranthene	mg/kg	0.03	0.091	22,700	0.12	0.3	-	-
Pyrene	mg/kg	0.03	892	54,500	0.09	0.33	-	-
Benz(a)anthracene	mg/kg	0.06	0.113	97.7	-	0.2	-	-
Chrysene	mg/kg	0.02	7.97	144	0.08	0.24	-	-
Benzo[bk]fluoranthene	mg/kg	0.07	2.62	103	-	0.46	-	-
Benzo(a)pyrene	mg/kg	0.04	0.048	14.5	-	0.23	-	-
Indeno(123cd)pyrene	mg/kg	0.04	0.218	62	-	0.24	-	-
Dibenzo(ah)anthracene	mg/kg	0.04	0.027	13	-	0.04	-	-
Benzo(ghi)perylene	mg/kg	0.04	1.04	663	-	0.2	-	-
Coronene	mg/kg	0.04	nv	nv	-	-	-	-
Total 17 EPA PAHs	mg/kg	0.64	nv	nv	0.38	2.39	-	-

xx	Exceeds Human Health Generic Assessment
xx	Exceeds Controlled Waters Generic Assessment
MDL	Method Detection Limit
-	Less than MDL
na	Not Analysed
nv	No Value
*	MDLs increased by a factor of 5 for sample MW04_1.5m

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 3: Soil Analytical Results: Heavy Metals
Land use: Commercial/Industrial

Sample Type						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID						TP02	TP03	TP05	TP05	TP06	TP08	TP10	MW04
Sample Depth						1.3-1.5	1.4-1.6	2.0-2.2	4.9-5.2	2.4-2.6	1.2-1.4	2.7-2.9	1.5
Date Sampled						8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	8-Sep-10	7-Sep-10
Parameters	**Units**	**MDL**	**Controlled Water GAC - Soil**	**Human Health GAC - Soil**	**EPA Background**								
Heavy Metals													
Arsenic	mg/kg	0.5	3.8	640	21.9	9.5	9.2	6.5	3.6	4.5	5.8	8.2	3.8
Cadmium	mg/kg	0.1	0.375	230	1.652	0.4	0.5	0.3	0.2	0.4	0.3	0.6	19.9
Chromium	mg/kg	0.5	48.8	34.8	86.8	20.1	12.4	7.7	6	7.3	6.9	11.8	14.7
Copper	mg/kg	1	150	71,700	45.9	37	38	24	13	18	214	44	50
Mercury	mg/kg	0.1	0.375	3,600	0.2	0.4	0.4	0.3	0.4	0.4	0.3	0.2	1.6
Nickel	mg/kg	0.7	7.5	1,800	50	22.1	22.3	12.7	10.3	11.3	10.6	24	9.2
Lead	mg/kg	5	675	6,010	62	39	68	20	10	18	22	42	288
Selenium	mg/kg	1	0.5	13,000	2.67	-	-	-	-	-	-	1	-
Zinc	mg/kg	5	0.3	665,000	144.7	224	136	91	43	72	61	211	249
Molybdenum	mg/kg	0.1	2.0	17,700	1903	1.6	1.6	0.5	0.4	0.4	0.5	1.3	3.5

xx	Exceeds Human Health Generic Assessment Criteria
xx	Exceeds Controlled Waters Generic Assessment
xx	Exceeds EPA Background Concentrations
MDL	Method Detection Limit
-	Less than MDL
na	Not Analysed
nv	No Value
IR	Insignificant risk to identified potential receptors

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 4: Groundwater Analytical Results: Hydrocarbons

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameter	**Units**	**MDL**	**GW Regs / IGV**		
Aliphatics					
C5-C6	ug/l	5	nv	-	-
C6-C8	ug/l	5	nv	-	-
C8-C10	ug/l	5	nv	-	-
C10-C12	ug/l	5	nv	-	-
C12-C16	ug/l	10	nv	-	-
C16-C21	ug/l	10	nv	-	-
C21-C35	ug/l	10	nv	-	-
Total Aliphatics	ug/l	10	nv	-	-
Aromatics					
C6-C7	ug/l	5	nv	-	-
C7-C8	ug/l	5	nv	-	-
C8-C10	ug/l	5	nv	-	-
C10-C12	ug/l	5	nv	-	-
C12-C16	ug/l	10	nv	-	17
C16-C21	ug/l	10	nv	78	89
C21-C35	ug/l	10	nv	-	-
Total Aromatics	ug/l	10	nv	78	106
TPH	ug/l	10	10	**78**	**106**
MTBE	ug/l	5	30	-	-
Benzene	ug/l	5	0.75	-	-
Toulene	ug/l	5	10	-	-
Ethylbenzene	ug/l	5	10	-	-
Xylenes	ug/l	10	10	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010
	IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 5: Groundwater Analytical Results: PAHs

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameter	**Units**	**MDL**	**GW Regs / IGV**		
PAHs					
Naphthalene	ug/l	10	1	-	-
Acenaphthylene	ug/l	10	nv	-	-
Acenaphthene	ug/l	10	nv	-	-
Fluorene	ug/l	10	nv	-	-
Phenanthrene	ug/l	10	nv	-	-
Anthracene	ug/l	10	10000	-	-
Fluoranthene	ug/l	10	1	-	-
Pyrene	ug/l	10	nv	-	-
Benzo(a)anthracene	ug/l	10	nv	-	-
Chrysene	ug/l	10	nv	-	-
Benzo(b)+Benzo(k) fluoranthene**	ug/l	10	0.05*	-	-
Benzo(a)pyrene	ug/l	10	0.0075	-	-
Indeno(123cd)pyrene**	ug/l	10	0.05	-	-
Dibenzo(ah)anthracene	ug/l	10	nv	-	-
Benzo(ghi)perylene**	ug/l	10	0.05	-	-
Sum 4 PAHs	ug/l	nv	0.1	-	-
Sum 16 PAHs	ug/l	nv	0.075	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value
*	Laboratory results are presented as a sum of the 2 compounds. Consequently, the lower IGV of 0.05mg/l for benzo(k)fluoranthene is used
**	Included in sum of 4 PAHs

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 6: Groundwater Analytical Results: Heavy Metals

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameters	**UNITS**	**MDL**	**GW Regs / IGV**		
Metals					
Arsenic	ug/l	2.5	7.5	-	-
Cadmium	ug/l	0.5	3.75	-	-
Chromium	ug/l	1.5	30	-	-
Copper	ug/l	7	30	-	-
Mercury	ug/l	1	0.75	-	-
Nickel	ug/l	2	15	2	6
Lead	ug/l	5	10	-	-
Selenium	ug/l	3	nv	-	-
Zinc	ug/l	3	100	-	11

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 7: Groundwater Analytical Results: Various

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameter	**Units**	**MDL**	**GW Regs / IGV**		
Anions and Cations					
Phosphorus	mg/l	0.005	0.035	**0.914**	**0.852**
Boron	mg/l	0.012	750	0.064	0.059
Iron	mg/l	0.02	0.2	-	-
Manganese	mg/l	0.002	0.05	**0.07**	**0.095**
Calcium	mg/l	0.2	200	169.3	**248.7**
Magnesium	mg/l	0.1	50	12.6	30.1
Potassium	mg/l	0.1	5	3.7	**7.2**
Sodium	mg/l	0.15	150	15	31.8
Chloride	mg/l	0.3	30	22.4	47.2
Fluoride	mg/l	0.3	1	-	-
Sulphate	mg/l	0.05	200	7.55	52.84
Alkalinity as $CaCO_3$	mg/l	1	nac	353	485
Total Dissolved Solids	mg/l	35	1000	598	597
Total Suspended Solids	mg/l	10	nv	829	72
Nutrients					
Ammonia (as ammonium)**	mg/l	0.04	0.15	**1.41**	**0.39**
Nitrate	mg/l	0.2	25	19.7	3.4
Nitrite	mg/l	0.02	0.1	**2.08**	0.09
Miscellaneous					
TOC	mg/l	2	nac	25	26
Total Cyanide	mg/l	0.04	0.01	-	-
Total Oxidised Nitrogen	mg/l	0.05	nac	5.1	0.8
Total Phenols	mg/l	0.01	0.5	-	-
Dissolved Methane	mg/l	0.001	nv	-	-
Electrical Conductivity*	uS/cm	nv	1000	605	**1268**
pH*	pH Units	nv	>6.5 - <9.5	6.8	6.91
Redox Potential*	mV	nv	nv	120.7	110.3
Temperature*	°C	nv	25°C	12.4	14.4

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nac	No abnormal change
nv	No Value
*	Measured in the field
**	Conversion factor of 1.286 used to convert ammoniacial nitrogen (as N) to ammonium (NH_4)

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 8: Groundwater Analytical Results: VOCs

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameters	**Units**	**MDL**	**GW Regs / IGV**		
Dichlorodifluoromethane	ug/l	2	nv	-	-
Chloromethane	ug/l	3	nv	-	-
Vinyl Chloride	ug/l	2	0.375	-	-
Bromomethane	ug/l	1	nv	-	-
Chloroethane	ug/l	3	nv	-	-
Trichlorofluoromethane	ug/l	3	nv	-	-
1,1-Dichloroethene	ug/l	3	nv	-	-
Carbon Disulphide	ug/l	3	nv	nv	nv
Dichloromethane	ug/l	3	10	-	-
Tert-butyl methyl ether	ug/l	2	30	-	-
Trans-1,2-Dichoroethene	ug/l	3	nv	-	-
1,1-Dichloroethane	ug/l	3	nv	-	-
Cis-1,2-Dichloroethene	ug/l	3	nv	-	-
2,2-Dichloropropane	ug/l	1	nv	-	-
Bromochloromethane	ug/l	2	nv	-	-
Chloroform	ug/l	3	12	-	-
1,1,1-Trichloroethane	ug/l	3	500	-	-
1,1-Dichloropropene	ug/l	3	nv	-	-
Carbontetrachloride	ug/l	2	nv	-	-
1,2-Dichloroethane	ug/l	2	2.25	-	-
Benzene	ug/l	3	1	-	-
Trichloroethene	ug/l	3	7.5	-	-
1,2-Dichloropropane	ug/l	2	nv	-	-
Dibromomethane	ug/l	3	nv	-	-
Bromodichloromethane	ug/l	3	nv	-	-
Cis-1,3-Dichloropropene	ug/l	2	nv	-	-
Toluene	ug/l	3	10	-	-
Trans-1,3-Dichloropropene	ug/l	2	nv	-	-
1,1,2-Trichloroethane	ug/l	2	nv	-	-
1,3-Dichloropropane	ug/l	2	nv	-	-
Tetrachloroethene	ug/l	3	7.5	-	-
Dibromochloromethane	ug/l	2	nv	-	-
1,2-Dibromoethane	ug/l	2	nv	-	-
Chlorobenzene	ug/l	2	1	-	-
1,1,1,2-tetrachloroethane	ug/l	2	nv	-	-
Ethylbenzene	ug/l	3	10	-	-
p/m-Xylene	ug/l	5	10	-	-
o-Xylene	ug/l	3	10	-	-
Styrene	ug/l	2	nv	-	-
Bromoform	ug/l	2	nv	-	-
Isopropylbenzene	ug/l	3	nv	-	-
1,1,2,2-Tetrachloroethane	ug/l	4	nv	-	-
1,2,3-Trichloropropane	ug/l	3	nv	-	-
Bromobenzene	ug/l	2	nv	-	-
Propylbenzene	ug/l	3	nv	-	-
2-Chlorotoluene	ug/l	3	nv	-	-
1,3,5-Trimethylbenzene	ug/l	3	nv	-	-
4-Chlorotoluene	ug/l	3	nv	-	-
Tert-Butylbenzene	ug/l	3	nv	-	-
1,2,4-Trimethylbenzene	ug/l	3	nv	-	-
Sec-Butylbenzene	ug/l	3	nv	-	-
4-Isopropyltoluene	ug/l	3	nv	-	-
1,3-Dichlorobenzene	ug/l	3	nv	-	-
1,4-Dichlorobenzene	ug/l	3	nv	-	-
n-Butylbenzene	ug/l	3	nv	-	-
1,2-Dichlorobenzene	ug/l	3	10	-	-
1,2-Dibromo-3-Chloropropan	ug/l	2	nv	-	-
1,2,4-Trichlorobenzene	ug/l	3	0.4	-	-
Hexachlorobutadiene	ug/l	3	0.1	-	-
Naphthalene	ug/l	2	1	-	-
1,2,3-Trichlorobenzene	ug/l	3	nv	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value
nd	Not Detected

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co
Job No: 49341895
Table 9: Groundwater Analytical Results: SVOCs

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameters	**Units**	**MDL**	**GW Regs / IGV**		
Phenol	ug/l	10	0.5	-	-
2-Chlorophenol	ug/l	10	200	-	-
2-Methylphenol	ug/l	10	nv	-	-
4-Methylphenol	ug/l	10	nv	-	-
2-Nitrophenol	ug/l	10	nv	-	-
4-Nitrophenol	ug/l	10	nv	-	-
2,4-Dichlorophenol	ug/l	10	nv	-	-
2,4-Dimethylphenol	ug/l	10	nv	-	-
4-Chloro-3-methylphenol	ug/l	10	nv	-	-
2,4,6-Trichlorophenol	ug/l	10	200	-	-
2,4,5-Trichlorophenol	ug/l	10	nv	-	-
Pentachlorophenol	ug/l	10	2	-	-
1,3-Dichlorobenzene	ug/l	10	nv	-	-
1,4-Dichlorobenzene	ug/l	10	10	-	-
1,2-Dichlorobenzene	ug/l	10	10	-	-
1,2,4-Trichlorobenzene	ug/l	10	0.4	-	-
Nitrobenzene	ug/l	10	10	-	-
Azobenzene	ug/l	10	nv	-	-
Hexachlorobenzene	ug/l	10	0.03	-	-
Naphthalene	ug/l	10	1	-	-
Acenaphthylene	ug/l	10	nv	-	-
Acenaphthene	ug/l	10	nv	-	-
Fluorene	ug/l	10	nv	-	-
Phenanthrene	ug/l	10	nv	-	-
Anthracene	ug/l	10	10000	-	-
Fluoranthrene	ug/l	10	1	-	-
Pyrene	ug/l	10	nv	-	-
Benzo(a)anthracene	ug/l	10	nv	-	-
Chrysene	ug/l	10	nv	-	-
Benzo(b)fluoranthrene	ug/l	10	0.5	-	-
Benzo(k)fluoranthrene	ug/l	10	0.05	-	-
Benzo(a)pyrene	ug/l	10	0.01	-	-
Indeno(1,2,3-cd)pyrene	ug/l	10	0.05	-	-
Dibenzo(a,h)anthracene	ug/l	10	nv	-	-
Benzo(ghi)perylene	ug/l	10	0.05	-	-
2-Chloronaphthalene	ug/l	10	nv	-	-
2-Methylnaphthalene	ug/l	10	nv	-	-
Carbazole	ug/l	10	nv	-	-
Isophorone	ug/l	10	nv	-	-
Dibenzofuran	ug/l	10	nv	-	-
Dimethyl phthalate	ug/l	10	nv	-	-
Diethyl phthalate	ug/l	10	10	-	-
Di-n-butylphthalate	ug/l	10	2	-	-
Di-n-octylphthalate	ug/l	10	0.1	-	-
Bis(2-ethylhexyl)phthalate	ug/l	10	8	-	-
Butylbenzylphthalate	ug/l	10	1	-	-
4-Chloroaniline	ug/l	10	nv	-	-
2-Nitroanaline	ug/l	10	10	-	-
3-Nitroaniline	ug/l	10	10	-	-
4-Nitroaniline	ug/l	10	nv	-	-
2,4-Dinitrotoluene	ug/l	10	nv	-	-
2,6-Dinitrotoluene	ug/l	10	nv	-	-
Bis(2-chloroethyl)ether	ug/l	10	30	-	-
4-Bromophenylphenylether	ug/l	10	nv	-	-
4-Chlorophenylphenylether	ug/l	10	40	-	-
Hexachloroethane	ug/l	10	10	-	-
Hexachlorobutadiene	ug/l	10	0.1	-	-
Hexchlorocyclopentadiene	ug/l	10	nv	-	-
Bis(2-chloroethoxy)methane	ug/l	10	10	-	-
N-nitrosodi-n-propylamine	ug/l	10	nv	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value
nd	Not Detected

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 10: Groundwater Analytical Results: Pesticides

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameters	**Units**	**MDL**	**GW Regs / IGV**		
Dichlorvos	ug/l	0.01	0.001	-	-
Mevinphos	ug/l	0.01	nv	-	-
Alpha-BHC	ug/l	0.01	nv	-	-
Beta-BHC	ug/l	0.01	nv	-	-
Gamma-BHC	ug/l	0.01	nv	-	-
Diazinon	ug/l	0.01	nv	-	-
Methyl Parathion	ug/l	0.01	nv	-	-
Ethyl Parathion (Parathion)	ug/l	0.01	nv	-	-
Heptachlor	ug/l	0.01	nv	-	-
Fenitrothion	ug/l	0.01	nv	-	-
Aldrin	ug/l	0.01	0.01	-	-
Malathion	ug/l	0.01	0.01	-	-
Heptachlor Epoxide	ug/l	0.01	nv	-	-
Endosulfan I	ug/l	0.01	0.001	-	-
Dieldrin	ug/l	0.01	0.075	-	-
4, 4'-DDE	ug/l	0.01	nv	-	-
Endosulfan II	ug/l	0.01	0.001	-	-
4,4'-DDD	ug/l	0.01	nv	-	-
Ethion	ug/l	0.01	nv	-	-
Endrin	ug/l	0.01	nv	-	-
Endosulfan Sulphate	ug/l	0.01	nv	-	-
4,4'-DDT	ug/l	0.01	0.075	-	-
Methoxychlor	ug/l	0.01	nv	-	-
Azinphos Methyl	ug/l	0.01	nv	-	-
Disulfoton	ug/l	0.01	nv	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value
nd	Not Detected

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 11: Groundwater Analytical Results: Herbicides

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameters	**Units**	**MDL**	**GW Regs / IGV**		
Benazolin	ug/l	0.1	nv	-	-
Bentazone	ug/l	0.1	nv	-	-
Bromoxynil	ug/l	0.1	nv	-	-
Clopyralid	ug/l	0.1	nv	-	-
4- CPA	ug/l	0.1	nv	-	-
2,4 – D	ug/l	0.1	nv	-	-
2,4 –DB	ug/l	0.1	nv	-	-
Dicamba	ug/l	0.1	nv	-	-
Dichloroprop	ug/l	0.1	100	-	-
Diclofop	ug/l	0.1	nv	-	-
Fenoprop	ug/l	0.1	nv	-	-
Flamprop	ug/l	0.1	nv	-	-
Flamprop – isopropyl	ug/l	0.1	nv	-	-
Ioxynil	ug/l	0.1	nv	-	-
MCPA	ug/l	0.1	nv	-	-
MCPB	ug/l	0.1	nv	-	-
Mecoprop	ug/l	0.1	10	-	-
Picloram	ug/l	0.1	nv	-	-
Pentachlorophenol	ug/l	0.1	2	-	-
2,4,5 – T	ug/l	0.1	nv	-	-
2,3,6 – TBA	ug/l	0.1	nv	-	-
Triclopyr	ug/l	0.1	nv	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value
nd	Not Detected

Client: Kilkenny County Council
Project: Tier 2 Investigation
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 12: Groundwater Analytical Results: Biological

Sample Type				Groundwater	Groundwater
Sample ID				MW02	MW03
Date Sampled				9-Sep-10	9-Sep-10
Parameter	**Units**	**MDL**	**GW Regs / IGV**		
Biological					
Biological Oxygen Demand (BOD)	mg/l	1	nv	8	3
Chemical Oxygen Demand (COD)	mg/l	10	nv	68	67
Coliforms	cfu/100ml	1	0	-	-

xx	GW Regs = EC Environmental Objectives (Groundwater) Regulations, 2010, S.I. No. 9 of 2010 IGV = Interim Guideline Value (Towards Setting Guideline Values for the Protection of Groundwater in Ireland – Interim Report, EPA)
MDL	Method Detection Limit
-	Less than the MDL
na	Not Analysed
nv	No Value

Client: Kilkenny County Council
Project: Tier 2 Assessment
Location: Ballyragget, Co Kilkenny
Job No: 49341895
Table 13: Landfill Gas Readings

Field Identification	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Atmospheric Pressure (mB)
MW01	08/09/2010	0.00	21.00	0.01	992
MW02	09/09/2010	0.00	20.80	0.01	1003
MW03	07/09/2010	0.00	20.89	0.01	986
MW04	08/09/2010	11.60	8.70	15.20	994
MW04	09/09/2010	28.50	0.40	27.80	1003
TP01	08/09/2010	0.00	21.00	0.00	990
TP02	08/09/2010	0.00	20.90	0.01	992
TP03	08/09/2010	0.00	20.90	0.00	990
TP04	08/09/2010	0.00	20.90	0.00	990
TP05	08/09/2010	0.00	20.60	0.00	990
TP06	08/09/2010	0.00	21.00	0.00	992
TP07	08/09/2010	0.00	20.80	0.00	992
TP08	08/09/2010	0.00	20.80	0.00	996
TP10	08/09/2010	0.00	20.90	0.00	993
Bungalow	09/09/2010	0.00	21.00	0.00	998

Appendix A - Photographs

Photograph No: 1

View from southern site boundary looking north towards Ballyragget.

Photograph No: 2

Distressed vegetation on surface of the site.

Photograph No: 3 Example of natural gravel sequence beneath site.

Photograph No: 4 Natural clays and gravels at location TP01.

Photograph No: 5 Material used to cap waste body at location TP04.

Photograph No: 6 Waste materials from trial pit TP03.

Photograph No: 7 Waste materials from trial pit TP06.

Photograph No: 8 Evidence of age of waste at location TP05.

Appendix B - Laboratory Reports

Jones Environmental Laboratory

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

Tel: +44 (0) 1244 833780
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URS Corporation
4th Floor Iveagh Court
6/8 Harcourt Road
Dublin 2

UKAS TESTING
No.4225

Attention :	David Mullen
Date :	20th September 2010
Your reference :	49341
Our reference :	Test Report 10/4252
Location :	Ballyragget
Date samples received :	10/09/10
Status :	Final Report
Issue :	1

Forty five samples were received for analysis on 10th September 2010 which was completed on 20th September 2010. 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.
All interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist

Client Name: URS Corporation **Report :** **Solids**

Reference: 49341

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

Contact: David Mullen

JE Job No.: 10/4252

J E Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-16	17-19	20-22	23-24	LOD	Units	Method No.
Sample ID	TP01	TP01	TP01	TP02	TP02	TP02	TP03	TP03	TP03	TP04			
Depth	0.3-0.5	0.9-1.0	2.7-2.8	0.4-0.5	1.3-1.5	2.8-3.0	0.2-0.3	1.4-1.6	3.0-3.1	0.3-0.4			
COC No / misc													
Containers	V,V	V,V	V,V,B	V,V	V,V	V,V,B	V,V	V,V,B	V,V,B	V,V			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
TPHCWG - Aliphatics													
>C5-C6 #	~	~	~	~	<0.1	~	~	<0.1	~	~	<0.1	mg/ kg	TM3/PM12
>C6-C8 #	~	~	~	~	<0.1	~	~	<0.1	~	~	<0.1	mg/ kg	TM3/PM12
>C8-C10	~	~	~	~	<0.1	~	~	0.5	~	~	<0.1	mg/ kg	TM3/PM12
>C10-C12#	~	~	~	~	<0.2	~	~	<0.2	~	~	<0.2	mg/ kg	TM5/PM8
>C12-C16#	~	~	~	~	<4	~	~	<4	~	~	<4	mg/ kg	TM5/PM8
>C16-C21#	~	~	~	~	25	~	~	<7	~	~	<7	mg/ kg	TM5/PM8
>C21-C35#	~	~	~	~	<7	~	~	<7	~	~	<7	mg/ kg	TM5/PM8
Total aliphatics C5-35#	~	~	~	~	25	~	~	<19	~	~	<19	mg/ kg	
TPHCWG - Aromatics													
>C5-EC7 #	~	~	~	~	<0.1	~	~	<0.1	~	~	<0.1	mg/ kg	TM3/PM12
>EC7-EC8 #	~	~	~	~	<0.1	~	~	<0.1	~	~	<0.1	mg/ kg	TM3/PM12
>EC8-EC10 #	~	~	~	~	<0.1	~	~	<0.1	~	~	<0.1	mg/ kg	TM3/PM12
>EC10-EC12#	~	~	~	~	<0.2	~	~	<0.2	~	~	<0.2	mg/ kg	TM5/PM8
>EC12-EC16#	~	~	~	~	<4	~	~	<4	~	~	<4	mg/ kg	TM5/PM8
>EC16-EC21#	~	~	~	~	13	~	~	<7	~	~	<7	mg/ kg	TM5/PM8
>EC21-EC35#	~	~	~	~	<7	~	~	44	~	~	<7	mg/ kg	TM5/PM8
Total aromatics C5-35#	~	~	~	~	<19	~	~	44	~	~	<19	mg/ kg	TM5/PM8
Total aliphatics and aromatics(C5-35)#	~	~	~	~	38	~	~	44	~	~	<38	mg/kg	
BTEX/MTBE# GC-FID													
MTBE #	~	~	~	~	<5	~	~	<5	~	~	<5	µg/ kg	TM31/PM7
Benzene #	~	~	~	~	<5	~	~	<5	~	~	<5	µg/ kg	TM31/PM7
Toluene #	~	~	~	~	61	~	~	11	~	~	<5	µg/ kg	TM31/PM7
Ethyl benzene #	~	~	~	~	<5	~	~	<5	~	~	<5	µg/ kg	TM31/PM7
m/p-Xylene #	~	~	~	~	<5	~	~	<5	~	~	<5	µg/ kg	TM31/PM7
o-Xylene#	~	~	~	~	<5	~	~	<5	~	~	<5	µg/ kg	TM31/PM7
Total Xylenes	~	~	~	~	<10	~	~	<10	~	~	<10	µg/ kg	TM31/PM7

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	1-2	3-4	5-7	8-9	10-11	12-14	15-16	17-19	20-22	23-24	LOD	Units	Method No.
Sample ID	TP01	TP01	TP01	TP02	TP02	TP02	TP03	TP03	TP03	TP04			
Depth	0.3-0.5	0.9-1.0	2.7-2.8	0.4-0.5	1.3-1.5	2.8-3.0	0.2-0.3	1.4-1.6	3.0-3.1	0.3-0.4			
COC No / misc													
Containers	V,V	V,V	V,V,B	V,V	V,V	V,V,B	V,V	V,V,B	V,V,B	V,V			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
PAH 16 MS #													
Naphthalene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Acenaphthylene	~	~	~	~	<0.03	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Acenaphthene #	~	~	~	~	<0.05	~	~	~	~	~	<0.05	mg/kg	TM4/PM8
Fluorene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Phenanthrene #	~	~	~	~	0.09	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Anthracene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Fluoranthene #	~	~	~	~	0.12	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Pyrene #	~	~	~	~	0.09	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	~	~	~	~	<0.06	~	~	~	~	~	<0.06	mg/kg	TM4/PM8
Chrysene #	~	~	~	~	0.08	~	~	~	~	~	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	~	~	~	~	<0.07	~	~	~	~	~	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Coronene	~	~	~	~	<0.04	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
PAH 17 Total	~	~	~	~	<0.64	~	~	~	~	~	<0.64	mg/kg	TM4/PM8
TOC#	~	~	~	~	7.4	~	~	11.8	~	~	<0.2	%	TM21
Arsenic #	~	~	~	~	9.5	~	~	9.2	~	~	<0.5	mg/kg	TM030
Cadmium #	~	~	~	~	0.4	~	~	0.5	~	~	<0.1	mg/kg	TM030
Chromium #	~	~	~	~	20.1	~	~	12.4	~	~	<0.5	mg/kg	TM030
Copper #	~	~	~	~	37	~	~	38	~	~	<1	mg/kg	TM030
Mercury #	~	~	~	~	0.4	~	~	0.4	~	~	<0.1	mg/kg	TM030
Nickel #	~	~	~	~	22.1	~	~	22.3	~	~	<0.7	mg/kg	TM030
Lead #	~	~	~	~	39	~	~	68	~	~	<5	mg/kg	TM030
Selenium #	~	~	~	~	<1	~	~	<1	~	~	<1	mg/kg	TM030
Zinc #	~	~	~	~	224	~	~	136	~	~	<5	mg/kg	TM030
Molybdenum #	~	~	~	~	1.6	~	~	1.6	~	~	<0.1	mg/kg	TM030

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	25-26	27-29	30-31	32-33	34-35	36-37	38-40	41-42	43-44	45-46	LOD	Units	Method No.
Sample ID	TP04	TP04	TP04	TP05	TP05	TP05	TP05	TP06	TP06	TP06			
Depth	1.0-1.2	2.0-2.2	3.1-3.3	0.4-0.6	1.2-1.4	2.0-2.2	4.9-5.2	0.4-0.6	1.2-1.4	2.4-2.6			
COC No / misc													
Containers	V,V	V,V,B	V,V	V,V	V,V	V,V	V,V,B	V,V	V,V	V,V			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
TPHCWG - Aliphatics													
>C5-C6 #	~	~	~	~	~	<0.1	<0.1	~	~	<0.1	<0.1	mg/ kg	TM3/PM12
>C6-C8 #	~	~	~	~	~	<0.1	<0.1	~	~	<0.1	<0.1	mg/ kg	TM3/PM12
>C8-C10	~	~	~	~	~	0.1	<0.1	~	~	0.5	<0.1	mg/ kg	TM3/PM12
>C10-C12#	~	~	~	~	~	<0.2	<0.2	~	~	<0.2	<0.2	mg/ kg	TM5/PM8
>C12-C16#	~	~	~	~	~	<4	4	~	~	<4	<4	mg/ kg	TM5/PM8
>C16-C21#	~	~	~	~	~	<7	41	~	~	20	<7	mg/ kg	TM5/PM8
>C21-C35#	~	~	~	~	~	<7	2558	~	~	137	<7	mg/ kg	TM5/PM8
Total aliphatics C5-35#	~	~	~	~	~	<19	2603	~	~	157	<19	mg/ kg	
TPHCWG - Aromatics													
>C5-EC7 #	~	~	~	~	~	<0.1	<0.1	~	~	<0.1	<0.1	mg/ kg	TM3/PM12
>EC7-EC8 #	~	~	~	~	~	<0.1	<0.1	~	~	<0.1	<0.1	mg/ kg	TM3/PM12
>EC8-EC10 #	~	~	~	~	~	<0.1	<0.1	~	~	<0.1	<0.1	mg/ kg	TM3/PM12
>EC10-EC12#	~	~	~	~	~	<0.2	<0.2	~	~	<0.2	<0.2	mg/ kg	TM5/PM8
>EC12-EC16#	~	~	~	~	~	<4	<4	~	~	<4	<4	mg/ kg	TM5/PM8
>EC16-EC21#	~	~	~	~	~	<7	<7	~	~	12	<7	mg/ kg	TM5/PM8
>EC21-EC35#	~	~	~	~	~	22	557	~	~	130	<7	mg/ kg	TM5/PM8
Total aromatics C5-35#	~	~	~	~	~	22	574	~	~	142	<19	mg/ kg	TM5/PM8
Total aliphatics and aromatics(C5-35)#	~	~	~	~	~	<38	3177	~	~	299	<38	mg/kg	
BTEX/MTBE# GC-FID													
MTBE #	~	~	~	~	~	<5	<5	~	~	<5	<5	µg/ kg	TM31/PM7
Benzene #	~	~	~	~	~	<5	<5	~	~	<5	<5	µg/ kg	TM31/PM7
Toluene #	~	~	~	~	~	60	28	~	~	<5	<5	µg/ kg	TM31/PM7
Ethyl benzene #	~	~	~	~	~	9	<5	~	~	7	<5	µg/ kg	TM31/PM7
m/p-Xylene #	~	~	~	~	~	28	6	~	~	19	<5	µg/ kg	TM31/PM7
o-Xylene #	~	~	~	~	~	8	<5	~	~	8	<5	µg/ kg	TM31/PM7
Total Xylenes	~	~	~	~	~	36	<10	~	~	27	<10	µg/ kg	TM31/PM7

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	25-26	27-29	30-31	32-33	34-35	36-37	38-40	41-42	43-44	45-46	LOD	Units	Method No.
Sample ID	TP04	TP04	TP04	TP05	TP05	TP05	TP05	TP06	TP06	TP06			
Depth	1.0-1.2	2.0-2.2	3.1-3.3	0.4-0.6	1.2-1.4	2.0-2.2	4.9-5.2	0.4-0.6	1.2-1.4	2.4-2.6			
COC No / misc													
Containers	V,V	V,V,B	V,V	V,V	V,V	V,V	V,V,B	V,V	V,V	V,V			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
PAH 16 MS #													
Naphthalene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Acenaphthylene	~	~	~	~	~	<0.03	~	~	~	~	<0.03	mg/kg	TM4/PM8
Acenaphthene #	~	~	~	~	~	<0.05	~	~	~	~	<0.05	mg/kg	TM4/PM8
Fluorene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Phenanthrene #	~	~	~	~	~	0.11	~	~	~	~	<0.03	mg/kg	TM4/PM8
Anthracene #	~	~	~	~	~	0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Fluoranthene #	~	~	~	~	~	0.30	~	~	~	~	<0.03	mg/kg	TM4/PM8
Pyrene #	~	~	~	~	~	0.33	~	~	~	~	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	~	~	~	~	~	0.20	~	~	~	~	<0.06	mg/kg	TM4/PM8
Chrysene #	~	~	~	~	~	0.24	~	~	~	~	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	~	~	~	~	~	0.46	~	~	~	~	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	~	~	~	~	~	0.23	~	~	~	~	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	~	~	~	~	~	0.24	~	~	~	~	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	~	~	~	~	~	0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	~	~	~	~	~	0.20	~	~	~	~	<0.04	mg/kg	TM4/PM8
Coronene	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
PAH 17 Total	~	~	~	~	~	2.39	~	~	~	~	<0.64	mg/kg	TM4/PM8
TOC#	~	~	~	~	~	1.2	1.1	~	~	2.1	<0.2	%	TM21
Arsenic #	~	~	~	~	~	6.5	3.6	~	~	4.5	<0.5	mg/kg	TM030
Cadmium #	~	~	~	~	~	0.3	0.2	~	~	0.4	<0.1	mg/kg	TM030
Chromium #	~	~	~	~	~	7.7	6.0	~	~	7.3	<0.5	mg/kg	TM030
Copper #	~	~	~	~	~	24	13	~	~	18	<1	mg/kg	TM030
Mercury #	~	~	~	~	~	0.3	0.4	~	~	0.4	<0.1	mg/kg	TM030
Nickel #	~	~	~	~	~	12.7	10.3	~	~	11.3	<0.7	mg/kg	TM030
Lead #	~	~	~	~	~	20	10	~	~	18	<5	mg/kg	TM030
Selenium #	~	~	~	~	~	<1	<1	~	~	<1	<1	mg/kg	TM030
Zinc #	~	~	~	~	~	91	43	~	~	72	<5	mg/kg	TM030
Molybdenum #	~	~	~	~	~	0.5	0.4	~	~	0.4	<0.1	mg/kg	TM030

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	47-49	50-51	52-53	54-56	57-58	59-60	61-63	64-65	66-67	68-70	LOD	Units	Method No.
Sample ID	TP06	TP07	TP07	TP07	TP08	TP08	TP08	TP09	TP09	TP09			
Depth	4.8-4.9	0.3-0.5	0.7-0.9	2.8-3.0	0.2-0.3	1.2-1.4	2.8-3.0	0.2-0.3	1.2-1.4	2.8-3.0			
COC No / misc													
Containers	V,V,B	V,V	V,V	V,V,B	V,V	V,V	V,V,B	V,V	V,V	V,V,B			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
TPHCWG - Aliphatics													
>C5-C6 #	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C6-C8 #	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C8-C10	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C10-C12#	~	~	~	~	~	<0.2	~	~	~	~	<0.2	mg/ kg	TM5/PM8
>C12-C16#	~	~	~	~	~	<4	~	~	~	~	<4	mg/ kg	TM5/PM8
>C16-C21#	~	~	~	~	~	<7	~	~	~	~	<7	mg/ kg	TM5/PM8
>C21-C35#	~	~	~	~	~	<7	~	~	~	~	<7	mg/ kg	TM5/PM8
Total aliphatics C5-35#	~	~	~	~	~	<19	~	~	~	~	<19	mg/ kg	
TPHCWG - Aromatics													
>C5-EC7 #	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC7-EC8 #	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC8-EC10 #	~	~	~	~	~	<0.1	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC10-EC12#	~	~	~	~	~	<0.2	~	~	~	~	<0.2	mg/ kg	TM5/PM8
>EC12-EC16#	~	~	~	~	~	<4	~	~	~	~	<4	mg/ kg	TM5/PM8
>EC16-EC21#	~	~	~	~	~	18	~	~	~	~	<7	mg/ kg	TM5/PM8
>EC21-EC35#	~	~	~	~	~	65	~	~	~	~	<7	mg/ kg	TM5/PM8
Total aromatics C5-35#	~	~	~	~	~	83	~	~	~	~	<19	mg/ kg	TM5/PM8
Total aliphatics and aromatics(C5-35)#	~	~	~	~	~	83	~	~	~	~	<38	mg/kg	
BTEX/MTBE# GC-FID													
MTBE #	~	~	~	~	~	<5	~	~	~	~	<5	µg/ kg	TM31/PM7
Benzene #	~	~	~	~	~	<5	~	~	~	~	<5	µg/ kg	TM31/PM7
Toluene #	~	~	~	~	~	6	~	~	~	~	<5	µg/ kg	TM31/PM7
Ethyl benzene #	~	~	~	~	~	<5	~	~	~	~	<5	µg/ kg	TM31/PM7
m/p-Xylene #	~	~	~	~	~	<5	~	~	~	~	<5	µg/ kg	TM31/PM7
o-Xylene #	~	~	~	~	~	<5	~	~	~	~	<5	µg/ kg	TM31/PM7
Total Xylenes	~	~	~	~	~	<10	~	~	~	~	<10	µg/ kg	TM31/PM7

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	47-49	50-51	52-53	54-56	57-58	59-60	61-63	64-65	66-67	68-70	LOD	Units	Method No.
Sample ID	TP06	TP07	TP07	TP07	TP08	TP08	TP08	TP09	TP09	TP09			
Depth	4.8-4.9	0.3-0.5	0.7-0.9	2.8-3.0	0.2-0.3	1.2-1.4	2.8-3.0	0.2-0.3	1.2-1.4	2.8-3.0			
COC No / misc													
Containers	V,V,B	V,V	V,V	V,V,B	V,V	V,V	V,V,B	V,V	V,V	V,V,B			
Sample Date	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10	08/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
PAH 16 MS #													
Naphthalene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Acenaphthylene	~	~	~	~	~	<0.03	~	~	~	~	<0.03	mg/kg	TM4/PM8
Acenaphthene #	~	~	~	~	~	<0.05	~	~	~	~	<0.05	mg/kg	TM4/PM8
Fluorene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Phenanthrene #	~	~	~	~	~	<0.03	~	~	~	~	<0.03	mg/kg	TM4/PM8
Anthracene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Fluoranthene #	~	~	~	~	~	<0.03	~	~	~	~	<0.03	mg/kg	TM4/PM8
Pyrene #	~	~	~	~	~	<0.03	~	~	~	~	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	~	~	~	~	~	<0.06	~	~	~	~	<0.06	mg/kg	TM4/PM8
Chrysene #	~	~	~	~	~	<0.02	~	~	~	~	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	~	~	~	~	~	<0.07	~	~	~	~	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
Coronene	~	~	~	~	~	<0.04	~	~	~	~	<0.04	mg/kg	TM4/PM8
PAH 17 Total	~	~	~	~	~	<0.64	~	~	~	~	<0.64	mg/kg	TM4/PM8
TOC#	~	~	~	~	~	7.3	~	~	~	~	<0.2	%	TM21
Arsenic #	~	~	~	~	~	5.8	~	~	~	~	<0.5	mg/kg	TM030
Cadmium #	~	~	~	~	~	0.3	~	~	~	~	<0.1	mg/kg	TM030
Chromium #	~	~	~	~	~	6.9	~	~	~	~	<0.5	mg/kg	TM030
Copper #	~	~	~	~	~	214	~	~	~	~	<1	mg/kg	TM030
Mercury #	~	~	~	~	~	0.3	~	~	~	~	<0.1	mg/kg	TM030
Nickel #	~	~	~	~	~	10.6	~	~	~	~	<0.7	mg/kg	TM030
Lead #	~	~	~	~	~	22	~	~	~	~	<5	mg/kg	TM030
Selenium #	~	~	~	~	~	<1	~	~	~	~	<1	mg/kg	TM030
Zinc #	~	~	~	~	~	61	~	~	~	~	<5	mg/kg	TM030
Molybdenum #	~	~	~	~	~	0.5	~	~	~	~	<0.1	mg/kg	TM030

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	71-72	73-75	76-77	78-79	80	81	82-83	84-85	86-87	88-89	LOD	Units	Method No.
Sample ID	TP10	TP10	MW04	MW04	MW03	MW03	MW03	MW03	MW03	MW03			
Depth	0.3-0.5	2.7-2.9	0.5	1.5	1.45	0.45	2.2	4.1	7.3	9.7			
COC No / misc													
Containers	V,V	V,V,B	V,V	V,V	V	V	V,V	V,V	V,V	V,V			
Sample Date	08/09/10	08/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
TPHCWG - Aliphatics													
>C5-C6 #	~	<0.1	~	1.2	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C6-C8 #	~	<0.1	~	2.2	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C8-C10	~	0.7	~	1.1	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>C10-C12#	~	<0.2	~	16.0	~	~	~	~	~	~	<0.2	mg/ kg	TM5/PM8
>C12-C16#	~	<4	~	<4	~	~	~	~	~	~	<4	mg/ kg	TM5/PM8
>C16-C21#	~	<7	~	<7	~	~	~	~	~	~	<7	mg/ kg	TM5/PM8
>C21-C35#	~	<7	~	<7	~	~	~	~	~	~	<7	mg/ kg	TM5/PM8
Total aliphatics C5-35#	~	<19	~	20	~	~	~	~	~	~	<19	mg/ kg	
TPHCWG - Aromatics													
>C5-EC7 #	~	<0.1	~	<0.1	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC7-EC8 #	~	<0.1	~	<0.1	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC8-EC10 #	~	<0.1	~	0.6	~	~	~	~	~	~	<0.1	mg/ kg	TM3/PM12
>EC10-EC12#	~	<0.2	~	29.0	~	~	~	~	~	~	<0.2	mg/ kg	TM5/PM8
>EC12-EC16#	~	<4	~	71	~	~	~	~	~	~	<4	mg/ kg	TM5/PM8
>EC16-EC21#	~	39	~	114	~	~	~	~	~	~	<7	mg/ kg	TM5/PM8
>EC21-EC35#	~	157	~	1095	~	~	~	~	~	~	<7	mg/ kg	TM5/PM8
Total aromatics C5-35#	~	196	~	1309	~	~	~	~	~	~	<19	mg/ kg	TM5/PM8
Total aliphatics and aromatics(C5-35)#	~	197	~	1329	~	~	~	~	~	~	<38	mg/kg	
BTEX/MTBE# GC-FID													
MTBE #	~	<5	~	<5	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
Benzene #	~	<5	~	66	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
Toluene #	~	8	~	105	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
Ethyl benzene #	~	<5	~	158	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
m/p-Xylene #	~	7	~	215	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
o-Xylene #	~	7	~	275	~	~	~	~	~	~	<5	µg/ kg	TM31/PM7
Total Xylenes	~	14	~	490	~	~	~	~	~	~	<10	µg/ kg	TM31/PM7

Please see attached notes for all abbreviations and acronyms

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	71-72	73-75	76-77	78-79	80	81	82-83	84-85	86-87	88-89	LOD	Units	Method No.
Sample ID	TP10	TP10	MW04	MW04	MW03	MW03	MW03	MW03	MW03	MW03			
Depth	0.3-0.5	2.7-2.9	0.5	1.5	1.45	0.45	2.2	4.1	7.3	9.7			
COC No / misc													
Containers	V,V	V,V,B	V,V	V,V	V	V	V,V	V,V	V,V	V,V			
Sample Date	08/09/10	08/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10			
PAH 16 MS #				x5 dilution									
Naphthalene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Acenaphthylene	~	~	~	<0.15	~	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Acenaphthene #	~	~	~	<0.25	~	~	~	~	~	~	<0.05	mg/kg	TM4/PM8
Fluorene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Phenanthrene #	~	~	~	<0.15	~	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Anthracene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Fluoranthene #	~	~	~	<0.15	~	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Pyrene #	~	~	~	<0.15	~	~	~	~	~	~	<0.03	mg/kg	TM4/PM8
Benz(a)anthracene #	~	~	~	<0.30	~	~	~	~	~	~	<0.06	mg/kg	TM4/PM8
Chrysene #	~	~	~	<0.10	~	~	~	~	~	~	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	~	~	~	<0.35	~	~	~	~	~	~	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
Coronene	~	~	~	<0.20	~	~	~	~	~	~	<0.04	mg/kg	TM4/PM8
PAH 17 Total	~	~	~	<3.20	~	~	~	~	~	~	<0.64	mg/kg	TM4/PM8
TOC#	~	13.4	~	16.6	~	~	~	~	~	~	<0.2	%	TM21
Arsenic #	~	8.2	~	3.8	~	~	~	~	~	~	<0.5	mg/kg	TM030
Cadmium #	~	0.6	~	19.9	~	~	~	~	~	~	<0.1	mg/kg	TM030
Chromium #	~	11.8	~	14.7	~	~	~	~	~	~	<0.5	mg/kg	TM030
Copper #	~	44	~	50	~	~	~	~	~	~	<1	mg/kg	TM030
Mercury #	~	0.2	~	1.6	~	~	~	~	~	~	<0.1	mg/kg	TM030
Nickel #	~	24.0	~	9.2	~	~	~	~	~	~	<0.7	mg/kg	TM030
Lead #	~	42	~	288	~	~	~	~	~	~	<5	mg/kg	TM030
Selenium #	~	1	~	<1	~	~	~	~	~	~	<1	mg/kg	TM030
Zinc #	~	211	~	249	~	~	~	~	~	~	<5	mg/kg	TM030
Molybdenum #	~	1.3	~	3.5	~	~	~	~	~	~	<0.1	mg/kg	TM030

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4252

Report : **Solids**

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

J E Sample No.	90-91	92-93	94-95	96-97	98-99						LOD	Units	Method No.
Sample ID	MW01	MW01	MW01	MW02	MW02								
Depth	0.3	2.3	4.0	0.25	2.0								
COC No / misc													
Containers	V,V	V,V,B	V,V	V,V	V								
Sample Date	07/09/10	07/09/10	07/09/10	07/09/10	07/09/10								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	10/09/10	10/09/10	10/09/10	10/09/10	10/09/10								

Please see attached notes for all abbreviations and acronyms

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

SOILS

Please note we are only MCERTS accredited 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. Your final report will reflect this, with non-MCERTS results on separate pages.

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 we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

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.
Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory . It is important that detection limits are carefully considered when requesting water analysis.
UKAS accreditation applies to surface water and groundwater and 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. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

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 analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.
The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:

$ sample temperature on receipt considered inappropriate for analysis requested
^ samples exceeding recomended holding times
& samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials)
~ no sampling date given, unable to confirm if samples are with acceptable holding times

ABBREVIATIONS and ACRONYMS USED

- UKAS accredited
M - MCERTS accredited
NAD - No Asbestos Detected
ND - None Detected (usually refers to VOC and/SVOC TICs)
SS - Calibrated against a single substance
* - analysis subcontracted to a Jones Environmental approved laboratory.
W - Results expressed on as received basis
+ Failed AQC results should be considered as indicative only and are not accredited.
++ Result outside calibration range, may be possible to re-run with higher detection limits

Jones Environmental Laboratory

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URS Corporation
4th Floor Iveagh Court
6/8 Harcourt Road
Dublin 2

UKAS TESTING
No.4225

Attention :	David Mullen
Date :	28th September 2010
Your reference :	49341
Our reference :	Test Report 10/4284
Location :	Ballyragget
Date samples received :	13/09/10
Status :	Final Report
Issue :	1

Three samples were received for analysis on 13th September 2010 which was completed on 28th September 2010. 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.
All interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist

Jones Environmental Laboratory

Client Name:	URS Corporation	**Report :**	**Liquids**
Reference:	49341		
Location:	Ballyragget		
Contact:	David Mullen	**Liquids/products:**	V=40ml vial, G=glass bottle, P=plastic bottle
JE Job No.:	10/4284		$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

J E Sample No.	1-5	6-10	11-12								LOD	Units	Method No.
Sample ID	MW02	MW03	Dup 01										
Depth	-	-	-										
COC No / misc													
Containers	V H G	V H G	V H G										
Sample Date	09/09/10	09/09/10	09/09/10										
Sample Type	Water	Water	Water										
Batch Number	1	1	1										
Date of Receipt	13/09/10	13/09/10	13/09/10										
BTEX GC-FID											<5	µg/ l	TM031W
MTBE	<5	<5	~								<5	µg/ l	TM031W
Benzene	<5	<5	~								<5	µg/ l	TM031W
Toluene	<5	<5	~								<5	µg/ l	TM031W
Ethyl benzene	<5	<5	~								<5	µg/ l	TM031W
m/p-Xylene	<5	<5	~								<5	µg/ l	TM031W
o-Xylene	<5	<5	~								<5	µg/ l	TM031W
Total Xylenes	<10	<10	~								<10	µg/ l	TM031W
TPH CWG - Aliphatics													
>C5-C6	<5	<5	~								<5	µg/ l	TM36/PM12
>C6-C8	<5	<5	~								<5	µg/ l	TM36/PM12
>C8-C10	<5	<5	~								<5	µg/ l	TM36/PM12
>C10-C12	<5	<5	~								<5	µg/ l	TM5/PM9
>C12-C16	<10	<10	~								<10	µg/l	TM5/PM9
>C16-C21	<10	<10	~								<10	µg/l	TM5/PM9
>C21-C35	<10	<10	~								<10	µg/l	TM5/PM9
Total aliphatics C5-35	<10	<10	~								<10	µg/l	
TPH CWG - Aromatics													
>C5-EC7	<5	<5	~								<5	µg/ l	TM36/PM12
>EC7-EC8	<5	<5	~								<5	µg/ l	TM36/PM12
>EC8-EC10	<5	<5	~								<5	µg/ l	TM36/PM12
>EC10-EC12	<5	<5	~								<5	µg/ l	TM5/PM9
>EC12-EC16	<10	17	~								<10	µg/ l	TM5/PM9
>EC16-EC21	78	89	~								<10	µg/ l	TM5/PM9
>EC21-EC35	<10	<10	~								<10	µg/l	TM5/PM9
Total aromatics C5-35	78	106	~								<10	µg/ l	
Total aliphatics and aromatics(C5-35)	78	106	~								<10	µg/l	
Arsenic - dissolved #	<2.5	<2.5	~								<2.5	µg/l	TM 030W
Boron - dissolved	64	59	~								<12	µg/l	TM 030W
Cadmium - dissolved #	<0.5	<0.5	~								<0.5	µg/l	TM 030W
Chromium - dissolved #	<1.5	<1.5	~								<1.5	µg/l	TM 030W
Copper - dissolved #	<7	<7	~								<7	µg/l	TM 030W
Mercury - dissolved #	<1	<1	~								<1	µg/l	TM 030W
Nickel - dissolved #	2	6	~								<2	µg/l	TM 030W
Lead - dissolved #	<5	<5	~								<5	µg/l	TM 030W
Selenium - dissolved #	<3	<3	~								<3	µg/l	TM 030W
Zinc - dissolved #	<3	11	~								<3	µg/l	TM 030W
Calcium - dissolved#	169.3	248.7	~								<0.2	mg/l	TM 030W
Magnesium - dissolved#	12.6	30.1	~								<0.1	mg/l	TM 030W
Potassium - dissolved#	3.7	7.2	~								<0.1	mg/l	TM 030W
Sodium - dissolved#	15.0	31.8	~								<0.1	mg/l	TM 030W
Iron - dissolved #	<20	<20	~								<20	µg/l	TM 030W

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name:	URS Corporation	**Report :**	**Liquids**
Reference:	49341		
Location:	Ballyragget		
Contact:	David Mullen	**Liquids/products:**	V=40ml vial, G=glass bottle, P=plastic bottle
JE Job No.:	10/4284		$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

J E Sample No.	1-5	6-10	11-12									
Sample ID	MW02	MW03	Dup 01									
Depth	-	-	-									
COC No / misc												
Containers	V H G	V H G	V H G									
Sample Date	09/09/10	09/09/10	09/09/10									
Sample Type	Water	Water	Water									
Batch Number	1	1	1									
Date of Receipt	13/09/10	13/09/10	13/09/10									

Please see attached notes for all abbreviations and acronyms

											LOD	Units	Method No.
Manganese - dissolved #	70	95	~								<2	µg/l	TM 030W
Molybdenum - dissolved #	<2	<2	~								<2	µg/l	TM 030W
Total Cyanide*	<40	<40	~								<40	µg/l	subcontracted
Sulphate#	7.55	52.84	~								<0.05	mg/l	TM038W
Chloride#	22.4	47.2	~								<0.3	mg/l	TM038W
Fluoride	<0.3	<0.3	~								<0.3	mg/l	TM027W
VOCs #	see tab	see tab	~								<1-5	µg/l	TM15/PM10
VOCs TICs	ND	ND	~								<100	µg/l	TM15/PM10
SVOCs (dissolved)	see tab	see tab	~								<10	µg/l	TM16/PM9
SVOC TICs	ND	ND	~								<100	µg/l	TM16/PM9
Total Suspended Solids	829	72	~								<10	mg/l	TM037W
Nitrate as NO_3#	19.7	3.4	~								<0.2	mg/l	TM038W
Nitrite as NO_2#	2.08	0.09	~								<0.02	mg/l	TM038W
Total Alkalinity as CaCO3#	353	485	~								<1	mg/l	TM032W
Ortho phosphate as PO4#	<0.06	<0.06	~								<0.06	mg/l	TM038W
Phosphorous - total	914	852	~								<5	µg/l	TM 030W
Dissolved Methane	<1	<1	~								<1	µg/l	TM25
Combined OP & OC Pesticides	see tab	see tab	~								<0.01	µg/l	TM042
Acid Herbicides	see tab	see tab	~								<0.01	µg/l	TM042
BOD settled	8	3	~								<1	mg/l	TM058W
COD	68	67	~								<7	mg/l	TM057W
Coliforms	<1	<1	~								<1	cfu/100ml	subcontracted
Amm N2/Tot Ammonia as N#	1.10	0.30	~								<0.03	mg/l	TM038W
Total Dissolved Solids	598	597	~								<35	mg/l	TM020W
TOC	25	26	~								<2	mg/l	TM060W
Total Oxidised Nitrogen as N#	5.10	0.80	~								<0.05	mg/l	TM038W

Jones Environmental Laboratory

Client Name:	URS Corporation
Reference:	49341
Location:	Ballyragget
Contact:	David Mullen
JE Job No.:	10/4284

Report : **Solids**

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

J E Sample No.	13-14												
Sample ID	MW02												
Depth	4.2												
COC No / misc											Please see attached notes for all abbreviations and acronyms		
Containers	V V												
Sample Date	09/09/10												
Sample Type	S												
Batch Number	1										**LOD**	**Units**	**Method No.**
Date of Receipt	13/09/10												

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4284

VOC Report : **LIQUID**

J E Sample No.	1-5	6-10									LOD	Units	Method No.
Sample ID	MW02	MW03											
Depth	-	-											
COC No / misc													
Containers	V H G	V H G											
Sample Date	09/09/10	09/09/10											
Sample Type	Water	Water											
Batch Number	1	1											
Date of Receipt	13/09/10	13/09/10											
Dichlorodifluoromethane	<2	<2									<2	µg/l	TM15/PM10
Methyl Tertiary Butyl Ether	<1	<1									<1	µg/l	TM15/PM10
Chloromethane #	<3	<3									<3	µg/l	TM15/PM10
Vinyl Chloride	<2	<2									<2	µg/l	TM15/PM10
Bromomethane	<1	<1									<1	µg/l	TM15/PM10
Chloroethane #	<3	<3									<3	µg/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	µg/l	TM15/PM10
1,1-Dichloroethene #	<3	<3									<3	µg/l	TM15/PM10
Carbon Disulphide #	NA	NA									<3	µg/l	TM15/PM10
Dichloromethane #	<3	<3									<3	µg/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	µg/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	µg/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	µg/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	µg/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	µg/l	TM15/PM10
Chloroform #	<2	<2									<2	µg/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	µg/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	µg/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	µg/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	µg/l	TM15/PM10
Benzene #	<1	<1									<1	µg/l	TM15/PM10
Trichloroethene #	<3	<3									<3	µg/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	µg/l	TM15/PM10
Dibromomethane #	<3	<3									<3	µg/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	µg/l	TM15/PM10
cis-1-3-Dichloropropene #	<2	<2									<2	µg/l	TM15/PM10
Toluene #	<2	<2									<2	µg/l	TM15/PM10
trans-1-3-Dichloropropene #	<2	<2									<2	µg/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	µg/l	TM15/PM10
Tetrachloroethene #	<3	<3									<3	µg/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	µg/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	µg/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	µg/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	µg/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	µg/l	TM15/PM10
Ethylbenzene #	<2	<2									<2	µg/l	TM15/PM10
p/m-Xylene #	<3	<3									<3	µg/l	TM15/PM10
o-Xylene #	<2	<2									<2	µg/l	TM15/PM10
Styrene #	<2	<2									<2	µg/l	TM15/PM10
Bromoform #	<2	<2									<2	µg/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	µg/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	µg/l	TM15/PM10
Bromobenzene #	<2	<2									<2	µg/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	µg/l	TM15/PM10
Propylbenzene #	<3	<3									<3	µg/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	µg/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	µg/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	µg/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	µg/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	µg/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	µg/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	µg/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	µg/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	µg/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	µg/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	µg/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	µg/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	µg/l	TM15/PM10
Hexachlorobutadiene #	<3	<3									<3	µg/l	TM15/PM10
Naphthalene	<2	<2									<2	µg/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	µg/l	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name:	URS Corporation
Reference:	49341
Location:	Ballyragget
Contact:	David Mullen
JE Job No.:	10/4284

SVOC Report : **LIQUID**

J E Sample No.	1-5	6-10											
Sample ID	MW02	MW03											
Depth	-	-											
COC No / misc											Please see attached notes for all abbreviations and acronyms		
Containers	V H G	V H G											
Sample Date	09/09/10	09/09/10											
Sample Type	Water	Water											
Batch Number	1	1									LOD	Units	Method No.
Date of Receipt	13/09/10	13/09/10											
Phenols													
2-Chlorophenol	<10	<10									<10	µg/ l	TM16/PM9
2-Methylphenol	<10	<10									<10	µg/ l	TM16/PM9
2-Nitrophenol	<10	<10									<10	µg/ l	TM16/PM9
2,4-Dichlorophenol	<10	<10									<10	µg/ l	TM16/PM9
2,4-Dimethylphenol	<10	<10									<10	µg/ l	TM16/PM9
2,4,5-Trichlorophenol	<10	<10									<10	µg/ l	TM16/PM9
2,4,6-Trichlorophenol	<10	<10									<10	µg/ l	TM16/PM9
4-Chloro-3-methylphenol	<10	<10									<10	µg/ l	TM16/PM9
4-Methylphenol	<10	<10									<10	µg/ l	TM16/PM9
4-Nitrophenol	<10	<10									<10	µg/ l	TM16/PM9
Pentachlorophenol	<10	<10									<10	µg/ l	TM16/PM9
Phenol	<10	<10									<10	µg/ l	TM16/PM9
PAHs													
2-Chloronaphthalene	<10	<10									<10	µg/ l	TM16/PM9
2-Methylnaphthalene	<10	<10									<10	µg/ l	TM16/PM9
Naphthalene	<10	<10									<10	µg/ l	TM16/PM9
Acenaphthylene	<10	<10									<10	µg/ l	TM16/PM9
Acenaphthene	<10	<10									<10	µg/ l	TM16/PM9
Fluorene	<10	<10									<10	µg/ l	TM16/PM9
Phenanthrene	<10	<10									<10	µg/ l	TM16/PM9
Anthracene	<10	<10									<10	µg/ l	TM16/PM9
Fluoranthene	<10	<10									<10	µg/ l	TM16/PM9
Pyrene	<10	<10									<10	µg/ l	TM16/PM9
Benz(a)anthracene	<10	<10									<10	µg/ l	TM16/PM9
Chrysene	<10	<10									<10	µg/ l	TM16/PM9
Benzo(bk)fluoranthene	<10	<10									<10	µg/ l	TM16/PM9
Benzo(a)pyrene	<10	<10									<10	µg/ l	TM16/PM9
Indeno(123cd)pyrene	<10	<10									<10	µg/ l	TM16/PM9
Dibenzo(ah)anthracene	<10	<10									<10	µg/ l	TM16/PM9
Benzo(ghi)perylene	<10	<10									<10	µg/ l	TM16/PM9
Phthalates													
Bis(2-ethylhexyl) phthalate	<10	<10									<10	µg/ l	TM16/PM9
Butylbenzyl phthalate	<10	<10									<10	µg/ l	TM16/PM9
Di-n-butyl phthalate	<10	<10									<10	µg/ l	TM16/PM9
Di-n-Octyl phthalate	<10	<10									<10	µg/ l	TM16/PM9
Diethyl phthalate	<10	<10									<10	µg/ l	TM16/PM9
Dimethyl phthalate	<10	<10									<10	µg/ l	TM16/PM9
Other SVOCs													
1,2-Dichlorobenzene	<10	<10									<10	µg/ l	TM16/PM9
1,2,4-Trichlorobenzene	<10	<10									<10	µg/ l	TM16/PM9
1,3-Dichlorobenzene	<10	<10									<10	µg/ l	TM16/PM9
1,4-Dichlorobenzene	<10	<10									<10	µg/ l	TM16/PM9
2-Nitroaniline	<10	<10									<10	µg/ l	TM16/PM9
2,4-Dinitrotoluene	<10	<10									<10	µg/ l	TM16/PM9
2,6-Dinitrotoluene	<10	<10									<10	µg/ l	TM16/PM9
3-Nitroaniline	<10	<10									<10	µg/ l	TM16/PM9
4-Bromophenylphenylether	<10	<10									<10	µg/ l	TM16/PM9
4-Chloroaniline	<10	<10									<10	µg/ l	TM16/PM9
4-Chlorophenylphenylether	<10	<10									<10	µg/ l	TM16/PM9
4-Nitroaniline	<10	<10									<10	µg/ l	TM16/PM9
Azobenzene	<10	<10									<10	µg/ l	TM16/PM9
Bis(2-chloroethoxy)methane	<10	<10									<10	µg/ l	TM16/PM9
Bis(2-chloroethyl)ether	<10	<10									<10	µg/ l	TM16/PM9
Carbazole	<10	<10									<10	µg/ l	TM16/PM9
Dibenzofuran	<10	<10									<10	µg/ l	TM16/PM9
Hexachlorobenzene	<10	<10									<10	µg/ l	TM16/PM9
Hexachlorobutadiene	<10	<10									<10	µg/ l	TM16/PM9
Hexachlorocyclopentadiene	<10	<10									<10	µg/ l	TM16/PM9
Hexachloroethane	<10	<10									<10	µg/ l	TM16/PM9
Isophorone	<10	<10									<10	µg/ l	TM16/PM9
N-nitrosodi-n-propylamine	<10	<10									<10	µg/ l	TM16/PM9
Nitrobenzene	<10	<10									<10	µg/ l	TM16/PM9

Jones Environmental Laboratory

Client Name: URS Corporation
Reference: 49341
Location: Ballyragget
Contact: David Mullen
JE Job No.: 10/4284

Report - Pesticides - waters

J E Sample No.	1-5	6-10											
Sample ID	MW02	MW03											
Depth	-	-											
Containers	V H G	V H G											
Sample Date	09/09/10	09/09/10											
Sample Type	Water	Water											
Batch Number	1	1											
Date of Receipt	13/09/10	13/09/10											
Combined Pesticide Suite													
Dichlorvos	<0.01	<0.01										<0.01	µg/l	TM042
Mevinphos	<0.01	<0.01										<0.01	µg/l	TM042
Alpha-BHC	<0.01	<0.01										<0.01	µg/l	TM042
Beta-BHC	<0.01	<0.01										<0.01	µg/l	TM042
Gamma-BHC	<0.01	<0.01										<0.01	µg/l	TM042
Diazinon	<0.01	<0.01										<0.01	µg/l	TM042
Methyl Parathion	<0.01	<0.01										<0.01	µg/l	TM042
Ethyl Parathion (Parathio	<0.01	<0.01										<0.01	µg/l	TM042
Heptachlor	<0.01	<0.01										<0.01	µg/l	TM042
Fenitrothion	<0.01	<0.01										<0.01	µg/l	TM042
Aldrin	<0.01	<0.01										<0.01	µg/l	TM042
Malathion	<0.01	<0.01										<0.01	µg/l	TM042
Heptachlor Epoxide	<0.01	<0.01										<0.01	µg/l	TM042
Endosulfan I	<0.01	<0.01										<0.01	µg/l	TM042
Dieldrin	<0.01	<0.01										<0.01	µg/l	TM042
4, 4'-DDE	<0.01	<0.01										<0.01	µg/l	TM042
Endosulfan II	<0.01	<0.01										<0.01	µg/l	TM042
4,4'-DDD	<0.01	<0.01										<0.01	µg/l	TM042
Ethion	<0.01	<0.01										<0.01	µg/l	TM042
Endrin	<0.01	<0.01										<0.01	µg/l	TM042
Endosulfan Sulphate	<0.01	<0.01										<0.01	µg/l	TM042
4,4'-DDT	<0.01	<0.01										<0.01	µg/l	TM042
Methoxychlor	<0.01	<0.01										<0.01	µg/l	TM042
Azinphos Methyl	<0.01	<0.01										<0.01	µg/l	TM042
Disulfoton	<0.01	<0.01										<0.01	µg/l	TM042

Jones Environmental Laboratory

Client Name: URS Corporation

Acid Herbicides Report : LIQUID

Reference: 49341

Location: Ballyragget

Contact: David Mullen

JE Job No.: 10/4284

J E Sample No.	1-5	6-10											
Sample ID	MW02	MW03											
Depth	-	-											
Containers	V H G	V H G											
Sample Date	09/09/10	09/09/10											
Sample Type	Water	Water											
Batch Number	1	1											
Date of Receipt	13/09/10	13/09/10											
Benazolin	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Bentazone	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Bromoxynil	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Clopyralid	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
4- CPA	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
2,4 – D	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
2,4 –DB	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Dicamba	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Dichloroprop	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Diclofop	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Fenoprop	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Flamprop	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Flamprop – isopropyl	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Ioxynil	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
MCPA	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
MCPB	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Mecoprop	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Picloram	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Pentachlorophenol	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
2,4,5 – T	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
2,3,6 – TBA	<0.1	<0.1										<0.1	µg/ l	TM16/PM8
Triclopyr	<0.1	<0.1										<0.1	µg/ l	TM16/PM8

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

SOILS

Please note we are only MCERTS accredited 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. Your final report will reflect this, with non-MCERTS results on separate pages.

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 we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

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.

Asbestos screens where requested will be undertaken by a UKAS accredited laboratory.

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory . It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and 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. All samples are treated as groundwaters and analysis performed on settled samples unless we are instructed otherwise.

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 analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:

$ sample temperature on receipt considered inappropriate for analysis requested
^ samples exceeding recomended holding times
& samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials)
~ no sampling date given, unable to confirm if samples are with acceptable holding times

ABBREVIATIONS and ACRONYMS USED

- UKAS accredited
M - MCERTS accredited
NAD - No Asbestos Detected
ND - None Detected (usually refers to VOC and/SVOC TICs)
SS - Calibrated against a single substance
* - analysis subcontracted to a Jones Environmental approved laboratory.
W - Results expressed on as received basis
+ Failed AQC results should be considered as indicative only and are not accredited.
++ Result outside calibration range, may be possible to re-run with higher detection limits

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TESTCONSULT IRELAND LTD
Materials Laboratory, Clonminam Ind. Est., Portlaoise
Tel (057) 8664885 Fax (057) 8664380

UKAS TESTING
2528

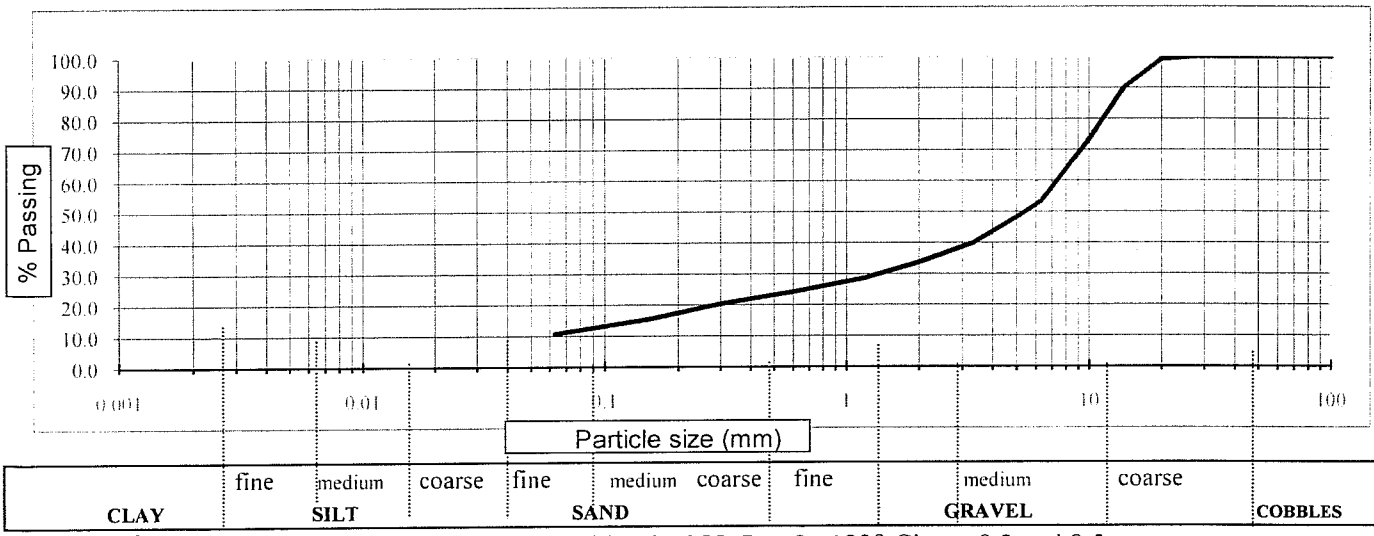
LABORATORY TEST REPORT

Determination of Particle Size Distribution - BS 1377 : Part 2 : 1990

Project:	**JS Drilling**	**Job No:**	**PL 720**
Client:	**JS Drilling**	**Lab Ref No.:**	**ST 50156**
	Thomastown	**Date Received:**	**10/09/2010**
	Co. Kilkenny	**Date Reported:**	**14/09/2010**
		Material:	**Orange/brown SAND,**
Order No:	**N/A**	**Visual Description**	**fine rock deposits**
Originator:	**Jim Stephenson**	**Specification**	**NRA**

Client Ref.	MW02 0.2-0.5
Location:	Client Info.
Supplier:	Client Info.
Source:	Client Info.
Depth (m):	0.2-0.5
Sampling Reason:	Routine
Sampled By:	Client
Specification:	NRA
Preparation Method:	Without Organics Preparation

BS Sieve Size	% Passing	Specification
125 mm	100.0	
100 mm	100.0	
75 mm	100.0	
63 mm	100.0	
50 mm	100.0	
37.5 mm	100.0	
28 mm	100.0	
20 mm	99.2	
14 mm	90.2	
10 mm	73.3	
6.3 mm	53.3	
5 mm	48.1	
3.35 mm	40.0	
2 mm	33.7	
1.18 mm	28.5	
0.6 mm	24.2	
0.425 mm	22.3	
0.3 mm	20.3	
0.15 mm	15.3	
0.063 mm	10.7	
#NAME? mm	N/A	
#NAME? mm	N/A	
#NAME? mm	N/A	



Tested in accordance with BS 1377: Part 2 : 1990 Clause 9.2 and 9.5
Sedimentation by Hydrometer, clause 9.5 - outside scope the of UKAS

Approved Signature
TESTCONSULT IRELAND LIMITED

☐ **Mark Dawkins, Managing Director;** ☐ **Michael Robinson, Director & Lab. Manager**
☑ **James Ward, Senior Technician**

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UKAS TESTING
2528

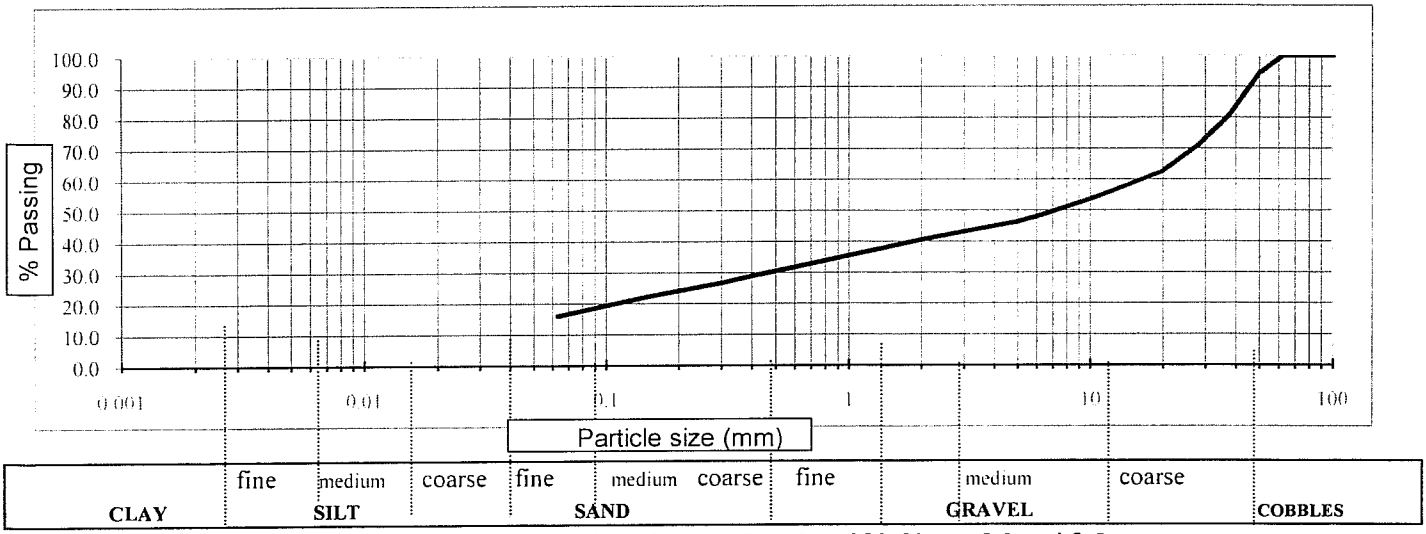
LABORATORY TEST REPORT

Determination of Particle Size Distribution - BS 1377 : Part 2 : 1990

Project:	**JS Drilling**	**Job No:**	**PL 720**
Client:	**JS Drilling**	**Lab Ref No.:**	**ST 50156**
	Thomastown	**Date Received:**	**10/09/2010**
	Co. Kilkenny	**Date Reported:**	**14/09/2010**
		Material:	**Orange/brown SAND,**
Order No:	**N/A**	**Visual Description**	**clay and rock**
Originator:	**Jim Stephenson**	**Specification**	**NRA**

Client Ref.	NS3 49341 URS
Location:	Client Info.
Supplier:	Client Info.
Source:	Client Info.
Depth (m):	N/A
Sampling Reason:	Routine
Sampled By:	Client
Specification:	NRA
Preparation Method:	Without Organics Preparation

BS Sieve Size	% Passing	Specification
125 mm	100.0	
100 mm	100.0	
75 mm	100.0	
63 mm	100.0	
50 mm	94.3	
37.5 mm	80.6	
28 mm	70.9	
20 mm	62.6	
14 mm	57.9	
10 mm	53.5	
6.3 mm	48.5	
5 mm	46.3	
3.35 mm	43.8	
2 mm	40.5	
1.18 mm	36.6	
0.6 mm	31.7	
0.425 mm	29.3	
0.3 mm	26.6	
0.15 mm	22.3	
0.063 mm	16.0	
#NAME? mm	N/A	
#NAME? mm	N/A	
#NAME? mm	N/A	



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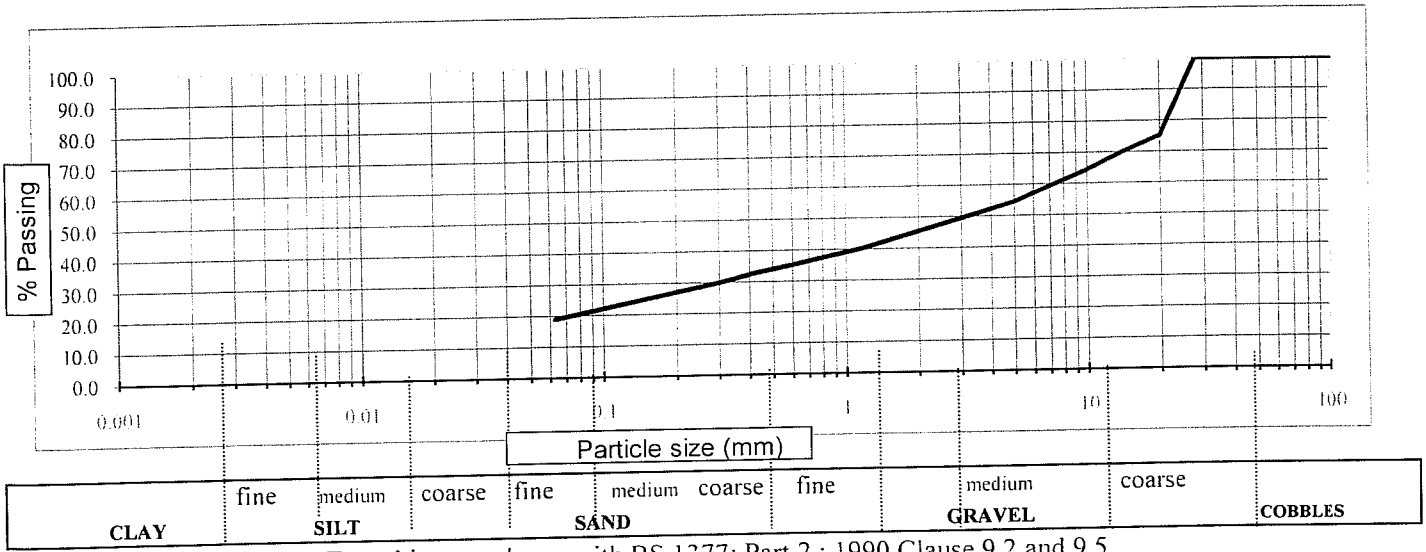
LABORATORY TEST REPORT

Determination of Particle Size Distribution - BS 1377 : Part 2 : 1990

Project:	**JS Drilling**	**Job No:**	**PL 720**
Client:	**JS Drilling**	**Lab Ref No.:**	**ST 50156**
	Thomastown	**Date Received:**	**10/09/2010**
	Co. Kilkenny	**Date Reported:**	**14/09/2010**
		Material:	**Saturated light brown, fine clay with medium sized rock deposits**
Order No:	**N/A**	**Visual Description**	
Originator:	**Jim Stephenson**	**Specification**	**NRA**

Client Ref.	MN03 0.5-0.9
Location:	Client Info.
Supplier:	Client Info.
Source:	Client Info.
Depth (m):	0.5-0.9
Sampling Reason:	Routine
Sampled By:	Client
Specification:	NRA
Preparation Method:	Without Organics Preparation

BS Sieve Size	% Passing	Specification
125 mm	100.0	
100 mm	100.0	
75 mm	100.0	
63 mm	100.0	
50 mm	100.0	
37.5 mm	100.0	
28 mm	100.0	
20 mm	75.1	
14 mm	70.0	
10 mm	64.4	
6.3 mm	57.9	
5 mm	54.5	
3.35 mm	50.5	
2 mm	45.5	
1.18 mm	40.2	
0.6 mm	35.2	
0.425 mm	32.8	
0.3 mm	29.9	
0.15 mm	25.0	
0.063 mm	18.9	
#NAME? mm	N/A	
#NAME? mm	N/A	
#NAME? mm	N/A	



Tested in accordance with BS 1377: Part 2 : 1990 Clause 9.2 and 9.5
Sedimentation by Hydrometer. clause 9.5 - outside scope the of UKAS

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Appendix C - Logs

URS

ENVIRONMENTAL BOREHOLE

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**MW01**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Hollow Stem Auger Rig	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Depth (Thickness)	STRATA: DESCRIPTION	STRATA: COMMENTS	Geology	Instrument/ Backfill
0.5	MW01_0.3	1.2		(1.00) 1.00	Brown sandy silty CLAY			
1.0				(0.50) 1.50	Orange sandy silty CLAY			
1.5				(0.50) 2.00	Grey, sandy clayey GRAVELS. Gravels are sub angular to rounded, sands are medium to coarse grained.			
2.0					Grey SAND with some fine gravels			
2.5	MW01_2.3	0.7		(1.40) 3.40				
3.0								
3.5				3.50	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained,			
4.0	MW01_4.0	1.4		3.70	Grey silty CLAY with gravels			
4.5				(1.30) 5.00	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained			
5.0					Weathered Limestone Bedrock			
5.5				(1.00) 6.00				
6.0					EOH @ 6m			

KEY	LEGEND	GENERAL REMARKS
	Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	AMR	Approved By	DM

URS ENVIRONMENTAL LOG BALLYRAGGET LANDFILL TPS.GPJ AGS3_ALL.GDT 24/9/10

URS

ENVIRONMENTAL BOREHOLE

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**MW02**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 09-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Hollow Stem Auger Rig	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Depth (Thickness)	STRATA: DESCRIPTION	STRATA: COMMENTS	Geology	Instrument/ Backfill
0	MW02_0.2-0.5	1.4		0.40	MADE GROUND Brown gravelly clay			
0.5				(0.60)	Light brown CLAY with dense gravels			
1.0				1.00				
1.5				(0.60)	Grey sandy GRAVELS with large dense cobbles. Gravels are sub angular to rounded, sands are medium to coarse grained.			
2.0	MW02_2.0	1.6		1.60	Grey/brown sandy GRAVELS. Gravels are medium grained and angular.			
2.5								
3.0				(3.00)				
3.5								
4.0	MW02_4.2	0.9						
4.5				4.60				
5.0				4.80	Grey/brown Silty Sandy Gravel. Gravels are sub angular to rounded.			
5.5				5.20	Weathered Limestone Bedrock Limestone becoming harder with depth			
6.0								
6.5				(2.30)				
7.0								
7.5				7.50	EOH @ 7.5			

KEY	LEGEND	GENERAL REMARKS
	Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

URS ENVIRONMENTAL LOG BALLYRAGGET LANDFILL TPS.GPJ AGS3_ALL.GDT 24/9/10

URS

ENVIRONMENTAL BOREHOLE

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**MW03**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 07-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Hollow Stem Auger Rig	1 of 2

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Depth (Thickness)	STRATA: DESCRIPTION	STRATA: COMMENTS	Geology	Instrument/ Backfill
0.5	MW03_0.45	0.6		(2.00) 2.00	MADE GROUND Brown sandy clay with some concrete & red brick fragments			
2.0	MW03_2.2	1.3		(0.75) 2.75	MADE GROUND Brown sandy clay with some concrete & red brick fragments			
3.0				(1.15) 3.90	Brown/Grey sandy GRAVELS with cobbles. Gravels are sub angular to round, Sands are medium to coarse.			
4.0	MW03_4.1	0.4		(0.70) 4.60	Brown/Grey gravelly sandy CLAY. Sand medium to coarse. Gravels are cobble size.			
				(0.60) 5.20	Brown/Grey sandy GRAVELS. Sands are medium to coarse. Gravels are sub angular to round.			
5.5				(0.60) 5.80	Brown/Grey GRAVELS & COBBLES			
6.5				(1.95) 7.75	Brown/Grey clayey SAND with large cobbles. Sand is medium to coarse.			
7.5	MW03_7.3	1.2						
8.5				(1.75) 9.50	Grey weathered LIMESTONE bedrock with some clays			
9.5	MW03_9.7	1.6		(0.50) 10.00	Grey weathered LIMESTONE bedrock with some sandy clays			

KEY	LEGEND	GENERAL REMARKS
	Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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ENVIRONMENTAL BORELOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**MW03**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 07-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Hollow Stem Auger Rig	2 of 2

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA Depth (Thick-ness)	DESCRIPTION	COMMENTS	Geology	Instrument/ Backfill
					EOH @10m			

KEY	LEGEND	GENERAL REMARKS
	Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	AMR	Approved By	DM

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ENVIRONMENTAL BOREHOLE

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**MW04**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Hollow Stem Auger Rig	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA Depth (Thickness)	DESCRIPTION	COMMENTS	Geology	Instrument/ Backfill
0.5	MW04_0.5			(0.75) 0.75	MADE GROUND Brown gravelly clay			
1.0				(0.65) 1.40	MADE GROUND Brown/grey sandy gravel with large cobbles			
1.5	MW04_1.6			(0.60) 2.00	FILL Municipal Waste			
2.0					EOH @ 2m - Refusal			

KEY	LEGEND	GENERAL REMARKS
	Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP_NS1**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.5					(0.75)	MADE GROUND Brown gravelly clayey		
1.0					0.75	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.		
1.5					(2.00)			
2.0								
2.5					2.75	EOH @2.75m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP_NS2**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
					(0.40)	MADE GROUND Brown sandy gravelly clay		
0.5					0.40	Grey sandy GRAVEL with large cobbles. Gravels are sub angular to rounded, sands are medium to coarse grained.		
1.0								
1.5					(2.55)			
2.0								
2.5					2.95	EOH @2.95m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	TP_NS3

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
					(0.25) 0.25	MADE GROUND Gravelly clay		
0.5					(0.65) 0.90	MADE GROUND Grey sandy Gravel with cobbles		
1.0					1.10	MADE GROUND Municipal Waste EOH @1.1m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill) Groundwater Table Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP01**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.0	TP01_0.3 - 0.5	0.0			(0.50)	TOP SOIL Dark brown gravelly sandy clay.	NEC	
0.5					0.50			
					(0.50)	Red brown gravelly silty CLAY.	NEC	
1.0	TP01_0.9 - 1.0	0.3			1.00			
					(2.00)	Grey to brown sandy GRAVEL with large subangular to rounded cobbles.	NEC	
2.5	TP01_2.7 - 2.8	0.5						
3.0					3.00	EOH at 3.0m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Topsoil; Gravelly Silt/Clay; Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP02**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
					(0.25) 0.25	MADE GROUND Gravelly clay.		
0.5	TP02_0.5	0.0			(0.55) 0.80	MADE GROUND Sandy gravel.		
1.0					(1.95)	FILL Municipal waste - plastic rubbish bags.	Strong odour	
1.5	TP02_1.5	32.3						
2.0								
2.5					2.75			
					2.90	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.		
3.0	TP02_3.0	10.3			3.10	Red brown gravelly sandy CLAY.	Water ingress at 3.1m	
						EOH at 3.1m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill) Fill (made ground) Sandy GRAVEL Gravelly Sandy Clay Groundwater Table Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP03**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.0	TP03_0.2 - 0.3	0.8			(0.50) 0.50	MADE GROUND Gravelly clay.		
0.5					(0.25) 0.75	MADE GROUND Sandy gravel.		
1.0						FILL Municipal Waste	Strong odour	
1.5	TP03_1.4 - 1.6	28.3						
2.0					(2.35)			
2.5								
3.0	TP03_3.0 - 3.1	1.3			3.10			
						EOH at 3.1m	No water ingress	

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP04**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.5	TP04_0.3 - 0.4	0.4			(0.75) 0.75	MADE GROUND Brown gravelly clay.	NEC	
1.0	TP04_1.0 - 1.2	0.8			(0.55) 1.30	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.	NEC	
1.5 2.0	TP04_2.0 - 2.2	2.4			(2.20)	Clayey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.	NEC	
2.5 3.0	TP04_3.1 - 3.3	0.8			3.50			
3.5						EOH at 3.5m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill) Sandy GRAVEL Clayey/silty sandy GRAVEL Groundwater Table Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP05**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument /Backfill
0	TP05_0.3 - 0.4	3.1			(0.40) 0.40	MADE GROUND Red/brown gravelly clay.	NEC	
0.5						MADE GROUND Sandy gravel.		
1.0	TP05_1.0 - 1.2	3.3			(1.10)			
1.5					1.50			
					1.75	MADE GROUND Concrete and rubble.		
2.0	TP05_2.0 - 2.2	5.2				FILL Municipal waste - Plastic bags with household waste.		
2.5								
3.0								
3.5					(3.20)			
4.0								
4.5								
5.0	TP05_4.9 - 5.0	4.3			4.95			
					5.20	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.		
						EOH at 5.2m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP06**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 2

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.5	TP06_0.4- 0.6	0.4			(0.80)	MADE GROUND Brown gravelly clay		
					0.80			
1.0	TP06_1.2-1.4	0.9			(0.70)	MADE GROUND Sandy Gravel		
1.5					1.50			
2.0						FILL Municipal Waste - Some Concrete & Rubble	Water Ingress @1.7m - Interface between gravels & waste	
2.5	TP06_2.4-2.6	0.7						
3.0					(3.30)			
3.5								
4.0								
4.5								
	TP06_4.8_4.9	1.8			4.80			
					4.90	Grey GRAVELS. Gravels are sub angular to rounded.		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP06**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	2 of 2

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
						EOH @ 4.9 m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP07**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
					(0.25) 0.25	MADE GROUND Brown gravelly clay	NEC	
	TP07_0.3 - 0.5	0.4			(0.25) 0.50	MADE GROUND Brown gravelly clay	NEC	
0.5						FILL	Odour	
	TP07_0.7 - 0.9	0.4			(0.50)	Municipal Waste - narrow band towards ditch		
1.0					1.00			
						Grey sandy GRAVEL with large cobbles.	NEC	
1.5								
2.0					(2.00)			
2.5								
	TP0_2.8 - 3.0	0.7						
3.0					3.00	EOH @ 3m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); Sandy Gravel; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP08**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0	TP08_0.2 - 0.3	0.7			(0.30) 0.30	MADE GROUND Brown sandy clay	NEC	
0.5						FILL Municipal Waste Waste tapers off to the east & east side of TP is sandy gravel	Very Strong Odour	
1.0	TP08_1.2-1.4	2.8						
1.5					(2.45)			
2.0								
2.5	TP08_2.8 - 3.0	2.7			2.75 (0.75) 3.50	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.	NEC	
3.0						EOH @3.5m		
3.5								

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP09**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.0	TP09_0.2 - 0.3	0.8			(0.60)	MADE GROUND Brown sandy gravelly clay		
0.5					0.60			
					(0.40)	MADE GROUND Brown sandy gravel		
1.0					1.00			
	TP09_1.2-1.4	2.9				FILL Municipal Waste Waste tapers off to the south side of the TP	Dry	
1.5								
2.0					(2.20)			
2.5								
	TP09_2.8 - 3.0	1.7						
3.0					3.20			
					(0.40)	Grey sandy GRAVEL. Gravels are sub angular to rounded, sands are medium to coarse grained.		
3.5					3.60	EOH @3.6m		

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Sandy GRAVEL; Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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TRIAL PIT LOG

Project Name and Site Location	Client	BOREHOLE No
Ballyragget Landfill Assessment	Kilkenny Co Council	**TP10**

Job No	Date	Ground Level (m)	Co-Ordinates ()
49341895	Start Date 08-09-10 End Date 08-09-10		

Contractor	Method / Plant Used	Sheet
JS Drilling	Long - reach 360 degree excavation	1 of 1

Depth BGL	Sample / Test Details	PID (ppm)	Water	STRATA: Legend	Depth (Thick-ness)	DESCRIPTION	COMMENTS	Instrument / Backfill
0.5	TP10_0.3 - 0.5	1.3			(0.50) 0.50	MADE GROUND Brown clayey gravel	NEC	
1.0						FILL Municipal Waste	Very Strong Odour	
1.5								
2.0					(3.00)			
2.5	TP10_2.7 - 2.9	2.7						
3.0								
3.5					3.50	EOH @3.5m	No visible water ingress	

Backfill	Sample Details	Legend	GENERAL REMARKS
		Made Ground (Fill); Fill (made ground); Groundwater Table; Groundwater Strike	NEC: no evidence of contamination EOH: end of hole

		Logged By	Approved By
		AMR	DM

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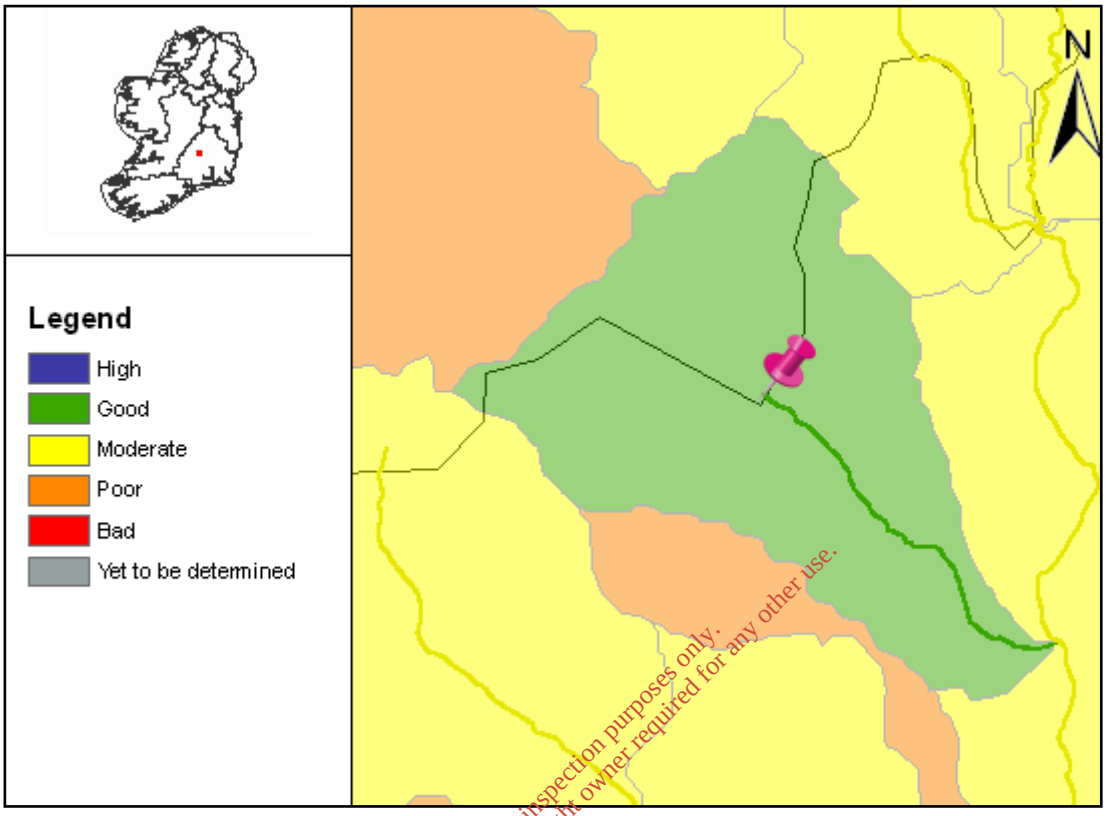
APPENDIX 2

Surface Water Body Report

water matters
'our Plan'

Full Report for Waterbody Lisdowney, Trib of Nore



River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The WaterMaps viewer is an integral part of the River Basin Management Plan and provides access to information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland.

The following report provides summary plan information about the selected waterbody (indicated by the pin in the map above) relating to its status, risks, objectives, and measures proposed to retain status where this is adequate, or improve it where necessary. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters], and coastal waters), or to groundwaters. Other relevant information not included in this report can be viewed using the WaterMaps viewer, including areas listed in the Register of Protected Areas.

You will find brief notes at the bottom of some of the individual report sheets that will help you in interpreting the information presented. More detailed information can be obtained in relation to all aspects of the RBMPs at www.wfdireland.ie.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Summary Information:

Water Management Unit:	IE_SE_NoreMain
WaterBody Category:	River Waterbody
WaterBody Name:	Lisdowney, Trib of Nore
WaterBody Code:	IE_SE_15_479
Overall Status:	Good
Overall Objective:	Protect
Overall Risk:	1a At Risk
Heavily Modified:	No

south eastern river basin district

Report data based upon final RBMP, 2009-2015.

The information provided above is a summary of the principal findings related to the selected waterbody. Further details and explanation of individual elements of the report are outlined in the following pages.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Status Report

Water Management Unit:	IE_SE_NoreMain
WaterBody Category:	River Waterbody
WaterBody Name:	Lisdowney, Trib of Nore
WaterBody Code:	IE_SE_15_479
Overall Status Result:	Good
Heavily Modified:	No

south eastern river basin district

	Status Element Description	Result
	Status information	
Q	Macroinvertebrate status	Good
PC	General physico-chemical status	N/A
FPQ	Freshwater Pearl Mussel / Macroinvertebrate status	N/A
DIA	Diatoms status	N/A
HYM	Hydromorphology status	N/A
FIS	Fish status	N/A
SP	Specific Pollutants status (SP)	N/A
ES	Overall ecological status	Good
CS	Overall chemical status (PAS)	n/a
EXT	Extrapolated status	N/A
MON	Monitored water body	YES
DON	Donor water bodies	N/A

n/a - not assessed

Status
By 'Status' we mean the condition of the water in the waterbody. It is defined by its chemical status and its ecological status, whichever is worse. Waters are ranked in one of 5 status classes: High, Good, Moderate, Poor, Bad. However, not all waterbodies have been monitored, and in such cases the status of a similar nearby waterbody has been used (extrapolated) to assign status. If this has been done the first line of the status report shows the code of the waterbody used to extrapolate.

You can read more about status and how it is measured in our RBMP Document Library at www.wfdireland.ie (Directory 15 Status).

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'Our Plan'

Risk Report

Water Management Unit: IE_SE_NoreMain

WaterBody Category: River Waterbody

WaterBody Name: Lisdowney, Trib of Nore

WaterBody Code: IE_SE_15_479

Overall Risk Result: 1a At Risk

Heavily Modified: No

south eastern river basin district

	Risk Test Description		Risk
	Diffuse Risk Sources		
RD1	EPA diffuse model (2008)	1b	Probably At Risk
RD2a	Road Wash - Soluble Copper	2b	Not At Risk
RD2b	Road Wash - Total Zinc	2b	Not At Risk
RD2c	Road Wash - Total Hydrocarbons	2b	Not At Risk
RD3	Railways	2b	Not At Risk
RD4a	Forestry - Acidification (2008)	2b	Not At Risk
RD4b	Forestry - Suspended Solids (2008)	2b	Not At Risk
RD4c	Forestry - Eutrophication (2008)	2a	Probably Not At Risk
RD5	Overall Unsewered (2008)	2b	Not At Risk
RD5a	Unsewered Areas - Pathogens (2008)	2a	Probably Not At Risk
RD5b	Unsewered Phosphorus (2008)	2b	Not At Risk
RD6a	Arable	2b	Not At Risk
RD6b	Sheep Dip	2b	Not At Risk
RD6c	Forestry - Dangerous Substances	2b	Not At Risk
RDO	Diffuse Overall -Worst Case (2008)	1b	Probably At Risk
	Hydrology		
RHY1	Water balance - Abstraction	2b	Not At Risk
	Morphological Risk Sources		
RM1	Channelisation (2008)	2b	Not At Risk
RM2	Embankments (2008)	2b	Not At Risk
RM3	Impoundments	2b	Not At Risk
RM4	Water Regulation	2b	Not At Risk
RM5	Intensive Landuse		N/A
RMO	Morphology Overall - Worst Case (2008)	2b	Not At Risk
	Overall Risk		
RA	Rivers Overall - Worst Case (2008)	1a	At Risk

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	Point Risk Sources		
RP1	WWTPs (2008)	2b	Not At Risk
RP2	CSOs	2b	Not At Risk
RP3	IPPCs (2008)	2b	Not At Risk
RP4	Section 4s (2008)	2b	Not At Risk
RP5	WTPs/Mines/Quarries/Landfills		N/A
RPO	Overall Risk from Point Sources - Worst Case (2008)	2b	Not At Risk
	Q Value		
Q	EPA Q rating and Margaritifera Assessment		N/A
	Q/RDI or Point/Diffuse		
QPD	Q class/EPA Diffuse Model or worst case of Point and Diffuse (2008)	1a	At Risk
	Rivers Direct Impacts		
RDI1	Rivers Direct Impacts - Dangerous Substances		N/A

Risk
By 'risk' we mean the risk that a waterbody will not achieve good ecological or good chemical status/potential at least by 2015. To examine risk the various pressures acting on the waterbody were identified along with any evidence of impact on water status. Depending on the extent of the pressure and its potential for impact, and the amount of information available, the risk to the water body was placed in one of four categories: 1a at risk; 1b probably at risk; 2a probably not at risk; 2b not at risk. Note that '2008' after the risk category means that the risk assessment was revised in 2008. All other risks were determined as part of an earlier risk assessment in 2005.

You can read more about risk assessment in our 'WFD Risk Assessment Update' document in the RBMP document library, and other documents at www.wfdireland.ie (Directory 31 Risk Assessments).

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Objectives Report

Water Management Unit: IE_SE_NoreMain

WaterBody Category: River Waterbody

WaterBody Name: Lisdowney, Trib of Nore

WaterBody Code: IE_SE_15_479

Overall Objective: Protect

Heavily Modified: No

south eastern river basin district

	Objectives Description	Result
	Extended timescale information	
E1	Extended timescales due to time requirements to upgrade WWTP discharges	No Status
E2	Extended timescales due to delayed recovery of chemical pollution and chemical status failures	No Status
E3	Extended timescales due to delayed recovery following reduction in agricultural nutrient losses	No Status
E4	Extended timescales due to delayed recovery from physical modifications and physical damage	No Status
E5	Extended timescales due to delayed recovery following implementing forestry acidification measures	No Status
E6	Extended timescales due to physical recovery timescales at mines and contaminated sites	No Status
E7	Extended timescales due to delayed recovery of highly impacted sites	No Status
E8	Extended timescales due to delayed recovery following reduction in agricultural nutrient losses	No Status
E9	Extended timescales due to delayed recovery from nitrogen losses to estuaries	No Status
E10	Extended timescales due to delayed recovery following reduction in agricultural nutrient losses	No Status
E11	Extended timescales due to delayed recovery from physical modifications and physical damage (overgrazing)	No Status
E12	Extended timescales due to delayed recovery from physical modifications and physical damage (channelisation)	No Status
E13	Extended timescales from Northern Ireland Environment Agency	No Status
EOV	Overall extended timescale - combination of all extended timescales fields	No Status
E14	Extended timescales due to the presence of Freshwater Pearl Mussel populations	No Status
EX15	Extended timescales due to highly impacted sites	No Status

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

	Objectives information	
OB1	Prevent deterioration objective	No Status
OB2	Restore at least good status objective	No Status
OB3	Reduce chemical pollution objective	No Status
OB4	Protected areas objective	Protect
OB5	Northern Ireland Environment Agency objective	No Status
OBO	Overall objectives	Protect

Extended timescales
Extended timescales have been set for certain waters due to technical, economic, environmental or recovery constraints. Extended timescales are usually of one planning cycle (6 years, to 2021) but in some cases are two planning cycles (to 2027).

Objectives
In general, we are required to ensure that our waters achieve at least good status/potential by 2015, and that their status does not deteriorate. Having identified the status of waters (this is given earlier in this report), the next stage is to set objectives for waters. Objectives consider waters that require protection from deterioration as well as waters that require restoration and the timescales needed for recovery. Four default objectives have been set initially:-

Prevent Deterioration
Restore Good Status
Reduce Chemical Pollution
Achieve Protected Areas Objectives

These objectives have been refined based on the measures available to achieve them, the latter's likely effectiveness, and consideration of cost-effective combinations of measures. Where it is considered necessary extended deadlines have been set for achieving objectives in 2021 or 2027.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Measures Report

Water Management Unit: IE_SE_NoreMain

WaterBody Category: River Waterbody

WaterBody Name: Lisdowney, Trib of Nore

WaterBody Code: IE_SE_15_479

Heavily Modified: No

south eastern river basin district

	Measures Description	Applicable
BC	Total number of basic measures which apply to this waterbody	20
BW	Directive - Bathing Waters Directive	No
BIR	Directive - Birds Directive	No
HAB	Directive - Habitats Directive	No
DW	Directive - Drinking Waters Directive	No
MAE	Directive - Major Accidents and Emergencies Directive	Yes
EIA	Directive - Environmental Impact Assessment Directive	Yes
SS	Directive - Sewage Sludge Directive	Yes
UWT	Directive - Urban Waste Water Treatment Directive	Yes
PPP	Directive - Plant Protection Products Directive	Yes
NIT	Directive - Nitrates Directive	Yes
IPC	Directive - Integrated Pollution Prevention Control Directive	Yes
CR	Other Stipulated Measure - Cost recovery for water use	Yes
SUS	Other Stipulated Measure - Promotion of efficient and sustainable water use	Yes
DWS	Other Stipulated Measure - Protection of drinking water sources	Yes
ABS	Other Stipulated Measure - Control of abstraction and impoundment	Yes
POI	Other Stipulated Measure - Control of point source discharges	Yes
DIF	Other Stipulated Measure - Control of diffuse source discharges	Yes
PS	Other Stipulated Measure - Control of priority substances	Yes
MOD	Other Stipulated Measure - Controls on physical modifications to surface waters	Yes
OA	Other Stipulated Measure - Controls on other activities impacting on water status	Yes
AP	Other Stipulated Measure - Prevention or reduction of the impact of accidental pollution incidents	Yes
TP1	WSIP - Agglomerations with treatment plants requiring capital works	No
TP2	WSIP - Agglomerations with treatment plants requiring further investigation prior to capital works	No
TP3	WSIP - Agglomerations requiring the implementation of actions identified in Shellfish PRPs	No
TP4	WSIP - Agglomerations with treatment plants requiring improved operational performance	No
TP5	WSIP - Agglomerations requiring investigation of CSOs	No

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TP6	WSIP - Agglomerations where exisitng treatment capacity is currently adequate but predicted loadings would result in overloading	No
OTS	On-site waste water treatment systems	Yes
FPM	Freshwater Pearl Mussel sub-basin plan	Yes
SHE	Shellfish Pollution Reduction Plan	No
IPR	IPPC licences requiring review	No
WPR	Water Pollution Act licences requiring review	No
FOR	Forestry guidelines and regulations	Yes
CH1	Chanelisation measures	No
CH2	Chanelisation investigations	No
OG	Overgrazing measures	No
HQW	Protect high quality waters	No

Measures
Measures are necessary to ensure that we meet the objectives set out in the previous page of this report. Many measures are already provided for in national legislation and must be implemented. Other measures have been recently introduced or are under preparation. A range of additional potential measures are also being considered but require further development. Any agreed additional measures can be introduced through the update of Water Management Unit Action Plans during the implementation process.

You can read more about Basic Measures in 'River Basin Planning Guidance' and in other documents in our RBMP Document Library at www.wfdireland.ie.

Date Reported to Europe:July 2010

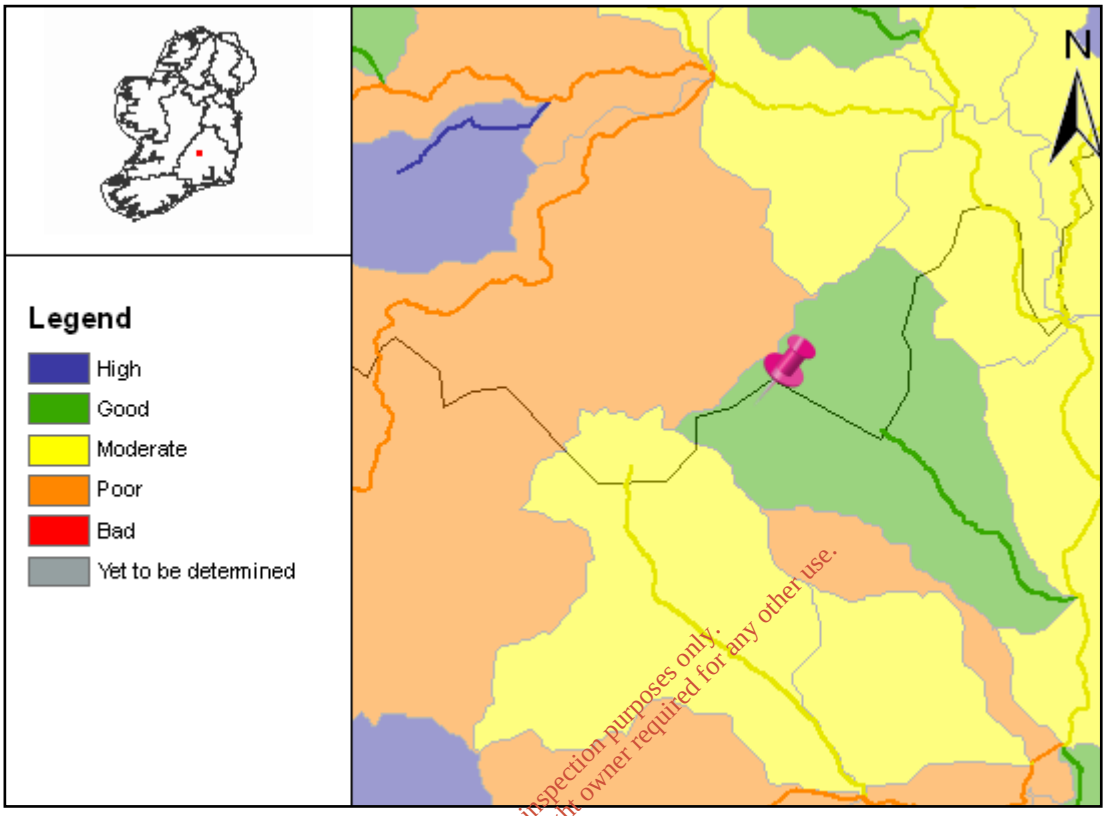
Date Report Created 11/12/2017

APPENDIX 3

Ground Water Body Report

water matters
'our Plan'

Full Report for Waterbody Lisdowney



River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The WaterMaps viewer is an integral part of the River Basin Management Plan and provides access to information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland.

The following report provides summary plan information about the selected waterbody (indicated by the pin in the map above) relating to its status, risks, objectives, and measures proposed to retain status where this is adequate, or improve it where necessary. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters], and coastal waters), or to groundwaters. Other relevant information not included in this report can be viewed using the WaterMaps viewer, including areas listed in the Register of Protected Areas.

You will find brief notes at the bottom of some of the individual report sheets that will help you in interpreting the information presented. More detailed information can be obtained in relation to all aspects of the RBMPs at www.wfdireland.ie.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Summary Information:

Water Management Unit:	N/A
WaterBody Category:	Groundwater Waterbody
WaterBody Name:	Lisdowney
WaterBody Code:	IE_SE_G_088
Overall Status:	Good
Overall Objective:	Protect
Overall Risk:	2a Probably Not At Risk
Heavily Modified:	No

south eastern river basin district

Report data based upon final RBMP, 2009-2015.

The information provided above is a summary of the principal findings related to the selected waterbody. Further details and explanation of individual elements of the report are outlined in the following pages.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Chemical and Quantitative Status Report

Water Management Unit: N/A

WaterBody Category: Groundwater Waterbody

WaterBody Name: Lisdowney

WaterBody Code: IE_SE_G_088

Overall Status Result: Good

Heavily Modified: No

south eastern river basin district

	Status Element Description	Result
	Status information	
INS	Status associated with saline intrusion into groundwater	GS-HC
DWS	Status associated with exceedances of water quality above specific standards	GS-HC
DS	Chemical status of groundwater due to pressure from diffuse sources of pollution	GS-HC
CLS	Chemical status of groundwater due to pressure from contaminated soil or land.	GS-HC
MS	Chemical status of groundwater due to pressure from mine sites (active or closed).	GS-HC
UAS	Chemical status of groundwater due to pressures from urban areas	GS-HC
GWS	General groundwater quality status	GS-HC
RPS	Status associated with MRP loading to rivers	GS-LC
TNS	Status associated with nitrate loading to transitional and coastal waters	GS-LC
SWS	Overall status associated with nutrient loadings to rivers and transitional and coastal waters	GS-LC
SQS	Status associated with dependant surface water quantitative status	GS-HC
GDS	Groundwater dependant terrestrial ecosystems status	GS-HC
QSO	Quantitative status overall	GS-HC
CSO	Chemical status overall	GS-LC
OS	Overall status	Good

GS -HC : Good status High Confidence
GS- LC : Good status Low Confidence
n/a - not assessed

Status
By 'Status' we mean the condition of the water in the waterbody. It is defined by its chemical status and quantitative status, whichever is worse. Groundwaters are ranked in one of 2 status classes: Good or Poor.

You can read more about status and how it is measured in our RBMP Document Library at www.wfdireland.ie (Directory 15 Status).

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Risk Report

Water Management Unit: N/A

WaterBody Category: Groundwater Waterbody

WaterBody Name: Lisdowney

WaterBody Code: IE_SE_G_088

Overall Risk Result: 2a Probably Not At Risk

Heavily Modified: No

south eastern river basin district

	Risk Test Description	Risk
	Groundwater Dependent Terrestrial Ecosystems	
TE	GWDTE Risk	N/A
	Groundwater Quality	
DIF	Diffuse Elements (General) Risk	N/A
DW	Drinking Waters Risk	N/A
INT	Intrusions Risk	N/A
WB	Water Balance Risk	N/A
	Groundwater Quality (General)	
GQ	General Groundwater Quality Risk	N/A
	Groundwater Quality (Point Risk)	
CL	Contaminated Land Risk	N/A
LF	Landfill Risk	N/A
MI	Mine Risk	N/A
QY	Quarry Risk	N/A
UR	Urban Risk	N/A
UW	UWWT Risk	N/A
	GW Diffuse Risk Sources	
WB3	Mobile Nutrients (NO3)	N/A
WB4	Mobile Chemicals	N/A
WB5	Clustered OSWTSs and leaking urban sewerage systems	N/A
	GW Hydrology	
WB1	Water balance - Abstraction	N/A
WB2	Abstraction - Intrusion	N/A

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

	GW Point Risk Sources		
WB10	Risk from Point sources of pollution - Contaminated Land		N/A
WB11	Risk from Point sources of pollution - Trade Effluent Discharges		N/A
WB12	Risk from Point sources of pollution - Urban Wastewater Discharges		N/A
WB6	Risk from Point sources of pollution - Mines		N/A
WB7	Risk from Point sources of pollution - Quarries		N/A
WB8	Risk from Point sources of pollution - Landfills		N/A
WB9	Risk from Point sources of pollution - Oil Industry Infrastructure		N/A
	Overall Risk		
RA	Groundwater Overall - Worst Case		N/A
	Risk information		
CLR	Contaminated land risk	2b	Not At Risk
DR	Risk of groundwater due to pressure from diffuse sources of pollution	2b	Not At Risk
DWR	Risk associated with exceedances of water quality above specific standards	2b	Not At Risk
GDR	Groundwater dependant terrestrial ecosystems risk	2b	Not At Risk
GWR	General groundwater quality risk	2b	Not At Risk
INR	Risk associated with saline intrusion into groundwater	2b	Not At Risk
LR	Risk due to landfills sites/old closed dump sites	2b	Not At Risk
MR	Mines risk	2b	Not At Risk
NULL	Diffuse nitrates from agriculture risk		N/A
QR	Risk due to quarries	2b	Not At Risk
RA	Revised risk assessment	2a	Probably Not At Risk
RPR	Risk associated with MRP loading to rivers	2a	Probably Not At Risk
SQR	Risk associated with dependant surface water quantitative status	2b	Not At Risk
SWR	Overall risk associated with nutrient loadings to rivers and transitional and coastal waters	2a	Probably Not At Risk
TNR	Risk associated with nitrate loading to transitional and coastal waters	2a	Probably Not At Risk
UAR	Risk of groundwater due to pressures from urban areas	2b	Not At Risk
UWR	Risk due to direct discharges of urban wastewater	2b	Not At Risk

Risk
By 'risk' we mean the risk that a waterbody will not achieve good ecological or good chemical status/potential at least by 2015. To examine risk the various pressures acting on the waterbody were identified along with any evidence of impact on water status. Depending on the extent of the pressure and its potential for impact, and the amount of information available, the risk to the water body was placed in one of four categories: 1a at risk; 1b probably at risk; 2a probably not at risk; 2b not at risk. Note that '2008' after the risk category means that the risk assessment was revised in 2008. All other risks were determined as part of an earlier risk assessment in 2005.

You can read more about risk assessment in our 'WFD Risk Assessment Update' document in the RBMP document library, and other documents at www.wfdireland.ie (Directory 31 Risk Assessments).

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Objectives Report

Water Management Unit: N/A

WaterBody Category: Groundwater Waterbody

WaterBody Name: Lisdowney

WaterBody Code: IE_SE_G_088

Overall Objective: Protect

Heavily Modified: No

south eastern river basin district

	Objectives Description	Result
	Extended timescale information	
E1	Extended deadlines due to agricultural P	No Status
E2	Extended deadlines due to agricultural N	No Status
E3	Extended deadlines due to mines	No Status
E4	Extended deadlines due to urban areas	No Status
E5	Extended deadlines due to contaminated lands	No Status
EO	Extended deadlines - overall	No Status
	Objectives information	
OB1	Prevent deterioration objective	Protect
OB2	Restore at least good status objective	No Status
OB3	Reduce chemical pollution objective	No Status
OB4	Protected areas objective	No Status
OBO	Overall objectives - objective	Protect

Extended timescales
Extended timescales have been set for certain waters due to technical, economic, environmental or recovery constraints. Extended timescales are usually of one planning cycle (6 years, to 2021) but in some cases are two planning cycles (to 2027).

Objectives
In general, we are required to ensure that our waters achieve at least good status/potential by 2015, and that their status does not deteriorate. Having identified the status of waters (this is given earlier in this report), the next stage is to set objectives for waters. Objectives consider waters that require protection from deterioration as well as waters that require restoration and the timescales needed for recovery. Four default objectives have been set initially:-

Prevent Deterioration
Restore Good Status
Reduce Chemical Pollution
Achieve Protected Areas Objectives

These objectives have been refined based on the measures available to achieve them, the latter's likely effectiveness, and consideration of cost-effective combinations of measures. Where it is considered necessary extended deadlines have been set for achieving objectives in 2021 or 2027.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

water matters
'our Plan'

Measures Report

Water Management Unit: N/A

WaterBody Category: Groundwater Waterbody

WaterBody Name: Lisdowney

WaterBody Code: IE_SE_G_088

Heavily Modified: No

south eastern river basin district

	Measures Description	Applicable
BC	Total number of basic measures which apply to this waterbody	24
BW	Directive - Bathing Waters Directive	No
BIR	Directive - Birds Directive	No
HAB	Directive - Habitats Directive	Yes
DW	Directive - Drinking Waters Directive	Yes
MAE	Directive - Major Accidents and Emergencies Directive	Yes
EIA	Directive - Environmental Impact Assessment Directive	Yes
SS	Directive - Sewage Sludge Directive	Yes
UWT	Directive - Urban Waste Water Treatment Directive	Yes
PPP	Directive - Plant Protection Products Directive	Yes
NIT	Directive - Nitrates Directive	Yes
IPC	Directive - Integrated Pollution Prevention Control Directive	Yes
CR	Other Stipulated Measure - Cost recovery for water use	Yes
SUS	Other Stipulated Measure - Promotion of efficient and sustainable water use	Yes
DWS	Other Stipulated Measure - Protection of drinking water sources	Yes
ABS	Other Stipulated Measure - Control of abstraction and impoundment	Yes
POI	Other Stipulated Measure - Control of point source discharges	Yes
DIF	Other Stipulated Measure - Control of diffuse source discharges	Yes
GW	Other Stipulated Measure - Authorisation of discharges to groundwaters	Yes
PS	Other Stipulated Measure - Control of priority substances	Yes
MOD	Other Stipulated Measure - Controls on physical modifications to surface waters	Yes
OA	Other Stipulated Measure - Controls on other activities impacting on water status	Yes
AP	Other Stipulated Measure - Prevention or reduction of the impact of accidental pollution incidents	Yes
OTS	On-site waste water treatment systems	Yes
FPM	Freshwater Pearl Mussel sub-basin plan	Yes
SHE	Shellfish Pollution Reduction Plan	No
IPR	IPPC licences requiring review	No
WPR	Water Pollution Act licences requiring review	No
FOR	Forestry guidelines and regulations	Yes

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

HQW	Protect high quality waters	Yes

Measures
Measures are necessary to ensure that we meet the objectives set out in the previous page of this report. Many measures are already provided for in national legislation and must be implemented. Other measures have been recently introduced or are under preparation. A range of additional potential measures are also being considered but require further development. Any agreed additional measures can be introduced through the update of Water Management Unit Action Plans during the implementation process.

You can read more about Basic Measures in 'River Basin Planning Guidance' and in other documents in our RBMP Document Library at www.wfdireland.ie.

Date Reported to Europe:July 2010

Date Report Created 11/12/2017

APPENDIX 4

2017 Borehole Logs

O'Callaghan Moran & Associates
Phone: 021 4345366

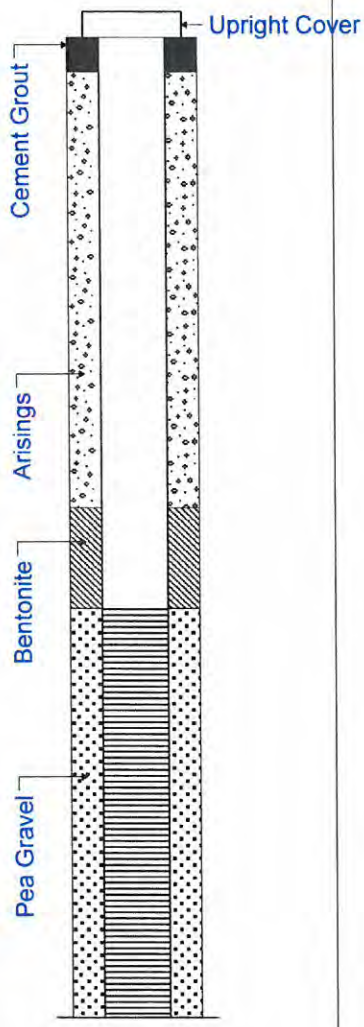
Borehole I.D. MW-5

Project: Tier 3 Investigation

Client: Kilkenny County Council Borehole Depth: 14.6

Location: Ballyragget Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
0	**TOPSOIL.** Light brown slightly sandy gravelly clay.		
1	**CLAY.** Light brown CLAY with dense gravels.		
3	**Gravelly CLAY.** Grey sandy gravelly CLAY. Gravels angular to sub-angular. Sands medium to coarse grained.		
4	**GRAVEL.** Grey weathered angular to sub-angular GRAVELS with some sandy clays.		
7	**LIMESTONE** LIMESTONE Bedrock. Water strike at 6.8 m bgl.		



Drilling Contractor: Ground Investigation Ireland Hole Size: 100mm

Drill Method: Air Rotary Geologist: Conor McGrath

Drill Date: 16/11/17 Sheet 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Borehole I.D. MW-6

Project: Tier 3 Investigation

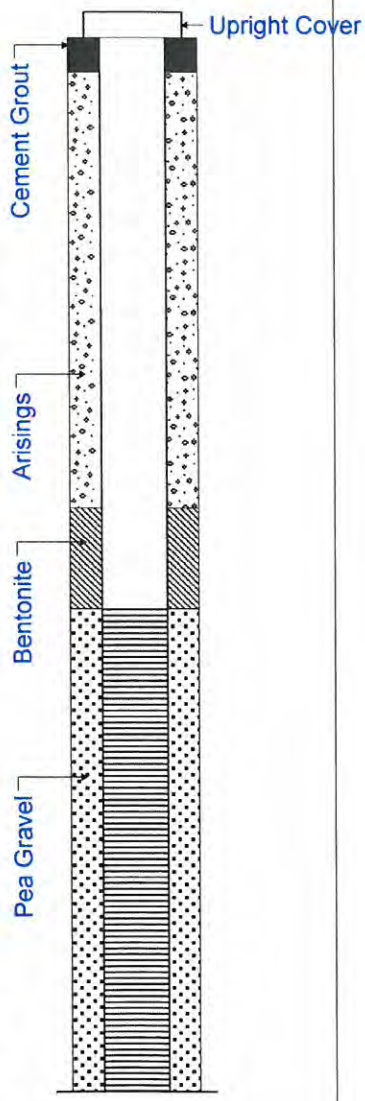
Client: Kilkenny County Council

Borehole Depth: 15.7

Location: Ballyragget

Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
0	**TOPSOIL.** Light brown slightly sandy gravelly clay.		
1	**CLAY.** Light brown CLAY with dense gravels.		
3	**Gravelly CLAY.** Grey sandy gravelly CLAY. Gravels angular to sub-angular. Sands medium to coarse grained.		
4	**GRAVEL.** Grey weathered angular to sub-angular GRAVELS with some sandy clays.		
7	**LIMESTONE** LIMESTONE Bedrock. Water strike at 5.5 m bgl.		



Drilling Contractor: Ground Investigation Ireland

Hole Size: 100mm

Drill Method: Air Rotary

Geologist: Conor McGrath

Drill Date: 16/11/17

Sheet 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Borehole I.D. MW-7

Project: Tier 3 Investigation

Client: Kilkenny County Council

Borehole Depth: 25.5

Location: Ballyragget

Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
0	***TOPSOIL.*** Light brown slightly sandy gravelly clay.		
2	***CLAY.*** Light brown CLAY with dense gravels.		
4	***Gravelly CLAY.*** Grey sandy gravelly CLAY. Gravels angular to sub-angular. Sands medium to coarse grained.		
6	***GRAVEL.*** Grey weathered angular to sub-angular GRAVELS with some sandy clays.		
8	***LIMESTONE*** LIMESTONE Bedrock.		
10	Water strike at 21.2 m bgl.		
26			

Upright Cover
Cement Grout
Arisings
Bentonite
Pea Gravel

Drilling Contractor: Ground Investigation Ireland

Hole Size: 100mm

Drill Method: Air Rotary

Geologist: Conor McGrath

Drill Date: 16/11/17

Sheet 1 of 1

APPENDIX 5

OCM Sampling Protocols

STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLING

The primary objective of groundwater sampling is to evaluate whether the potential contaminant sources at a site have impacted the quality of the groundwater in the underlying aquifer. The additional objective is to measure hydraulic gradient, or slope, of the water table in the shallow aquifer in an effort to evaluate the direction of groundwater flow.

The purpose of this procedure is to ensure that representative samples of groundwater are collected and documented using consistent methods to ensure sample integrity.

1.0 SAMPLING PROCEDURES

1.1 Well Operating and Purging Procedures

All groundwater sampling will be conducted after the installed and developed wells have been allowed to equilibrate for at least 2 to 3 days. A Field Data Sheet for Well Sampling will be completed for each well.

Groundwater sampling teams will use to following procedure for approaching, opening, purging and sampling all wells unless directed otherwise by the workplan.

1) Prior to placing any equipment into the well, decontaminate the sampling equipment according to standard decontamination protocol.

2) Approach the well with a working FID/PID, a well key, and a depth-to-water meter.

3) Unlock and open the well cap just enough to insert the probe of the OVA or HNu. Take and record a reading. A decision to upgrade PPE may be necessary based on the FID/PID readings in the breathing zone.

4) Where practical, the surface water column will be visually examined for the presence of hydrocarbons, if present or suspected, the thickness of the hydrocarbon layer will be measured using an oil/water interface probe prior to taking the depth-to-water measurement.

5) Insert the water level probe into the well and measure and record the static water level to the nearest 0.01 m with respect to the established survey point on top of the well casing.

6) Decontaminate the water level probe with DDI water (Do not rinse with any solvents unless product was encountered).

7) Calculate and record the minimum volume of water to be purged according to the following conversion factors: -

1 well volume	=	water column in metres x litres/linear metre
2 inch casing	=	2.0 LPM
4 inch casing	=	8.1 LPM
6 inch casing	=	18.2 LPM
8 inch casing	=	32.4 LPM

8) Purge the well of at least 3 casing volumes by pumping or bailing with a decontaminated submersible pump or PVC bailer equipped with a bottom filling check valve (if the purge volume is low, generally less than 100 litres, the sampling team might find it more efficient to purge with a bailer than a pump). Use a graduated bucket to track the amount of water removed from the well. Periodically determine the pH, temperature and specific conductance of the purged water. Continue purging until the well has been completely evacuated or until the pH and specific conductance measurements have stabilised for at least one well volume. Wells that become dewatered prior to producing three casing volumes will be sampled as soon as practical once they recover sufficiently.

9) Dispose of purge water collected in the graduated bucket by dumping onto the ground at a distance of 50 to 60 metres from the vicinity of the well. If the water is known or suspected to be significantly contaminated, it may be necessary to store the purge water in a secure container, such as a drum, pending proper disposal.

10) Be aware and record any unusual occurrence during purging such as cascading (a shallow water entry zone that trickles into the borehole).

1.2 Field Parameter Measurement

Measurements of field parameters of pH, temperature and electrical conductivity are collected and organic vapour screening is conducted while the well is purged. To facilitate the collection of basic field parameters, the field team needs to: -

- Purge three well volumes of water from the well and measure field parameters for each well volume removed.

- Collection of water samples should take place after stabilisation of the following parameters: -

  - Temperature $^{+}$/- 1^{o}C
  - pH (meter or paper) $^{+}$/- 0.2 units
  - Specific conductivity $^{+}$/- 5%

- If the aforementioned parameters do not stabilise within three purge volumes, the well will be purged up to a maximum of six borehole volumes unless two consecutive sets of stabilised parameters are obtained.

- Note any observations in the field logbook.

1.3 Collection of Water Samples

All samples or chemical analysis will be placed in laboratory prepared bottles. The types of sample containers and preservative required for each type of analysis are described in the workplan. If required, preservatives will be placed in the sample containers prior to collecting the samples.

The following procedure will be used to sample a well: -

1) After the well has been purged and allowed to recover, sample the well using a properly decontaminated or dedicated disposable bailer. Gently lower the bailer into the water column. Allow the bailer to sink and fill with a minimum of surface disturbance.

2) Slowly raise the bailer out of the well. Do not allow the bailer line to contact the ground, either by coiling it on a clean plastic sheet or by looping it from arm to arm as the line is extracted from the well.

3) Samples will be collected for VOCs analysis immediately after purging is complete and before other samples are collected. Pour the samples slowly into the laboratory prepared 40 ml glass vial. Overfill each vial slightly to eliminate air bubbles, a convex meniscus should be present at the top of the vial. Ensure that the Teflon liner of the septum cap is facing inward and that no bubbles are entrapped. After capping securely, turn bottle upside-down, tap it against your other hand, and observe sample water for bubbles. If bubbles are observed, remove the cap, overfill the vial and reseal. Repeat this step for each vial until the samples with no bubbles are obtained.

4) Place a label on the container and enter the following information: -

   Client/Site Name
   Date Collected
   Time Collected
   Analysis
   Preservative
   Sample Identification Number

5) Record pertinent information in the field logbook and on the Field Data Sheet for Well Sampling. Complete chain-of-custody form.

6) Place custody seals on the container caps. As soon as possible, place sample containers in a cooler with bagged ice and maintain at 4^{o}C until extraction. Surround the bottles with vermiculite.

7) Obtain the semi-volatile compound/pesticides/PCBs sample(s) by transferring the water to a laboratory prepared 1000 ml amber glass bottle with Teflon-lined cap. Fill the bottle to the bottom of the neck and follow steps 4, 5 and 6 above.

8) Dissolved metals (if necessary) requires the team to filter the sample water through a .45 micron filter. The water is collected in a 1 litre, unpreserved, plastic or glass bottle with HNO_3 preservative. Filtering must be done within 15 minutes of sample collection.

9) Obtain the total metals sample by directly transferring the water from the bailer into a laboratory prepared 1000 ml plastic or glass bottle with HNO_3 preservative.

10) Be sure the pH of the metals sampled is less than 2 by pouring off an aliquot in a clean jar and testing for pH using litmus paper. Dispose of this water and rinse the jar.

11) Collect and prepare Field QA/QC samples in accordance with separate SOP.

12) Be sure to record all data required on the Field Data Sheet or Well Sampling and appropriate entries into the field logbook.

13) Secure the well cap and replace the locking cover.

14) Decontaminate all sampling equipment according to procedure.

15) Decontaminate submersible pumps as follows: -

Scrub pump and cord in a tub of Liquinox and potable water
Pump at least 80 litres of soapy water through pump
Rinse with potable water
Pump at least 80 litres of rinse water through the pump
Rinse with D1 water before lowering pump into the next well.

END.

APPENDIX 6

Laboratory Results

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

O'Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm
Cork
Ireland

Attention :	Sean Moran
Date :	6th December, 2017
Your reference :	17.238.01
Our reference :	Test Report 17/19392 Batch 1
Location :	Ballyragget
Date samples received :	24th November, 2017
Status :	Final report
Issue :	1

Four samples were received for analysis on 24th November, 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: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran
JE Job No.: 17/19392

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	28-37							LOD/LOR	Units	Method No.
Sample ID	MW-5	MW-6	MW-7	MW-2									
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/11/2017	21/11/2017	22/11/2017	21/11/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	24/11/2017	24/11/2017	24/11/2017	24/11/2017									
Dissolved Arsenic	6.3	<2.5	3.4	4.3							<2.5	ug/l	TM30/PM14
Dissolved Boron	143	76	63	62							<12	ug/l	TM30/PM14
Dissolved Cadmium	<0.5	<0.5	<0.5	<0.5							<0.5	ug/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
Dissolved Lead	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Manganese	272	153	4	<2							<2	ug/l	TM30/PM14
Dissolved Mercury	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel	8	7	3	<2							<2	ug/l	TM30/PM14
Dissolved Potassium	21.0	8.4	2.8	4.0							<0.1	mg/l	TM30/PM14
Dissolved Selenium	<3	<3	<3	<3							<3	ug/l	TM30/PM14
Dissolved Sodium	38.0	21.9	33.2	11.0							<0.1	mg/l	TM30/PM14
Dissolved Zinc	314	486	15	6							<3	ug/l	TM30/PM14
Total Phosphorus	295	52	47	123							<5	ug/l	TM30/PM14
PAH MS													
Naphthalene	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM4/PM30
Acenaphthylene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Acenaphthene	0.145	0.079	0.072	<0.013							<0.013	ug/l	TM4/PM30
Fluorene	<0.014	0.018	<0.014	<0.014							<0.014	ug/l	TM4/PM30
Phenanthrene	<0.011	0.031	0.013	<0.011							<0.011	ug/l	TM4/PM30
Anthracene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluoranthene	0.020	0.017	0.012	<0.012							<0.012	ug/l	TM4/PM30
Pyrene	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Benzo(a)anthracene	<0.015	<0.015	<0.015	<0.015							<0.015	ug/l	TM4/PM30
Chrysene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.018	<0.018	<0.018	<0.018							<0.018	ug/l	TM4/PM30
Benzo(a)pyrene	<0.016	<0.016	<0.016	<0.016							<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
PAH 16 Total	<0.195	<0.195	<0.195	<0.195							<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	97	95	99	98							<0	%	TM4/PM30

Client Name: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran
JE Job No.: 17/19392

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	28-37							LOD/LOR	Units	Method No.
Sample ID	MW-5	MW-6	MW-7	MW-2									
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/11/2017	21/11/2017	22/11/2017	21/11/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	24/11/2017	24/11/2017	24/11/2017	24/11/2017									
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	<0.01	<0.01	<0.01	<0.01							<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	<1.00 AB	<1.00 AB	<1.00 AB	<1.00 AB							<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
Benazolin	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Bentazone	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Bromoxynil	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Clopyralid	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
4 - CPA	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
2,4 - D	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
2,4 - DB	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Dicamba	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Dichloroprop	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Diclofop	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Fenoprop	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Flamprop	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Flamprop – isopropyl	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30

Client Name: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran
JE Job No.: 17/19392

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	28-37							LOD/LOR	Units	Method No.
Sample ID	MW-5	MW-6	MW-7	MW-2									
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/11/2017	21/11/2017	22/11/2017	21/11/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	24/11/2017	24/11/2017	24/11/2017	24/11/2017									
loxynil	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
MCPA	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
MCPB	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Mecoprop	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Picloram	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Pentachlorophenol	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
2,4,5 - T	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
2,3,6 - TBA	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Triclopyr	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM42/PM30
Resorcinol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
Phenol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02	<0.02							<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
Total cresols	<0.03	<0.03	<0.03	<0.03							<0.03	mg/l	TM26/PM0
Xylenols	<0.06	<0.06	<0.06	<0.06							<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1	<0.1							<0.1	mg/l	TM26/PM0
Sulphate as SO4	15.8	13.7	14.4	13.9							<0.5	mg/l	TM38/PM0
Chloride	63.8	47.6	57.2	34.0							<0.3	mg/l	TM38/PM0
Nitrate as NO3	35.0	41.9	26.8	53.6							<0.2	mg/l	TM38/PM0
Nitrite as NO2	0.34	0.05	0.03	0.42							<0.02	mg/l	TM38/PM0
Ortho Phosphate as P	<0.03	<0.03	<0.03	<0.03							<0.03	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	8.0	9.5	6.1	12.2							<0.2	mg/l	TM38/PM0
Total Cyanide	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N	41.40	10.19	0.27	40.42							<0.03	mg/l	TM38/PM0
BOD (Settled)	3	1	2	1							<1	mg/l	TM58/PM0
COD (Settled)	15	35	9	14							<7	mg/l	TM57/PM0
Total Organic Carbon	4	<2	<2	<2							<2	mg/l	TM60/PM0
Total Dissolved Solids	417	355	92	245							<35	mg/l	TM20/PM0

Client Name: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran
JE Job No.: 17/19392

SVOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-37								
Sample ID	MW-5	MW-6	MW-7	MW-2								
Depth												
COC No / misc												
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G	V H N P BOD G								
Sample Date	21/11/2017	21/11/2017	22/11/2017	21/11/2017								
Sample Type	Liquid	Liquid	Liquid	Liquid								
Batch Number	1	1	1	1								
Date of Receipt	24/11/2017	24/11/2017	24/11/2017	24/11/2017								

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
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
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
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	115	112	116	108							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	122	125	127	110							<0	%	TM16/PM30

Client Name: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran
JE Job No.: 17/19392

VOC Report : **Liquid**

J E Sample No.	1-9	10-18	19-27	28-37							LOD/LOR	Units	Method No.
Sample ID	MW-5	MW-6	MW-7	MW-2									
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G	V H N P BOD G	V H N P BOD G									
Sample Date	21/11/2017	21/11/2017	22/11/2017	21/11/2017									
Sample Type	Liquid	Liquid	Liquid	Liquid									
Batch Number	1	1	1	1									
Date of Receipt	24/11/2017	24/11/2017	24/11/2017	24/11/2017									
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	101	87	102	119							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	119	99	116	139							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: O'Callaghan Moran & Associates
Reference: 17.238.01
Location: Ballyragget
Contact: Sean Moran

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/19392						

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.: 17/19392

SOILS

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

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

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

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

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

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

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

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

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

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

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

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

WATERS

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

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

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

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

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

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

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to 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	x100 Dilution

JE Job No: 17/19392

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
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
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.				
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
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.				
TM42	Modified US EPA method 8270. Pesticides and herbicdes by GC-MS	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
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.				

JE Job No: 17/19392

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
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.				
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.				
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.				

APPENDIX 7

Tier 3 Risk Scores

Risk Screening/ Prioritisation

Table 1a LEACHATE: SOURC/HAZARD SCORING MATRIX			
	Waste FOOTPRINT (ha)		
WASTE TYPE	≤ 1ha	> 1 ≤ 5 ha	> 5ha
C&D	0.5	1	1.5
Municipal	5	7	10
Industrial	5	7	10
Pre 1977 sites	1	2	3

1a =	5

Table 1b LANDFILL GAS: SOURC/HAZARD SCORING MATRIX			
	Waste FOOTPRINT (ha)		
WASTE TYPE	≤ 1ha	> 1 ≤ 5 ha	> 5ha
C&D	0.5	0.75	1
Municipal	5	7	10
Industrial	3	5	7
Pre 1977 sites	0.5	0.75	1

1b =	7

Table 2a : LEACHATE MIGRATION: PATHWAYS	
GROUNDWATER VULNERABILITY (Vertical Pathway)	Points
Extreme Vulnerability	3
High Vulnerability	2
Moderate Vulnerability	1
Low Vulnerability	0.5
High - Low Vulnerability (use where vulnerability not on GIS)	2

2a =	2

Table 2b : LEACHATE MIGRATION: PATHWAYS	
GROUNDWATER FLOW REGIME (Horizontal Pathway)	Points
Karstified Groundwater Bodies (Rk)	5
Productive Fissured Bedrock Groundwater Bodies (Rf & Lm)	3
Gravel Groundwater Bodies (Rg and Lg)	2
Poorly Productive Bedrock Groundwater Bodies (Ll, Pl, Pu)	1

2b =	5

Risk Screening/ Prioritisation

Table 2c : LEACHATE MIGRATION: PATHWAYS	
SURFACE WATER DRAINAGE (Surface water pathway)	**Points**
Is there a direct connection between drainage ditches associated with the waste body and adjacent surface water body? Yes	2
If no direct connection	0

2c =	**0**

Table 2d : LANDFILL GAS: PATHWAY	
LANDFILL GAS LATERAL MIGRATION POTENTIAL	**Points**
Sand and Gravel, Made ground, urban, karst	3
Bedrock	2
All other Tills (including limestone, sandstone etc - moderate permabi	1.5
All Namurian or Irish Sea Tills (low permability)	1
Clay, Alluvium, Peat	1

2d =	**3**

Table 2e : LANDFILL GAS: PATHWAY (assuming receptor located above source)	
LANDFILL GAS LATERAL MIGRATION POTENTIAL	**Points**
Sand and Gravel, Made ground, urban, karst	5
Bedrock	3
All other Tills (including limestone, standstone etc - moderate permab	2
All Namurian or Irish Sea Tills (low permability)	1
Clay, Alluvium, Peat	1

2e =	**5**

Table 3a : LEACHAGE MIGRATION: *RECEPTORS*	
HUMAN PRESENCE (presence of a house indicates potential private wells)	**Points**
On or within 50m of the waste body	3
Greater than 50m but less than 250m	2
Greater than 250m but less than 1km from waste body	1
Greater than 1km of the waste body	0

3a =	**2**

Risk Screening/ Prioritisation

Table 3b : LEACHAGE MIGRATION: RECEPTORS PROTECTED AREAS (SWDTE or GWDTE)	Points
Within 50m of waste body	3
Greater than 50m but less than 250m of the waste body	2
Greater than 250m but less than 1km from waste body	1
Greater than 1km of the waste body	0
Undesignated sites within 50m of waste body	1
Undesignated sites greater than 50m but less than 250m	0.5
Undesignated sites greater than 250m of the waste body	0

3b =	0

Table 3c : LEACHAGE MIGRATION: *RECEPTORS*	
AQUIFER CATEGORY (resource potential)	Points
Regionally Important Aquifers (Rk, Rf, Rg)	5
Locally Important Aquifers (LI, Lm, Lg)	3
Poor Aquifers (Pl, Pu)	1

3c =	5

Table 3d : LEACHAGE MIGRATION: *RECEPTORS*	
PUBLIC WATER SUPPLIES (Other than private wells)	Points
Within 100m of site boundary	7
Greater than 100m but less than 300m or with in Inner SPA for GW supplies	5
Greater than 300m but less than 1km or within Outer SPA (SO) for GW supplies	3
Greater than 1km (karst aquifer)	3
Greater than 1km (no karst aquifer)	0

3d =	3

Table 3e : LEACHAGE MIGRATION: *RECEPTORS*	
SURFACE WATER BODIES	Points
Within 50m of site boundary	3
Greater than 50m but less than 250m	2
Greater than 250m but less than 1km	1
Greater than 1km	0

3e =	1

Table 3f : LEACHAGE MIGRATION: *RECEPTORS*	
HUMAN PRESENCE	Points
On site or within 50m of site boundary	5
Greater than 50m but less than 150m	3
Greater than 150m but less than 250m	1
Greater than 250m	0.5

3f =	3

Risk Screening/ Prioritisation

Note: The table below represents the Tier 1 risk rating for this site. SPR 1 to 9 represent the leachate risk scores. SPR 10 & 11 represent Landfill Gas risks. The migration pathways are colour coded as follows:			
Groundwater & Surface Water	Groundwater only	Surface water only	Lateral & Vertical

Calculator	SPR Values	Maximum Score	Linkages	Normalised Score	
SPR 1 =	35	300	Leachate => surface water	12%	
SPR 2 =	0	300	Leachate => SWDTE	0%	
SPR 3 =	70	240	Leachate => human presence	29%	33
SPR 4 =	0	240	Leachate => GWDTE	0%	
SPR 5 =	175	400	Leachate => Aquifer	44%	
SPR 6 =	105	560	Leachate => Surface Water	19%	21
SPR 7 =	35	240	Leachate => SWDTE	15%	
SPR 8 =	0	60	Leachate => Surface Water	0%	
SPR 9 =	0	60	Leachate => SWDTE	0%	
SPR 10 =	63	150	Landfill Gas => Human Presence	42%	
SPR 11 =	105	250	Landfill Gas => Human Presence	42%	

Risk Classification	Range of Risk Scores
Highest Risk (Class A)	Greater than or equal to 70% for any individual SPR lingage
Moderate Risk (Class B)	Between 40-70% for any individual SPR linkage
Lowest Risk (Class C)	Less than or equal to 40% for any individual SPR linkage

TIER 3 RATING	MODERATE RISK (Class B)