WASTE RECOVERY SERVICES (FERMOY) LTD.

Licence No. W0107-01

ANNUAL ENVIRONMENTAL REPORT

2015

Prepared By: Adrian Dunlea.

Table of Contents

LIST OF APPENDICES

1 INTRODUCTION

1.1 Reporting Period

The following is the annual report (AER) for the period January 2015 to December 2015 for the Waste Transfer/Recycling Facility operated by Waste Recovery Services (Fermoy) Ltd. (WRS) at Cullenagh, Fermoy, County Cork. The contents of this report are as specified in Schedule F of Waste licence W0107-01 granted on 18th of April 2002.

1.2 Waste Activities Carried Out.

WRS are licensed by the Environmental Protection Agency (EPA) to carry out waste activities in a non-hazardous waste transfer station. The facility is licensed to accept non hazardous waste (commercial, industrial and construction and demolition waste). Hazardous or liquid wastes are not accepted. Facility. The activities authorised by the licence are in Table 1.1 and 1.2.

Table 1.1 Licensed Waste Recovery Activities,

Third Schedule **Class 12. Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.** This activity is limited to the transfer of non-recoverable waste into jumbo skips for transfer to landfill. **Class 13. Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.** This activity is limited to the temporary storage of non-recoverable wastes prior to dispatch to landfill.

Table 1.2 Licensed Waste Disposal Activities

Fourth Schedule

Class 3. Recycling or reclamation of metals and metal compounds:

This activity is limited to the recovery and temporary storage of metal waste separated from waste accepted at the facility.

Class 4. Recycling or reclamation of other inorganic materials:
This activity is limited to the recovery and temporary storage of timber waste and of construction and demolition wastes accepted at the facility.

Class 13. Storage of waste intended for submission to any activity referred to in a Preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced:

This activity is limited to the storage of materials on site prior to recovery at the facility or removal to a recovery facility off-site

1.3 Site Infrastructure & Development

1.3.1 Site Infrastructure

The facility comprises a site office, weighbridge, process sheds, workshop and temporary storage areas as well as a waste water and storm water management system. The operational area is separated into three sections:

1. Waste Transfer Area.
2. Construction & Demolition Area.
3. Timber Segregation & Shredding Area.

1.3.2 Waste Handling & Processing Capacity

The processing capacity each sections are outlined in Tables 1.3, 1.4 and 1.5.

Table 1.3 Equipment in Waste Transfer Area

Equipment Type	Equipment Use	Rate of Tonnes Per Hour	Daily Tonnage Capacity - 10 Hour Day >>	Weekly Processing Capacity - 6 Days a Week	Annual Processing Capacity 51 Weeks
Ejector Trailer / Walking Floor, Komatsu - 13 Tonne Excavator, New Holland Skid Steer S160	Loading & Sorting Waste, Transport of Waste Materials	20	200	1,200.00	61,200.00
		Tonnes	**Tonnes**	**Tonnes**	**Tonnes**

Table 1.4 Equipment in Construction & Demolition Area

Equipment Type	Equipment Use	Rate of Tonnes Per Hour	Daily Tonnage Capacity - 10 Hour Day >>	Weekly Processing Capacity - 6 Days a Week	Annual Processing Capacity 51 Weeks
Extec – Finger Screener & LJH – Mobile Picking Station, Manitou Telescopic loader, Tipper Lorries	Screening Waste, Sorting & Segregating Waste. Loading & Sorting Waste. Transport of Waste Materials	40.00	400.00	2,400.00	122,400.00
		Tonnes	**Tonnes**	**Tonnes**	**Tonnes**

Table 1.5 Equipment in Timber Segregation & Shredding area

Equipment Type	Equipment Use	Rate of Tonnes Per Hour	Daily Tonnage Capacity - 10 Hour Day >>	Weekly Processing Capacity - 6 Days a Week	Annual Processing Capacity 51 Weeks
2 Wood Shredders, One 14 Tonne Loader & 13 Tonne Excavator, Walking Floor.	Shredding, Loading Wood & Woodchip	20	240	1,440.00	73,440.00
		Tonnes	**Tonnes**	**Tonnes**	**Tonnes**

2 WASTE ACTIVITES

The waste categories and quantities that can be accepted at the Facility are in Schedule A (Table 2) of the waste licence (See Table 2.1):

Table 2.1 Waste types and quantities permitted by waste license

Waste Type	Maximum Tonnes Per annum
Commercial	3000
Industrial	1700
Construction and Demolition	1800
Total	**6500**

The types of wastes received and quantities (tonnes) of waste received and dispatched at the site during 2015 are given in Table 2.2. The total quantity of waste received was x,xxx tonnes. The total waste consigned was x,xxx tonnes. More waste was accepted to the site than consigned from it, the difference being xxx tonnes. This was due to material that had been accepted but not consigned in 2015 prior to consignment in 2016.

Table 2.2 Wastes Received and Dispatched from the 1st January – 31st December 2015

Not Available on Electronic Copy – Call to site for Full Copy

2015 Waste In & Out				
EWC - Waste Description	**Waste Destination Details**	**Waste Facility Permit / Licence No.**	**Waste In**	**Waste Out**

2015 Waste In & Out				
EWC - Waste Description	**Waste Destination Details**	**Waste Facility Permit / Licence No.**	**Waste In**	**Waste Out**

2015 Waste In & Out				
EWC - Waste Description	**Waste Destination Details**	**Waste Facility Permit / Licence No.**	**Waste In**	**Waste Out**

2015 Waste In & Out				
EWC - Waste Description	**Waste Destination Details**	**Waste Facility Permit / Licence No.**	**Waste In**	**Waste Out**
Grand Total				

2.1 Waste Recovered at the Site

87% of the waste consigned from the facility in 2015 was recycled. A copy of the PRTR is in Appendix 1.

3 SUMMARY OF RESULTS AND INTERPRETATION OF ENVIRONMENTAL DATA

Foul Water Monitoring

Foul water monitoring is carried out at one location (FW-1), the foul water holding tank that contains water from the process shed. The holding tank is emptied regularly and the contents sent to the Fermoy Waste Water Treatment Plant. All of the parameters complied with the emission limit values (ELVs) set in the Licence. The laboratory reports are in Appendix 2.

Groundwater Monitoring

Groundwater monitoring was carried out quarterly at six monitoring wells and the laboratory reports are in Appendix 2. Wells BH-1 and BH-3 are within the facility, while the other wells (Dunlea, O'Riordan, O'Leary and Coughlan) are at private residences in the vicinity of the facility. It is likely that BH-3 and O'Leary's are either upgradient of the facility or not in the same catchment. BH-1, Dunlea's and O'Riordan's are down gradient and Coughlan's is possibly side downgradient of the facility.

The licence does not specify any ELVs or Trigger Levels and for interpretation purposes the results had previously been compared to the Interim Guideline Values (IGV) for groundwater published by the Agency. The results are now also compared to the Threshold Values for groundwater (GTV) quality introduced by the European Communities Environmental Objectives (Groundwater) Regulations 2010 S.I. No. 9 of 2010.

The IGV levels represent typical background or unpolluted conditions; however levels higher than the IGV can occur naturally, depending on the local geological and hydrogeological conditions. While the GTVs are more appropriate for large scale abstraction wells used for potable supply, they can be used to assess the significance of contamination where present in groundwater. Because not all parameters monitored have been assigned GTVs, the relevant IGVs continue to be used for comparative purposes.

pH levels in all wells are below the IGV range with the exception of O'Riordan's well, which is fitted with a treatment unit to balance the pH in the drinking water supply and O'Leary's

well in Q4 where the pH level was marginally above the lower limit. The low pH is considered to be naturally occurring.

Elevated concentrations of potassium, exceeding the IGV, were detected in BH-1, Dunlea's well and O'Riordan's well in all monitoring rounds. The potassium levels in O'Riordan's well are associated with the treatment unit.

Elevated concentrations of ammonia, exceeding the GTV, were detected in BH-1 in Q1 – Q4, and in O'Riordan's well from Q2 to Q4. Ammonia concentrations did not exceed the IGV or GTV in any other wells.

Elevated concentrations of zinc, exceeding the IGV, were identified in O'Riordan's well in Q1. Elevated concentrations of copper, exceeding the IGV but not exceeding the GTV, were identified in O'Riordan's well in Q1, and in O'Leary's well from Q2 to Q4.

Due to an administrative error the annual parameters were analysed in Q1, Q2 and Q3 2015 and therefore are discussed in the respective quarterly reports and summarised below. Elevated concentrations of manganese, exceeding the IGV, were detected in BH-1, Dunlea's well and O'Riordan's well in Q1, Q2 and Q3. Elevated concentrations of manganese were detected in BH-3 in Q1 and in all monitoring wells in Q3. High levels of manganese have been detected in all of these wells previously. As the high levels were detected in both up and down gradient wells it is probable that the manganese is naturally occurring. Elevated concentration of Orthophosphate exceeding the IGV were detected in Dunlea's well and O'Leary's well in Q1, Q2 and Q3, in O'Riordan's well in Q3 and Q4 and in BH-1 in Q3.

Elevated concentrations of TPH, exceeding the IGV, were detected in BH-1 in Q1, but not in any other well. The chloride concentration in Dunlea's well exceeded the GTV in Q2. The chloride concentration in BH-1, BH-3 and Dunlea's well exceeded the IGV, but did not exceed the GTV from Q1 to Q3. The nitrate concentration in BH-3 exceeded the IGV but did not exceed the GTV in Q2. The sulphate concentration in Dunlea's well exceeded the IGV and GTV in Q3.

The total coliform levels in all of the wells are within the ranges previously detected, with the highest concentration identified in BH-1 in Q2 (4,780cfu/100ml). E-Coli was detected in BH-

1 in Q1 and Q3, in Dunlea's well in Q2, Q3 and Q4, Coughlan's well and Dunlea's well in Q3 and in O'Riordan's well in Q3 and Q4. The highest concentration was identified in O'Riordan's well in Q4 (8mpn/100ml).

All other parameters analysed were below their respective IGV and GTVs.

Percolation Area

The discharge to the percolation area (P1) was monitored for BOD, suspended solids and speciated EPH. The laboratory reports are in Appendix 2. There were no exceedances of the Trigger Levels.

Dust

Dust monitoring was carried out on three occasions at the three monitoring points specified in the Licence. The monitoring was conducted in July, August and December. The results for Dust Point 3 in July and August exceeded the deposition limit of 350mg/m^2/day for total dust particles. The results of the December monitoring were all below the deposition limit. The laboratory reports are in Appendix 2.

Noise

Noise monitoring was carried out annually at the monitoring points specified in the Licence. The noise levels complied with the ELV set in the Licence. The noise monitoring report is in Appendix 3.

3.1 Review of Nuisance Controls

Nuisance controls are reviewed on weekly basis.

4 REPORTED COMPLAINTS AND INCIDENTS

There were no reported complaints or incidents in 2015.

5 RESOURCE AND ENERGY CONSUMPTION

The main resources consumed at the facility during the reporting period were electricity, diesel, and lubricants. A summary of the significant resources consumed are in Tables 5.1 and Table 5.2.

Table 5.1 Principal areas of energy and resources usage January – December 2015

Area of Use	**Purpose**	**Principal Resource Consumed**
Site Plant/Vehicles	Moving and processing of Waste	Diesel, Lubricants
Offices and Sheds	Management of Yard and The facility management	Electricity and Water

Table 5.2 Energy and Resources Consumption January – December 2015

Resource	**Consumption for Reporting Period - 2015**	**Consumption for previous year - 2014**	**Increase / Decrease (%)**
Site Management			
Electricity	46,096 Units	28,810 Units	60%
Site Plant / Vehicles			
Diesel	298,481.03 Litres	400,270.89 Litres	-25.43%
Lubricants	2621.78	3,990.4 Litres	-34.30%

6 ENVIRONMENTAL OBJECTIVES & TARGETS FOR 2015

Table 6.1 Progress on Objectives for site improvement for 2015

Project	Status
1. Dust Emissions / Monitoring	On going
2. Noise Emissions / Monitoring	On going
3. Ground Water / Monitoring	On going
4. Foul Water / Monitoring	On going

7 ENVIRONMENTAL OBJECTIVES & TARGETS FOR 2016

Table 7.1 Objectives and Targets for 2016

Objective	Target	Responsibility	Timescale
Assess and reduce where possible all dust emissions.	Not to exceed 350 mg/m^2/day in order to reduce the possibility of causing dust deposition nuisance beyond site boundary.	Adrian Dunlea	Ongoing
Assess and reduce where possible all site noise emissions.	Not to exceed 55 db(a) L_{AEq} (30 minutes) during day time and not to exceed 45 db(a) L_{AEq} (30 minutes) during night at noise monitoring locations in order to reduce the possibility of causing noise nuisance at noise sensitive locations beyond the site boundary.	Adrian Dunlea	Ongoing
Assess and monitoring groundwater quality at the site and in the immediate vicinity of the site	No pollution of groundwater due to site activities.	Adrian Dunlea	Ongoing
Assess and monitoring waste water emissions from the site.	Compliance with emission limits as required by schedule C4 of W0107-01.	Adrian Dunlea	Ongoing

8 NEW PROCEDURES PUT IN PLACE DURING 2015

No new procedures were put in place during 2015.

9 MANAGEMENT AND STAFFING STRUCTURES

The management and staffing structures in place at WRS (Table 8.1) ensures clear communication of environmental policy and responsibility for environmental management on-site. A critical part of this management system is the provision of health and safety and environmental training to all staff members to ensure that all staff members from management to operatives are aware of their responsibilities and best practice to ensure the firm meets its environmental obligations.

Table 9.1 Management Structure

Position	**Name**
General Manager	John Dunlea
Facility Manager / Site Manager / Environmental Manager	Adrian Dunlea
Deputy Facility Manager / Financial Manger / Administration / Logistics etc	Shane Dunlea

10 PUBLIC INFORMATION PROGRAMME

WRS have developed and implemented a communications procedure as part of the site EMS. In accordance with Condition 2.4 of the waste licence this procedure ensures that members of the public can obtain relevant information, at all reasonable times, concerning the environmental performance of the facility.

11 FINANCIAL PROVISION

An environmental liabilities risk assessment and site closure report have been prepared and submitted to the Agency. These reports contain proposals for financial provision which have been agreed by the Agency.

Adrian Dunlea
Environmental Manager
Waste Recovery Services (Fermoy) Ltd

APPENDIX 1

2015 PRTR

Environmental Protection Agency

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2015

1. FACILITY IDENTIFICATION

Parent Company Name	Waste Recovery Services (Fermoy) Limited
Facility Name	Waste Recovery Services (Fermoy) Limited
PRTR Identification Number	W0107
Licence Number	W0107-01

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Cullenagh
Address 2	Fermoy
Address 3	
Address 4	
	Cork
Country	Ireland
Coordinates of Location	-8.30669 52.1138
River Basin District	IESW
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Adrian Dunlea
AER Returns Contact Email Address	a.dunlea@wrs.ie
AER Returns Contact Position	Environmental Manager
AER Returns Contact Telephone Number	025 31055
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	25
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	Yes

This question is only applicable if you are an IPPC or Quarry site

4.1 RELEASES TO AIR Link to previous years emissions data | PRTR# : W0107 | Facility Name : Waste Recovery Services (Fermoy) Limited | Filename : W0107_2015.xls | Return Year : 2015 | 24/08/2016 17:39

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Waste Recovery Services (Fermoy) Limited

Please enter summary data on the quantities of methane flared and / or utilised	**T (Total) kg/Year**	**M/C/E**	**Method Used**		**Facility Total Capacity m3 per hour**	
			Method Code	**Designation or Description**		
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

| PRTR# : W0107 | Facility Name : Waste Recovery Services (Fermoy) Limited | Filename : W0107_2015.xls | Return Year : 2015 | 24/08/2016 17:39

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as t

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.4 RELEASES TO LAND

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
			Method Used				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
			Method Used				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

APPENDIX 2.

2015 MONITORING RESULTS

2a - GROUNDWATER LABORATORY REPORTS

2b – FOUL WATER LABORATORY REPORTS

2c – PERCOLATION AREA LABORATORY REPORTS

2d – DUST MONITORING REPORTS

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/001
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	C (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.013	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.017	mg/l NH4	INAB	
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		0.026	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	3.59	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	15.89	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	10.2	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	9.8	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	6	MPN/100ml		OOS-A
	Analyst Micro Comment: The start date for this micro test is 31/03/15								
	E. Coli		MIC133	0	0	0	MPN/100ml	INAB	
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		6	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Metals-Trace									
	Barium		EM130	1.0		9.5	ug/L	INAB	
	Calcium		EM130	1.0		9.1	mg/L	INAB	
	Magnesium		EM130	0.3		1.7	mg/L	INAB	
	Potassium		EM130	0.2		0.9	mg/L	INAB	
	Zinc		EM130	1.0		32	ug/L	INAB	
	Cadmium		EM130	0.1		0.2	ug/L	INAB	
	Chromium		EM130	1.0		<1.0	ug/L	INAB	
	Iron		EM130	20	200	<20	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	40.8	ug/L	INAB	
	Nickel		EM130	0.5		2.6	ug/L	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/001
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	C (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Lead		EM130	0.3	10	0.8	ug/L	INAB	
	Boron		EM130	0.02		0.03	mg/L	INAB	
	Copper		EM130	0.003	2	0.009	mg/L	INAB	
	Sodium		EM130	0.5	200	7.4	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	5.4	pH Units	INAB	OOS-A
	Conductivity @20 DegC		EW153	25	2500	112	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		2.32	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		0.02	mg/l P	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/002
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	OL (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.014	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.018	mg/l NH4	INAB	
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		0.046	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	4.37	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	19.35	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	11.2	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	5.3	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	16	MPN/100ml		OOS-A
	E. Coli		MIC133	0	0	0	MPN/100ml	INAB	
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		9	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Metals-Trace									
	Barium		EM130	1.0		11.2	ug/L	INAB	
	Calcium		EM130	1.0		4.8	mg/L	INAB	
	Magnesium		EM130	0.3		2.8	mg/L	INAB	
	Potassium		EM130	0.2		0.9	mg/L	INAB	
	Zinc		EM130	1.0		41	ug/L	INAB	
	Cadmium		EM130	0.1		0.1	ug/L	INAB	
	Chromium		EM130	1.0		<1.0	ug/L	INAB	
	Iron		EM130	20	200	160	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	12.5	ug/L	INAB	
	Nickel		EM130	0.5		1.8	ug/L	INAB	
	Lead		EM130	0.3	10	1.2	ug/L	INAB	
	Boron		EM130	0.02		<0.02	mg/L	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/002
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	OL (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Copper		EM130	0.003	2	0.026	mg/L	INAB	
	Sodium		EM130	0.5	200	8.0	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	5.7	pH Units	INAB	OOS-A
	Conductivity @20 DegC		EW153	25	2500	102	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		5.05	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		0.10	mg/l P	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

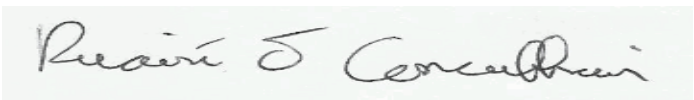
ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/003
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	D (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.076	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.098	mg/l NH4	INAB	
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		0.042	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	3.50	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	15.49	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	38.0	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	193.1	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	0	MPN/100ml	INAB	
	E. Coli		MIC133	0	0	0	MPN/100ml	INAB	
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		2	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Metals-Trace									
	Barium		EM130	1.0		62.6	ug/L	INAB	
	Calcium		EM130	1.0		80.1	mg/L	INAB	
	Magnesium		EM130	0.3		16.1	mg/L	INAB	
	Potassium		EM130	0.2		7.8	mg/L	INAB	
	Zinc		EM130	1.0		5.1	ug/L	INAB	
	Cadmium		EM130	0.1		0.4	ug/L	INAB	
	Chromium		EM130	1.0		<1.0	ug/L	INAB	
	Iron		EM130	20	200	<20	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	6000	ug/L		OOS-A
	Nickel		EM130	0.5		8.5	ug/L	INAB	
	Lead		EM130	0.3	10	<0.3	ug/L	INAB	
	Boron		EM130	0.02		0.06	mg/L	INAB	



Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/003
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	D (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Copper		EM130	0.003	2	<0.003	mg/L	INAB	
	Sodium		EM130	0.5	200	28.8	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	5.9	pH Units	INAB	OOS-A
	Conductivity @20 DegC		EW153	25	2500	646	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		3.88	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		0.05	mg/l P	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/004
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	R (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.055	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.071	mg/l NH4	INAB	
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		0.030	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	3.93	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	17.40	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	14.4	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	14.0	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	6	MPN/100ml		OOS-A
	E. Coli		MIC133	0	0	0	MPN/100ml	INAB	
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		3	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Metals-Trace									
	Barium		EM130	1.0		22.1	ug/L	INAB	
	Calcium		EM130	1.0		5.0	mg/L	INAB	
	Magnesium		EM130	0.3		2.6	mg/L	INAB	
	Potassium		EM130	0.2		131.1	mg/L		
	Zinc		EM130	1.0		120	ug/L		
	Cadmium		EM130	0.1		0.3	ug/L	INAB	
	Chromium		EM130	1.0		<1.0	ug/L	INAB	
	Iron		EM130	20	200	<20	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	706	ug/L		OOS-A
	Nickel		EM130	0.5		7.7	ug/L	INAB	
	Lead		EM130	0.3	10	2.5	ug/L	INAB	
	Boron		EM130	0.02		0.09	mg/L	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/004
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	R (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Copper		EM130	0.003	2	0.150	mg/L	INAB	
	Sodium		EM130	0.5	200	14.3	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	7.2	pH Units	INAB	
	Conductivity @20 DegC		EW153	25	2500	578	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		1.04	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		0.02	mg/l P	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/005
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	Gw 1 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.29	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.376	mg/l NH4	INAB	OOS-A
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		<0.009	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	3.13	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	13.86	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	32.4	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	100.6	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	202	MPN/100ml		OOS-A
	Analyst Micro Comment:Over 0-201 Range.Result >201								
	E. Coli		MIC133	0	0	3	MPN/100ml		OOS-A
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		4	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		27	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		24	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		51	ug/L		
Metals-Trace									
	Barium		EM130	1.0		32.1	ug/L	INAB	
	Calcium		EM130	1.0		42.1	mg/L	INAB	
	Magnesium		EM130	0.3		7.0	mg/L	INAB	
	Potassium		EM130	0.2		16.4	mg/L	INAB	
	Zinc		EM130	1.0		22	ug/L	INAB	
	Cadmium		EM130	0.1		0.4	ug/L	INAB	
	Chromium		EM130	1.0		1.3	ug/L	INAB	
	Iron		EM130	20	200	110	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	2540	ug/L		OOS-A
	Nickel		EM130	0.5		4.8	ug/L	INAB	
	Lead		EM130	0.3	10	1.4	ug/L	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

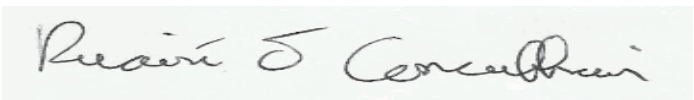
ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/005
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	Gw 1 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Boron		EM130	0.02		0.04	mg/L	INAB	
	Copper		EM130	0.003	2	0.004	mg/L	INAB	
	Sodium		EM130	0.5	200	21.4	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	5.8	pH Units	INAB	OOS-A
	Conductivity @20 DegC		EW153	25	2500	397	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		4.89	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		0.07	mg/l P	INAB	



Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/006
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	Gw 3 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.0070		0.0090	mg/l N	INAB	
	Ammonia (as NH4)		EW154M-1	0.009	0.3	0.012	mg/l NH4	INAB	
AQ2-UP1									
	Phosphate-Ortho(MRP)		EW154M-1	0.009		0.009	mg/l P	INAB	
	Nitrate (as N)		EW154M-1	0.12	11.31	4.05	mg/l N	INAB	
	Nitrate (as NO3)		EW154M-1	0.53	50	17.93	mg/l NO3	INAB	
	Nitrite (as N)		EW154M-1	0.013	0.15	<0.013	mg/l N	INAB	
	Nitrite (as NO2)		EW154M-1	0.043	0.5	<0.043	mg/l NO2	INAB	
AQ2-UP2									
	Chloride		EW154M-1	2.6	250	73.5	mg/L	INAB	
	Sulphate		EW154M-1	1.0	250	115.4	mg/L	INAB	
Coliforms									
	Total Coliforms		MIC133	0	0	0	MPN/100ml	INAB	
	E. Coli		MIC133	0	0	0	MPN/100ml	INAB	
Dissolved Oxygen									
	Dissolved Oxygen		EW043	1		9	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Metals-Trace									
	Barium		EM130	1.0		38.8	ug/L	INAB	
	Calcium		EM130	1.0		54.1	mg/L	INAB	
	Magnesium		EM130	0.3		9.1	mg/L	INAB	
	Potassium		EM130	0.2		2.9	mg/L	INAB	
	Zinc		EM130	1.0		14	ug/L	INAB	
	Cadmium		EM130	0.1		0.3	ug/L	INAB	
	Chromium		EM130	1.0		1.5	ug/L	INAB	
	Iron		EM130	20	200	55	ug/L	INAB	
	Mercury		EM130	0.02		<0.02	ug/L	INAB	
	Manganese		EM130	1.00	50	244	ug/L		OOS-A
	Nickel		EM130	0.5		2.6	ug/L	INAB	
	Lead		EM130	0.3	10	0.7	ug/L	INAB	
	Boron		EM130	0.02		<0.02	mg/L	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84160 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84160/006
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	07/04/2015
Quotation No	QN003735	**Sample Type**	Drinking Water
Customer Ref	Gw 3 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Metals-Trace									
	Copper		EM130	0.003	2	<0.003	mg/L	INAB	
	Sodium		EM130	0.5	200	35.7	mg/L	INAB	
Titralab									
	pH		EW153	0.0	6.5-9.5	5.4	pH Units	INAB	OOS-A
	Conductivity @20 DegC		EW153	25	2500	513	uscm-1@20	INAB	
Total Organic Carbon (TOC)									
	Total Organic Carbon (TOC)		EW123	0.25		1.95	mg/L	INAB	
Total Phosphorus-TP									
	Total Phosphorus-TP		EW146	0.01		<0.01	mg/l P	INAB	

Signed : _____ 07/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84161 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84161/001
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	09/04/2015
Quotation No	QN003735	**Sample Type**	Waste Water
Customer Ref	P1 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
BOD									
	BOD		EW001	1		<1	mg/L	INAB	
GCFID TPH Split									
	TPH >C10 - C20 (DRO)		EO063	10		<10	ug/L		
	TPH >C20 - C40 (MO)		EO063	10		<10	ug/L		
	TPH >C6 - C10 (PRO)		EO063	10		<10	ug/L		
	TPH >C6-C40 (TPH)		EO063	10		<10	ug/L		
Suspended Solids									
	Suspended Solids		EW013	5		<5	mg/L	INAB	

Signed : _____ 09/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

ENVIRONMENTAL LABORATORY SERVICES
Acorn Business Campus
Mahon Industrial Park,
Blackrock,
Cork
Ireland
Tel: +353 21 453 6141
Fax: +353 21 453 6149
Web: www.irishwatertesting.com
email: info@elsltd.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 111T

Contact Name	Adrian Dunlea	**Report Number**	**84162 - 1**
Address	Waste Recovery Services (Fermoy) Ltd Cullenagh,	**Sample Number**	84162/001
		Date of Receipt	30/03/2015
		Date Started	30/03/2015
Tel No	(025) 31055	**Received or Collected**	Hand
Fax No	(025) 31528	**Condition on Receipt**	Good
Customer PO	Per Batch	**Date of Report**	15/04/2015
Quotation No	QN003735	**Sample Type**	Waste Water
Customer Ref	Fw 1 (30/03/15)		

CERTIFICATE OF ANALYSIS

TEST	ANALYTE	SUB	METHOD	LOQ	SPEC	RESULT	UNITS	ACCRED.	OOS
Ammonia									
	Ammonia (as N)		EW154M-1	0.035		62	mg/l N		
BOD									
	BOD		EW001	1		97	mg/L	INAB	
COD									
	COD		EW094	8		330	mg/L	INAB	
Detergents as MBAS (Sub1)									
	Detergents/Surfactants as MBAS	*	Default	0.21		0.75	mg/L		
Oils Fats Grease (OFG)									
	Oils Fats Grease (OFG)		EW004	4.0		19.3	mg/L		
Suspended Solids									
	Suspended Solids		EW013	5		85	mg/L	INAB	
Titralab									
	pH		EW153			7.9	pH Units	INAB	

Signed : _____ 15/04/2015

Dr. Ruairí OConcubhair-Technical Manager

NOTES
1.This Report shall not be Reproduced except in full, without the permission of the laboratory and only relates to the items tested.
2.SPEC= Allowable limit or parametric value
3.OOS=Result which is outside specification highlighted as OOS-A
4.LOQ=Limit of Quantification or lowest value that can be reported
5.ACCRED=Indicates matrix accreditation for the test,a blank field indicates not accredited
6."*" Indicates sub-contract test

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

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

4225

Attention :	Neil Sandes
Date :	23rd June, 2015
Your reference :	15-182-02
Our reference :	Test Report 15/8534 Batch 1
Location :	WRS Fermoy
Date samples received :	10th June, 2015
Status :	Final report
Issue :	1

Eight samples were received for analysis on 10th June, 2015 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Bob Millward BSc FRSC
Principal Chemist

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS Fermoy
Contact: Neil Sandes
JE Job No.: 15/8534

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-5	6-10	11-15	16-20	21-25	26-30	31-34	35-39			LOD/LOR	Units	Method No.
Sample ID	BH-1	BH-3	O COUGHLAN	DUNLEA	O LEARY	O RIORDAN	FW-1	P-1					
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G	V H P G	V H P G	V H P G	H P BOD G	V P BOD G					
Sample Date	09/06/2015 12:45	09/06/2015 10:45	09/06/2015 11:30	09/06/2015 12:30	09/06/2015 11:00	09/06/2015 11:45	09/06/2015 12:15	09/06/2015 12:00					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Liquid	Surface Water					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015					
Dissolved Barium #	31	39	8	64	9	15	-	-			<3	ug/l	TM30/PM14
Dissolved Boron	68	31	44	83	<12	116	-	-			<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-			<0.5	ug/l	TM30/PM14
Dissolved Calcium #	47.2	66.8	9.7	83.2	5.0	5.2	-	-			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	1.6	<1.5	<1.5	-	-			<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	31	<7	-	-			<7	ug/l	TM30/PM14
Total Dissolved Iron #	33	<20	<20	<20	<20	<20	-	-			<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5	-	-			<5	ug/l	TM30/PM14
Dissolved Magnesium #	8.4	10.7	1.8	16.8	2.9	2.8	-	-			<0.1	mg/l	TM30/PM14
Dissolved Manganese #	3854	22	45	6066	16	908	-	-			<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1	-	-			<1	ug/l	TM30/PM14
Dissolved Nickel #	13	<2	2	8	<2	7	-	-			<2	ug/l	TM30/PM14
Dissolved Potassium #	17.8	2.3	0.8	8.3	0.8	269.0_{AA}	-	-			<0.1	mg/l	TM30/PM14
Dissolved Sodium #	31.2	43.3	8.5	32.1	8.3	16.3	-	-			<0.1	mg/l	TM30/PM14
Dissolved Zinc #	36	11	18	4	41	9	-	-			<3	ug/l	TM30/PM14
Total Phosphorus	59	38	33	70	95	51	-	-			<5	ug/l	TM30/PM14
Mercury Dissolved by CVAF #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-			<0.01	ug/l	TM61/PM38
EPH >C8-C10	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
EPH >C10-C20	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
EPH >C20-C30	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
EPH >C30-C40	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
EPH >C8-C40 #	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
C8-C40 Mineral Oil (Calculation)	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM5/PM30
Fats Oils and Grease	-	-	-	-	-	-	<10	-			<10	ug/l	TM5/PM30
GRO (>C4-C8) #	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM36/PM12
GRO (>C8-C12) #	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM36/PM12
GRO (>C4-C12) #	<10	<10	<10	<10	<10	<10	-	<10			<10	ug/l	TM36/PM12
Sulphate #	118.39	135.85	10.82	208.20	7.56	15.34	-	-			<0.05	mg/l	TM38/PM0
Chloride #	43.7	78.2	12.5	39.1	12.5	16.1	-	-			<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	9.1	27.3	15.7	13.4	17.4	16.8	-	-			<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-			<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4	0.05	<0.03	0.03	0.13	0.08	0.06	-	-			<0.03	mg/l	TM38/PM0
Nitrate as N #	2.06	6.17	3.55	3.03	3.93	3.80	-	-			<0.05	mg/l	TM38/PM0
Nitrite as N #	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	-			<0.006	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	-	43.01	-			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	1.06	0.07	<0.03	0.10	0.03	0.84	-	-			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	1.36	0.09	<0.03	0.13	0.04	1.08	-	-			<0.03	mg/l	TM38/PM0
Anionic Surfactants	-	-	-	-	-	-	0.6	-			<0.2	mg/l	TM33/PM0
BOD (Settled)	-	-	-	-	-	-	53	-			<1	mg/l	TM58/PM0

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS Fermoy
Contact: Neil Sandes
JE Job No.: 15/8534

Report : Liquid

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

J E Sample No.	1-5	6-10	11-15	16-20	21-25	26-30	31-34	35-39			LOD/LOR	Units	Method No.
Sample ID	BH-1	BH-3	O COUGHLAN	DUNLEA	O LEARY	O RIORDAN	FW-1	P-1					
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G	V H P G	V H P G	V H P G	H P BOD G	V P BOD G					
Sample Date	09/06/2015 12:45	09/06/2015 10:45	09/06/2015 11:30	09/06/2015 12:30	09/06/2015 11:00	09/06/2015 11:45	09/06/2015 12:15	09/06/2015 12:00					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Liquid	Surface Water					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015	10/06/2015					
BOD (Settled) #	-	-	-	-	-	-	-	<1			<1	mg/l	TM58/PM0
COD (Settled)	-	-	-	-	-	-	262	-			<7	mg/l	TM57/PM0
Electrical Conductivity @25C #	553	669	144	722	129	880	-	-			<2	uS/cm	TM76/PM0
pH	-	-	-	-	-	-	7.75	-			<0.01	pH units	TM73/PM0
pH #	6.34	6.12	5.67	6.15	5.79	7.95	-	-			<0.01	pH units	TM73/PM0
Total Organic Carbon #	5	<2	2	4	<2	<2	-	-			<2	mg/l	TM60/PM0
Total Suspended Solids	-	-	-	-	-	-	36	-			<10	mg/l	TM37/PM0
Total Suspended Solids #	-	-	-	-	-	-	-	<10			<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/8534

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.

WATERS

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

ISO17025 (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.

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.

NOTE

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
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

JE Job No: 15/8534

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM33	Determination of Anionic surfactants by reaction with Methylene Blue to form complexes which are analysed spectrophotometrically. (MBAS)	PM0	No preparation is required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.				
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			

JE Job No: 15/8534

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
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.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1848
Page No.: 1 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - BH-1 - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**4,780**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1849
Page No.: 2 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - BH-3 - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**15**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1850
Page No.: 3 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - Coughlan - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1851
Page No.: 4 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - Dunlea - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**4**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1852
Page No.: 5 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - O'Leary - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**4**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1773822
Job Ref: 15F05537
Sample Ref No.: *LSN* 97/1853
Page No.: 6 of 6
Date Received: 09/06/2015
Date Reported: 11/06/2015

CERTIFICATE OF ANALYSIS

Groundwater - Riordan - 09/06/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 09/06/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 09/06/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**5**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

183T

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

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

4225

Attention :	Neil Sandes
Date :	14th September, 2015
Your reference :	15-182-02
Our reference :	Test Report 15/12282 Batch 1
Location :	WRS
Date samples received :	3rd September, 2015
Status :	Final report
Issue :	1

Eight samples were received for analysis on 3rd September, 2015 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS
Contact: Neil Sandes
JE Job No.: 15/12282

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-39			LOD/LOR	Units	Method No.
Sample ID	BH-1	BH-3	OLEARY	ORIORDAN	COUGHLAN	DUNLEA	PERCULATOR AREA	FOUL					
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G	V H P G	V H P G	V H P G	V P BOD G	H P BOD G					
Sample Date	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Liquid					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015					
Dissolved Barium #	35	41	15	19	9	68	-	-			<3	ug/l	TM30/PM14
Dissolved Boron	71	33	<12	120	60	89	-	-			<12	ug/l	TM30/PM14
Dissolved Cadmium #	0.6	<0.5	<0.5	<0.5	<0.5	0.7	-	-			<0.5	ug/l	TM30/PM14
Dissolved Calcium #	47.6	49.0	4.6	5.5	8.3	78.7	-	-			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	-	-			<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	35	15	8	<7	-	-			<7	ug/l	TM30/PM14
Total Dissolved Iron #	72	<20	<20	<20	<20	<20	-	-			<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	6	<5	<5	-	-			<5	ug/l	TM30/PM14
Dissolved Magnesium #	8.6	9.1	2.7	2.6	1.7	17.1	-	-			<0.1	mg/l	TM30/PM14
Dissolved Manganese #	4528	210	81	854	51	6263	-	-			<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1	<1	-	-			<1	ug/l	TM30/PM14
Dissolved Nickel #	11	3	3	7	2	9	-	-			<2	ug/l	TM30/PM14
Dissolved Potassium #	18.3	2.3	0.7	153.8_{AB}	0.7	7.8	-	-			<0.1	mg/l	TM30/PM14
Dissolved Sodium #	28.8	32.5	7.5	14.7	8.3	30.4	-	-			<0.1	mg/l	TM30/PM14
Dissolved Zinc #	35	5	41	22	24	6	-	-			<3	ug/l	TM30/PM14
Total Phosphorus	37	28	53	45	30	70	-	-			<5	ug/l	TM30/PM14
EPH >C8-C10	<10	<10	<10	<10	<10	<10	<10	-			<10	ug/l	TM5/PM30
EPH >C10-C20	<10	<10	<10	<10	<10	<10	<10	-			<10	ug/l	TM5/PM30
EPH >C20-C30	<10	<10	<10	<10	<10	<10	<10	-			<10	ug/l	TM5/PM30
EPH >C30-C40	<10	<10	<10	<10	<10	<10	<10	-			<10	ug/l	TM5/PM30
EPH >C8-C40 #	<10	<10	<10	<10	<10	<10	<10	-			<10	ug/l	TM5/PM30
Fats Oils and Grease	-	-	-	-	-	-	-	<10			<10	ug/l	TM5/PM30
Sulphate #	137.00	128.07	5.58	14.89	11.15	221.07	-	-			<0.05	mg/l	TM38/PM0
Chloride #	35.6	55.6	11.7	15.6	10.5	38.7	-	-			<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	9.1	22.5	16.0	15.4	12.0	14.5	-	-			<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-			<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4	<0.03	<0.03	0.04	0.04	<0.03	0.08	-	-			<0.03	mg/l	TM38/PM0
Nitrate as N #	2.05	5.09	3.62	3.48	2.72	3.27	-	-			<0.05	mg/l	TM38/PM0
Nitrite as N #	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	-			<0.006	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	-	-	-	-	-	-	-	20.76			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.57	<0.03	<0.03	0.30	<0.03	0.09	-	-			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.73	<0.03	<0.03	0.39	<0.03	0.12	-	-			<0.03	mg/l	TM38/PM0
Anionic Surfactants	-	-	-	-	-	-	-	2.0_{AA}			<0.2	mg/l	TM33/PM0
BOD (Settled)	-	-	-	-	-	-	-	43			<1	mg/l	TM58/PM0
BOD (Settled) #	-	-	-	-	-	-	<1	-			<1	mg/l	TM58/PM0
COD (Settled)	-	-	-	-	-	-	-	264			<7	mg/l	TM57/PM0
Electrical Conductivity @25C #	1458	544	121	604	143	746	-	-			<2	uS/cm	TM76/PM0
pH	-	-	-	-	-	-	-	7.32			<0.01	pH units	TM73/PM0
pH #	5.95	6.18	5.74	6.90	5.62	5.99	-	-			<0.01	pH units	TM73/PM0
Total Organic Carbon #	7	2	<2	4	3	7	-	-			<2	mg/l	TM60/PM0

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS
Contact: Neil Sandes
JE Job No.: 15/12282

Report : Liquid

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

J E Sample No.	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-39			LOD/LOR	Units	Method No.
Sample ID	BH-1	BH-3	OLEARY	ORIORDAN	COUGHLAN	DUNLEA	PERCULATOR AREA	FOUL					
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G	V H P G	V H P G	V H P G	V P BOD G	H P BOD G					
Sample Date	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015	02/09/2015					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Liquid					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015	03/09/2015					
Total Suspended Solids	-	-	-	-	-	-	-	27			<10	mg/l	TM37/PM0
Total Suspended Solids #	-	-	-	-	-	-	<10	-			<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS
Contact: Neil Sandes

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 15/12282						

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.: 15/12282

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.

WATERS

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

ISO17025 (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.

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.

NOTE

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x5 Dilution

JE Job No: 15/12282

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM33	Determination of Anionic surfactants by reaction with Methylene Blue to form complexes which are analysed spectrophotometrically. (MBAS)	PM0	No preparation is required.				
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.				
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				

JE Job No: 15/12282

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand.	PM0	No preparation is required.	Yes			
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34275
Page No.: 1 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - BH-1 - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**2,620**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**5**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34276
Page No.: 2 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - BH-3 - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**45**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34277
Page No.: 3 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - O'Leary - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**548**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34278
Page No.: 4 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - O'Riordan - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**24**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34279
Page No.: 5 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - Coughlan - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**34**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**6**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1857440
Job Ref: 15I01156
Sample Ref No.: *LSN* 1A/34280
Page No.: 6 of 6
Date Received: 02/09/2015
Date Reported: 04/09/2015

CERTIFICATE OF ANALYSIS

GW - Dunlea - 15-182-02 - 02/09/15

Date Sampled:
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 02/09/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 02/09/2015

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**201**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**2**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

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

4225

Attention :	Neil Sandes
Date :	15th December, 2015
Your reference :	15-182-02
Our reference :	Test Report 15/17202 Batch 1
Location :	WRS
Date samples received :	2nd December, 2015
Status :	Final report
Issue :	1

Eight samples were received for analysis on 2nd December, 2015 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: O'Callaghan Moran & Associates
Reference: 15-182-02
Location: WRS
Contact: Neil Sandes
JE Job No.: 15/17202

Report : Liquid

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

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-23	24-27			LOD/LOR	Units	Method No.
Sample ID	BH-1	BH-3	OLEARY	ORIORDAN	COUGHLAN	DUNLEA	PERC	FOUL					
Depth													
COC No / misc													
Containers	H P G	H P G	H P G	H P G	H P G	H P G	V P BOD G	H P BOD G					
Sample Date	01/12/2015 13:00	01/12/2015 10:00	01/12/2015 10:30	01/12/2015 12:30	01/12/2015 11:00	01/12/2015 12:15	01/12/2015 11:30	01/12/2015 11:30					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Liquid					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	02/12/2015	02/12/2015	02/12/2015	02/12/2015	02/12/2015	02/12/2015	02/12/2015	02/12/2015					
Dissolved Copper #	<7	<7	31	16	<7	<7	-	-			<7	ug/l	TM30/PM14
Total Dissolved Iron #	72	<20	<20	<20	<20	<20	-	-			<20	ug/l	TM30/PM14
Dissolved Potassium #	14.8	2.4	0.9	176.1_{AA}	0.8	8.8	-	-			<0.1	mg/l	TM30/PM14
Dissolved Sodium #	17.3	25.6	8.1	15.3	8.7	32.9	-	-			<0.1	mg/l	TM30/PM14
Dissolved Zinc #	19	4	43	13	14	6	-	-			<3	ug/l	TM30/PM14
Mineral Oil (C10-C40) #	-	-	-	-	-	-	<10	-			<10	ug/l	TM5/PM30
Fats Oils and Grease	-	-	-	-	-	-	-	<10			<10	ug/l	TM5/PM30
Ammoniacal Nitrogen as N	-	-	-	-	-	-	-	26.41			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.15	<0.03	<0.03	0.19	<0.03	0.09	-	-			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4	-	-	-	-	-	-	-	34.01			<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.19	<0.03	<0.03	0.25	<0.03	0.11	-	-			<0.03	mg/l	TM38/PM0
Anionic Surfactants	-	-	-	-	-	-	-	0.6			<0.2	mg/l	TM33/PM0
BOD (Settled)	-	-	-	-	-	-	-	49			<1	mg/l	TM58/PM0
BOD (Settled) #	-	-	-	-	-	-	<1	-			<1	mg/l	TM58/PM0
COD (Settled)	-	-	-	-	-	-	-	285			<7	mg/l	TM57/PM0
Dissolved Oxygen	9	10	10	6	7	2	-	-			<1	mg/l	TM59/PM0
Electrical Conductivity @25C #	376	393	112	534	122	683	-	-			<2	uS/cm	TM76/PM0
pH	-	-	-	-	-	-	-	7.53			<0.01	pH units	TM73/PM0
pH #	7.18	5.03	5.75	6.97	5.71	6.03	-	-			<0.01	pH units	TM73/PM0
Total Suspended Solids	-	-	-	-	-	-	-	45			<10	mg/l	TM37/PM0
Total Suspended Solids #	-	-	-	-	-	-	<10	-			<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/17202

SOILS

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

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

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

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

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

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

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

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

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

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

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

WATERS

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

ISO17025 (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.

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.

NOTE

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
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

JE Job No: 15/17202

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM33	Determination of Anionic surfactants by reaction with Methylene Blue to form complexes which are analysed spectrophotometrically. (MBAS)	PM0	No preparation is required.				
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.				
TM37	Modified USEPA 160.2 .Gravimetric determination of Total Suspended Solids. Sample is filtered and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand.	PM0	No preparation is required.				

JE Job No: 15/17202

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM58	Modified USEPA methods 405.1 and BS 5667-3. Measurement of Biochemical Oxygen Demand.	PM0	No preparation is required.	Yes			
TM59	Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79787
Page No.: 1 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

BH-1

Date Sampled: 01/12/2015
Time Sampled: 13.00
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 1

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**866**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79788
Page No.: 2 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

BH-3

Date Sampled: 01/12/2015
Time Sampled: 10.00
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 2

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**20**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79789
Page No.: 3 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

O'Leary

Date Sampled: 01/12/2015
Time Sampled: 10.30
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 3

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**3**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79790
Page No.: 4 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

O'Riordan

Date Sampled: 01/12/2015
Time Sampled: 12.30
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 4

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**50**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**8**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.183T

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79791
Page No.: 5 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

Coughlan

Date Sampled: 01/12/2015
Time Sampled: 11.00
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 5

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**6**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

Exova
Glanmire Industrial Estate
Glanmire
Co. Cork

T: +353 (0) 214822288
F: +353 (0) 214866342
E: cork@exova.com
W: www.exova.com

Version : 1

Client: Neil Sandes
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Certificate No.: 1945221
Job Ref: 15L00500
Sample Ref No.: *LSN* 1D/79792
Page No.: 6 of 6
Date Received: 01/12/2015
Date Reported: 02/12/2015

CERTIFICATE OF ANALYSIS

Dunlea

Date Sampled: 01/12/2015
Time Sampled: 12.15
Sample Type: WATER - ENVIRONMENTAL

Category: MICRO
Date Testing Initiated: 01/12/2015
Sample Condition: Satisfactory
Order No.: 15-182-02
Date Received: 01/12/2015
Sample No: 6

Test	Result	Unit	Method	Comments	Est.
Total Coliform Count-Colilert	**24**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		
E.COLI Count - Colilert	**<1**	**MPN/100ml**	**MTC12/MDW Part 4D (2009)**		

All tests are carried out according to our INAB schedule of accreditation.

Comments, opinions, grades and interpretations expressed herein are outside this current scope of INAB accreditation. The Laboratory has tested the material/items supplied by the customer as sampled in accordance with the customers own requirements.

Signed for and on behalf of Exova (Ireland) Ltd.

Michelle Everard
B.Sc (Biosciences)
Supervisor Microbiology Division

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.183T

southern scientific services ltd.

ANALYSIS REPORT

CUSTOMER:	**WASTE RECOVERY SERVICES**	**SAMPLE TYPE:**	**DUST**
ADDRESS:	Cullenagh, Fermoy, County Cork	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	02 July – 31 July 2015
REPORT TO:	**ADRIAN DUNLEA**	**DATE RECEIVED:**	07 August 2015
SAMPLED BY:	Adrian Dunlea	**DATE ANALYSED:**	10 - 13 August 2015
SAMPLING PT:	**DUST POINT 1 ~ 3**	**DATE REPORTED:**	13 August 2015
ORDER NO:	PO 003166	**WORK NO.:**	**33333 C**

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m2/day	INORGANIC PARTICULATES mg/m2/day
SCP 039	C15-Aug 115	Dust Point 1	336	99
SCP 039	C15-Aug 116	Dust Point 2	122	75
SCP 039	C15-Aug 117	Dust Point 3	383	162

Jennifer Keane
Jennifer Keane
Chemistry Laboratory Manager

- **The results relate only to the items tested.**
- **The analysis report shall not be reproduced except in full without written approval of the laboratory.**

(registered office)
4 park business centre | farranfore | county kerry | ireland | telephone +353 66 976 3588 | fax +353 66 976 3589
dunrine | killarney | county kerry | ireland | telephone +353 64 66 33922 | fax +353 64 66 39022

web site www.southernscientificireland.com | e-mail info@southernscientificireland.com

directors: K. Murphy, M. Murphy & C. Murphy
registered in ireland no 323196 | vat reg no IE 6343196 M

COMMENT:

C15-Aug 117 - Dust Point 3

The collector gauge contained green coloured water and a small amount of brown particulates. The dried dish contained a small amount of green particulates.

The ashed dish contained a small amount of brown particulates. The ashed residue underwent no effervescence on addition of acid indicating the absence of carbonate in the residue.

In accordance to standard laboratory practice a blank sample and a QC standard were analysed with the batch of samples.

southern scientific services ltd.

ANALYSIS REPORT

CUSTOMER:	**WASTE RECOVERY SERVICES**	**SAMPLE TYPE:**	**DUST**
ADDRESS:	Cullenagh, Fermoy, County Cork	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	01 – 30 August 2015
REPORT TO:	**ADRIAN DUNLEA**	**DATE RECEIVED:**	14 October 2015
SAMPLED BY:	Adrian Dunlea	**DATE ANALYSED:**	28 October – 03 November 2015
SAMPLING PT:	**DUST POINT 1 ~ 3**	**DATE REPORTED:**	03 November 2015
ORDER NO:	PO 003315	**WORK NO.:**	**33829 C**

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m2/day	INORGANIC PARTICULATES mg/m2/day
SCP 039	C15-Oct 359	Dust Point 1	191	81
SCP 039	C15-Oct 360	Dust Point 2	116	58
SCP 039	C15-Oct 361	Dust Point 3	708	215

Jennifer Keane

Jennifer Keane
Chemistry Laboratory Manager

- **The results relate only to the items tested.**
- **The analysis report shall not be reproduced except in full without written approval of the laboratory.**

(registered office)
4 park business centre | farranfore | county kerry | ireland | telephone +353 66 976 3588 | fax +353 66 976 3589
dunrine | killarney | county kerry | ireland | telephone +353 64 66 33922 | fax +353 64 66 39022

web site www.southernscientificireland.com | e-mail info@southernscientificireland.com

directors: K. Murphy, M. Murphy & C. Murphy
registered in ireland no 323196 | vat reg no IE 6343196 M

COMMENT:

C15-Oct 361 - Dust Point 3

The collector gauge contained green coloured water and a large amount of green algal growth. The dried dish contained a large amount of green particulates.

The ashed dish contained a small amount of brown residue. The ashed residue underwent no effervescence on addition of acid indicating the absence of carbonate in the residue.

In accordance to standard laboratory practice a blank sample and a QC standard were analysed with the batch of samples.

ANALYSIS REPORT

CUSTOMER:	**WASTE RECOVERY SERVICES**	**SAMPLE TYPE:**	**DUST**
ADDRESS:	Cullenagh, Fermoy, County Cork	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	02 December – 31 December 2015
REPORT TO:	**ADRIAN DUNLEA**	**DATE RECEIVED:**	26 January 2016
SAMPLED BY:	Adrian Dunlea	**DATE ANALYSED:**	01 – 08 February 2016
SAMPLING PT:	**DUST POINT 1 ~ 3**	**DATE REPORTED:**	09 February 2016
ORDER NO:	PO 003503	**WORK NO.:**	**34491 C**

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m2/day	INORGANIC PARTICULATES mg/m2/day
SCP 039	C16-Jan 461	Dust Point 1	110	52
SCP 039	C16-Jan 462	Dust Point 2	81	41
SCP 039	C16-Jan 463	Dust Point 3	64	64

Jennifer Keane
Jennifer Keane
Chemistry Laboratory Manager

- **The results relate only to the items tested.**
- **The analysis report shall not be reproduced except in full without written approval of the laboratory.**

(registered office)
4 park business centre | farranfore | county kerry | ireland | telephone +353 66 976 3588 | fax +353 66 976 3589
dunrine | killarney | county kerry | ireland | telephone +353 64 66 33922 | fax +353 64 66 39022

web site www.southernscientificireland.com | e-mail info@southernscientificireland.com

directors: K. Murphy, M. Murphy & C. Murphy
registered in ireland no 323196 | vat reg no IE 6343196 M

APPENDIX 3.

NOISE MONITORING REPORT

dBA
damian brosnan acoustics

2015 annual noise compliance survey at Waste Recovery Services, Cullenagh, Fermoy, Co. Cork

Licence ref. W0107-01

Client **Waste Recovery Services**

Prepared by **Damian Brosnan BSc MSc MIOA MIEI**

Report no	Date	Status
064.1.1	07.12.15	Release 1

damian brosnan acoustics

based in Cork, serving Ireland
damianbrosnan@gmail.com

✆ 086 813 1195
damianbrosnan.com

Damian Brosnan – assisting clients since 2001

damian brosnan acoustics is part of the DixonBrosnan Group

Contents

Summary

On 04.12.15, Damian Brosnan Acoustics carried out the 2015 annual environmental noise survey in the vicinity of the Waste Recovery Services facility at Cullenagh, Fermoy, Co. Cork. The survey is a requirement of waste licence W0107-01 issued by the Environmental Protection Agency in respect of the facility. Operations proceeded at the facility throughout the survey.

Facility noise emissions did not contribute to noise levels measured at two specified noise stations. It is concluded that site emissions were markedly lower than the 55 dB daytime noise limit specified in waste licence W0107-01. No tones or impulses were detected in facility emissions, thus complying with condition 6.4 of the waste licence.

1 Introduction

1.1 Damian Brosnan Acoustics was instructed by Waste Recovery Services (WRS) to carry out the 2015 annual environmental noise survey in the vicinity of their waste management facility at Cullenagh, Fermoy, Co. Cork. The survey is a requirement of waste licence W0107-01 issued by the Environmental Protection Agency in respect of the facility. The objectives of the survey were as follows:

- To undertake noise monitoring in accordance with *International Standard ISO 1996-2 Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels* (2007) and Environmental Protection Agency document *NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities* (2012).
- To measure noise levels at two stations specified in licence W0107-01 and shown in **appendix 1**.
- To assess measured levels in the context of noise limit specified in the licence, reproduced in **appendix 2**.

1.2 The noise survey was undertaken Friday 04.12.15 while facility operations were in progress. As the facility does not operate during evening or night-time hours, the survey was confined to daytime hours. Survey methodology, equipment specifications and weather conditions are listed in **appendix 3**.

1.3 WRS waste processing operations, involving mobile plant and the processing line, were in progress from approximately 0900 h. Limited operations occurred prior to 0900 h. Throughout the survey, emissions arose from sporadic vehicle movements through the site entrance.

2 Results

2.1 Noise data recorded are presented in **appendix 4**, and summarised in **table 1** below. Frequency spectra and time history profiles are shown in **appendix 5**. Tabulated frequency data are presented in **appendix 6**.

Table 1: Noise data summary.

Station	MP1	MP2
Period	Day	Day
Ambient $L_{Aeq\ 30\ min}$ (dB)	54-59	60
Facility specific $L_{Aeq\ 30\ min}$ (dB)	<43	<50
Tone objectively detected	x	x
Tone attributable to facility	x	x
Facility audibly tonal	x	x
Facility audibly impulsive	x	x
Facility rated $L_{Req\ 30\ min}$ (dB)	<43	<50
Limit (dB)	55	55
Compliance	✓	✓

2.2 $L_{Aeq\ 30\ min}$ levels measured at MP1 at the site entrance were 54-59 dB. These values were influenced chiefly by intermittent traffic on the adjacent public road, in addition to sporadic vehicle movements through the WRS gate. Apart from faintly audible reversing alarms, WRS emissions were not audible. It is concluded that facility emissions were less than measured $L_{AF90\ 30\ min}$ levels, and therefore in compliance with the 55 dB daytime limit specified in licence W0107-01.

2.3 WRS emissions were not audible at station MP2 to the south, and did not contribute to the 60 dB $L_{Aeq\ 30\ min}$ level measured which was dominated by road traffic. Facility emissions therefore did not exceed the 55 dB daytime limit.

2.4 Facility operations did not give rise to tones or impulses at either of the monitoring stations, thus complying with condition 6.4 of the waste licence.

3 Conclusions

3.1 WRS noise emissions did not contribute to $L_{Aeq\ 30\ min}$ or $L_{AF90\ 30\ min}$ levels measured at the two stations. It is concluded that site emissions were markedly lower than the 55 dB daytime noise limit specified in waste licence W0107-01.

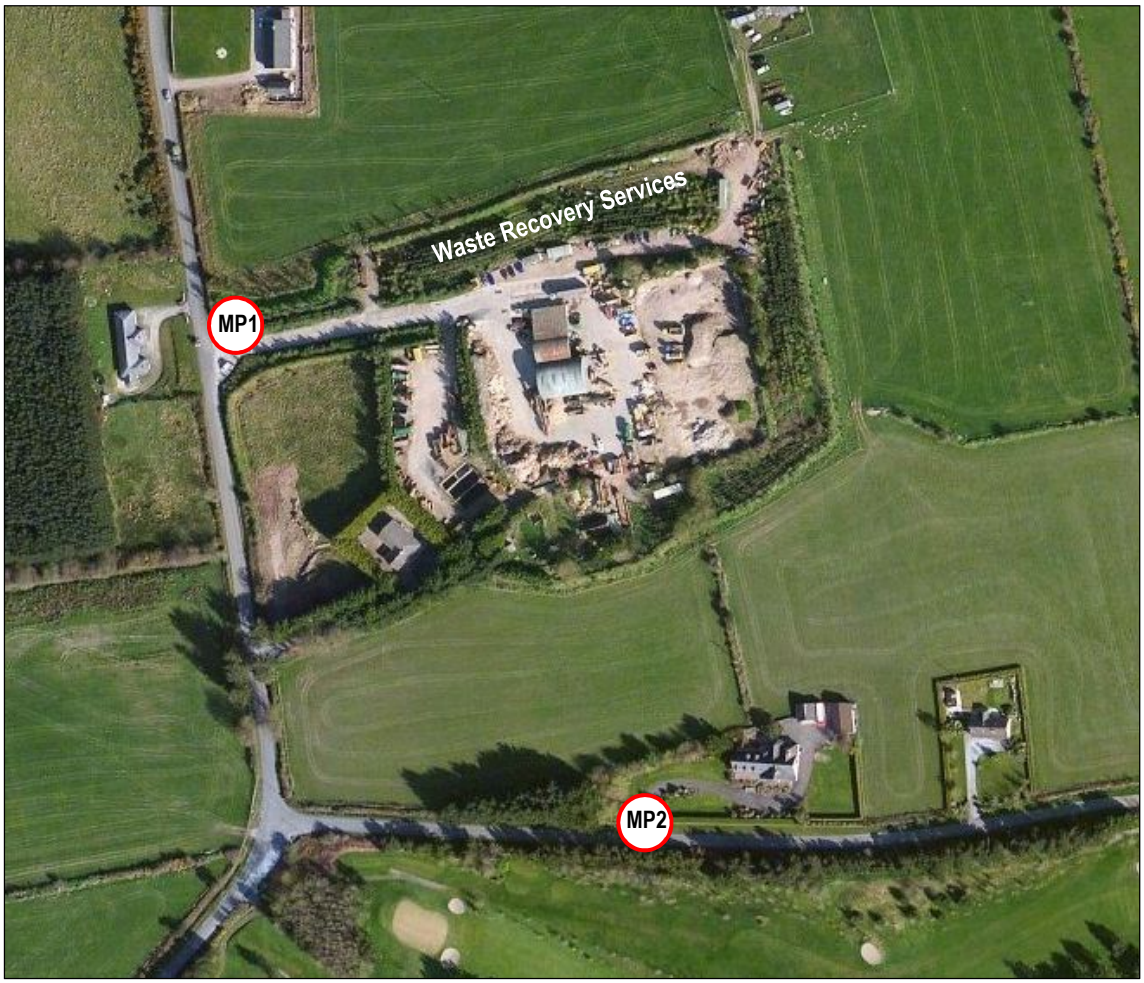
3.2 No tones or impulses were detected in facility emissions, thus complying with condition 6.4 of the waste licence.

Appendix 1: Noise stations

Station	ITM NGR*	Location	Propagation route terrain
MP1	578856 595838	WRS facility gate	Free field; line of sight to weighbridge area partially screened by brow of access lane; terrain falling source-receiver; terrain chiefly under paved ground, leylandii.
MP2	579034 595625	20 m W of gate to detached dwelling 170 m SE of main WRS building	Free field; line of sight almost entirely obstructed by vegetation; terrain gently falling source-receiver; terrain under pasture & hedgerows

*Not verified onsite.

N



Appendix 2: W0107-01 noise conditions

6.4. There shall be no clearly audible tonal component or impulsive component in the noise emissions from the activity at the noise sensitive locations.

C.1 Noise Emissions: (Measured at the monitoring points indicated in Table D.1.1).

Day dB(A) L_{Aeq}(30 minutes)	Night dB(A) L_{Aeq}(30 minutes)
55	45

Table D.1.1 Noise, groundwater, foul water and dust monitoring locations

Noise Stations	Groundwater Stations	Foul Water Stations	
MP1[Note1]	GW1 (Borehole of John Dunlea)	FW1[Note1]	
MP2[Note1]	GW2[Note1]		
	GW3[Note1]		
	Private wells (Condition 9.4.4)		
	P1 (Emissions to percolation area)[Note1]		

D.3 Noise

Table D.3.1 Noise Monitoring Frequency and Technique

Parameter	Monitoring Frequency	Analysis Method/Technique
$L(A)_{EQ}$ [30 minutes]	Annual	Standard [Note 1]
$L(A)_{10}$ [30 minutes]	Annual	Standard [Note 1]
$L(A)_{90}$ [30 minutes]	Annual	Standard [Note 1]
Frequency Analysis(1/3 Octave band analysis)	Annual	Standard [Note 1]

Note 1: "International Standards Organisation. ISO 1996. Acoustics - description and Measurement of Environmental noise. Parts 1, 2 and 3."

Appendix 3: Survey details

File	Project ref.	064
	Client	Waste Recovery Services
	Location	Cullenagh Fermoy
	Stations	Onsite: - Offsite: MP1 MP2
	Purpose	Waste licence compliance survey
	Comment	Facility operating
Event	Period	Daytime
	Date	04.12.15
	Day	Friday
	Time	0800-1130
	Operator	Damian Brosnan BSc MIOA MIEI
	Sound level meter	2250: MP1 MP2 2250L: -
Conditions	Cloud cover	Varying 70-100 %
	Precipitation	0 mm
	Temperature	7 °C
Wind	Direction	SW
	Speed	Initially 1-3 m/s, gradually increasing to 3-5 m/s with gusts to 6-7 m/s by survey end
	Measurement	Anemo anemometer 2 m above ground level
Sound level meter	Instrument	Bruel & Kjaer Type 2250
	Instrument serial no.	2506594
	Microphone serial no.	2529531
	Application	BZ7224 Version 2.5
	Bandwidth	Broadband & 1/3 octaves
	Max. input level	141.16 dB
	Broadband weightings	Time: Fast Frequency: AC
	Spectrum weightings	Time: Fast Frequency: Z
	Windscreen correction	UA-1650
	Sound field correction	Free-field
	UKAS calibration	21.01.14
	Calibrating laboratory	Bruel & Kjaer Denmark
	Calibration certificate	Available on request
Onsite calibration	Time	04/12/2015 07:51:35
	Type	External
	Sensitivity	47.94 mV/Pa
	Post survey check	93.9 dB
Onsite calibrator	Instrument	Bruel & Kjaer Type 4231
	Instrument serial no.	2342544
	UKAS calibration	13.01.15
	Calibrating laboratory	Bruel & Kjaer Denmark
	Calibration certificate	Available on request
Uncertainty	Instrumentation	±1 dB (IEC 61672:2002 Class 1)
	External	±0-3 dB (station & weather dependent, estimated)
	Total	±5 dB (estimated, including expanded uncertainty)
Methodology	Standards	ISO 1996 (2003 & 2007) EPA NG4 (2012)
	Microphone positions	Free field, 1.5 m above ground level
	Intervals	30 min logging at 10 s

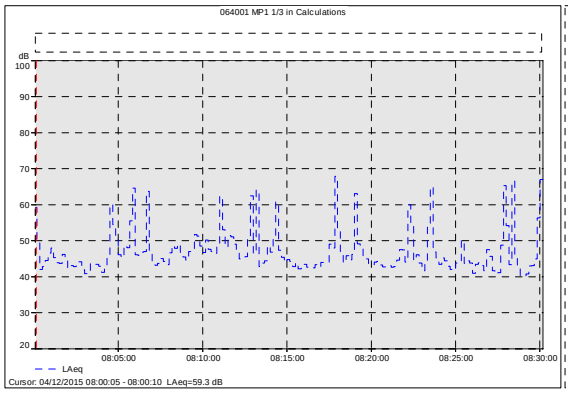
Appendix 4: Noise data

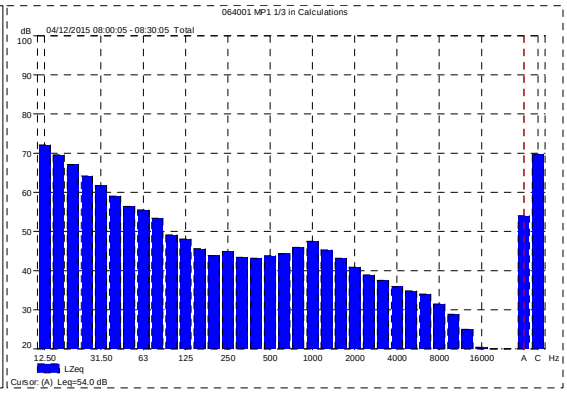
Station	Date	Time	Wind vector	$L_{Aeq\ 30\ min}$ dB	$L_{AF10\ 30\ min}$ dB	$L_{AF90\ 30\ min}$ dB	Specific $L_{Aeq\ 30\ min}$ dB
MP1	04.12.15	0800-0830	-	54	52	42	<42*
	Facility: No emissions audible apart from sporadic vehicle movements through gate. **Extraneous**: Occasional passing road traffic dominant when present. Distant road traffic continuously audible at low level to S and SW. Bird song/calls and aircraft. Rustling trees occasionally audible at low level.						
MP1	04.12.15	0908-0938	-	57	56	41	<41*
	Facility: No emissions audible, apart from sporadic vehicle movements through gate, and faintly audible reversing alarms. **Extraneous**: As above. Rustling trees more frequently audible. Grass mower at approx 200 m becoming continuously slightly audible.						
MP1	04.12.15	1015-1045	-	59	59	43	<43*
	Facility: As above. **Extraneous**: Occasional passing road traffic dominant when present. Distant road traffic continuously audible at low level to S and SW, although becoming masked by continuously rustling trees nearby. Bird song/calls and aircraft.						
MP2	04.12.15	0833-0903	x	60	54	41	<41
	Facility: No emissions audible. **Extraneous**: Occasional passing road traffic dominant when present. Distant road traffic continuously clearly audible to S and SW. Bird song, crow calls and aircraft. Breeze through nearby treetops occasionally audible at low level. Grass mower slightly audible in distance from 0850.						
MP2	04.12.15	0941-1011	x	60	60	48	<48
	Facility: No emissions audible. **Extraneous**: As above. Grass mower at golf course in zone at 40-100 m clearly audible continuously and dominating background until 0950. Breeze through nearby treetops becoming more frequently audible during interval.						
MP2	04.12.15	1047-1117	x	60	61	50	<50
	Facility: As above. **Extraneous**: Occasional passing road traffic dominant when present. Distant road traffic continuously audible, partially masked by breeze through nearby treetops. Bird song/calls and aircraft.						

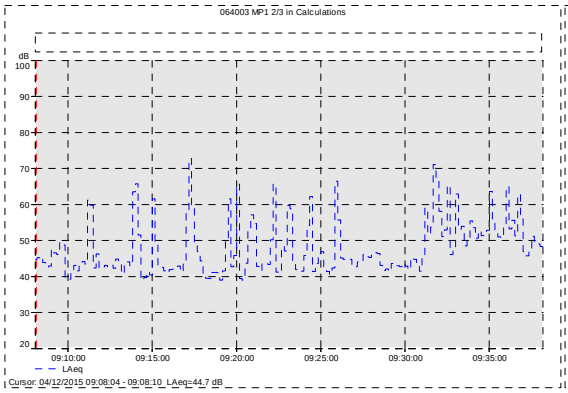
Wind vector: See final appendix. **Specific L_{Aeq}**: Level considered attributable to source under consideration, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, spectral statistics and near field correction if applicable. **Audibility scale**: Inaudible; faintly audible; slightly audible; audible at low level; quite audible; clearly audible; dominant; intrusive; excessive.

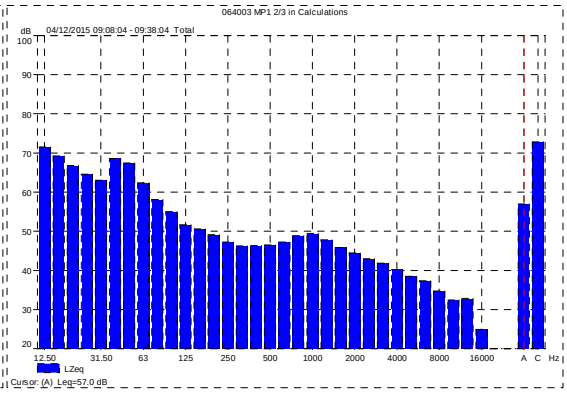
*Not including vehicle movements through site entrance.

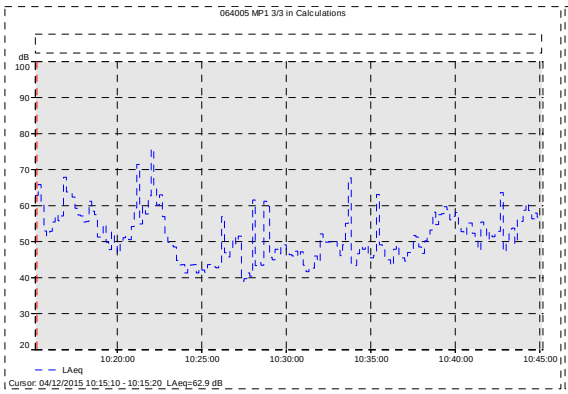
Appendix 5: Profiles & spectra

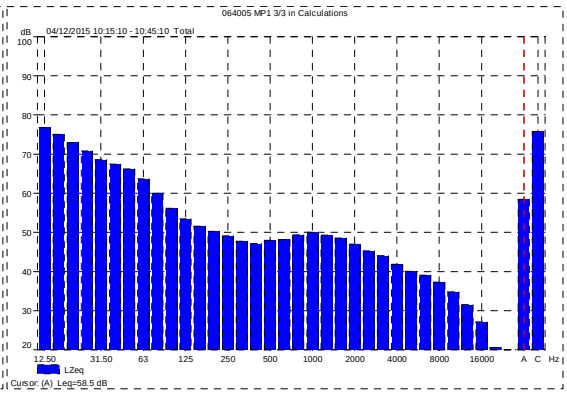


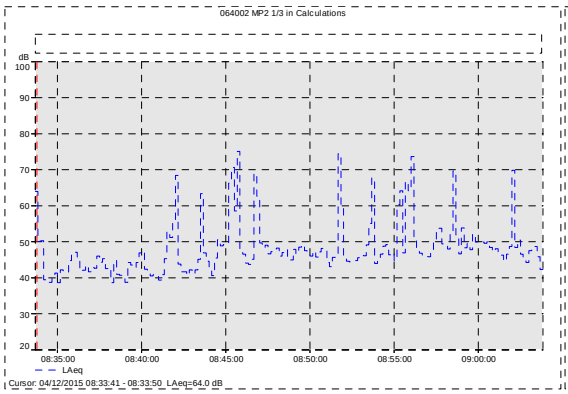


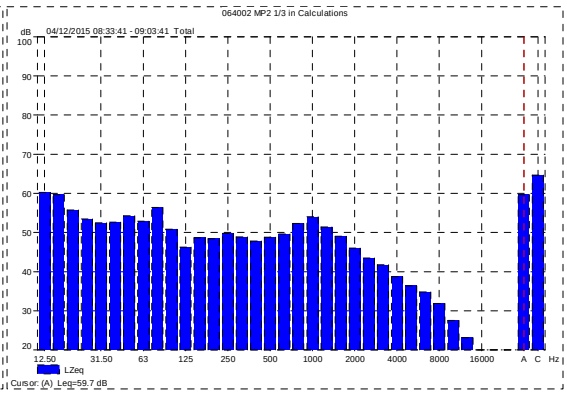


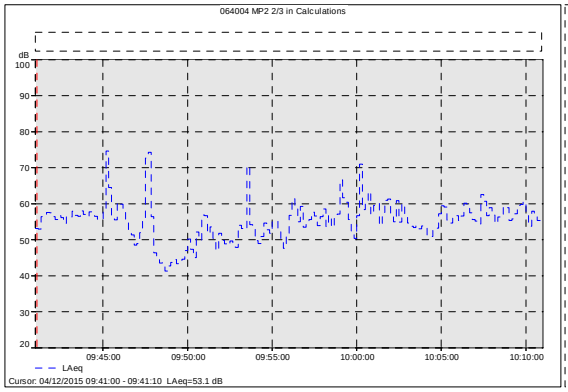


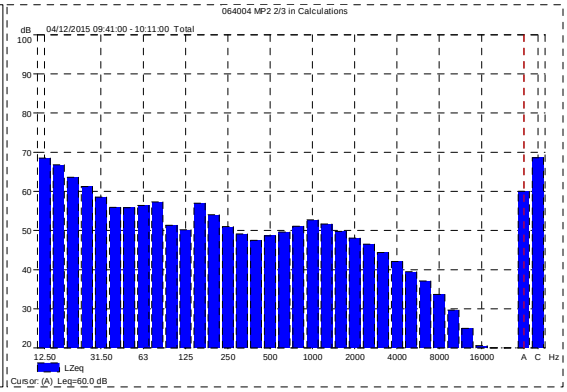


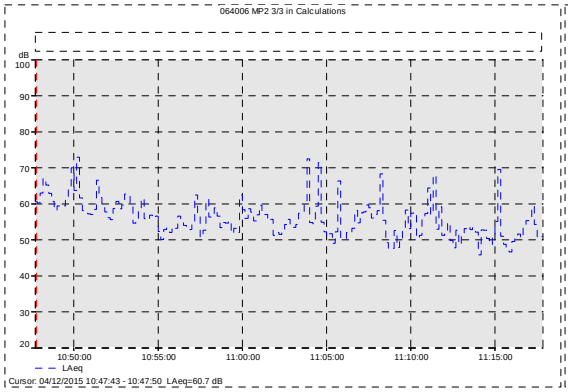


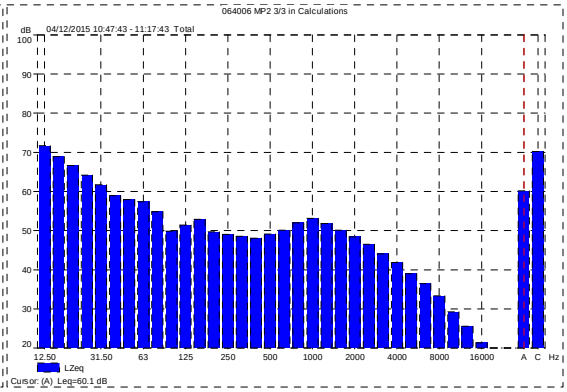





064004 MP2 2/3 in Calculations
dB
100
90
80
70
60
50
40
30
20
09:45:00
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
LAeq
Cursor: 04/12/2015 09:41:00 - 09:41:10 LAeq=53.1 dB


064004 MP2 2/3 in Calculations
dB
04/12/2015 09:41:00 - 10:11:00 Total
100
90
80
70
60
50
40
30
20
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A C Hz
LZeq
Cursor: (A) Leq=60.0 dB


064006 MP2 3/3 in Calculations
dB
100
90
80
70
60
50
40
30
20
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
LAeq
Cursor: 04/12/2015 10:47:43 - 10:47:50 LAeq=60.7 dB


064006 MP2 3/3 in Calculations
dB
04/12/2015 10:47:43 - 11:17:43 Total
100
90
80
70
60
50
40
30
20
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A C Hz
LZeq
Cursor: (A) Leq=60.1 dB

Appendix 6: Frequency data

Frequency data are tabulated over as required by Environmental Protection Agency document *NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities* (2012). $L_{Zeq\ 30\ min}$ spectra are tabulated over. Spectra are shown in **appendix 5**.

Tonality may be assessed using level differences suggested by annex D of *International Standard ISO 1996-2 Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels* (2007) as follows:

- 15 dB in the third octave bands 25-125 Hz.
- 8 dB in the third octave bands 160-400 Hz.
- 5 dB in the third octave bands 500-10000 Hz.

Level differences in the 10-160 Hz range which exceed the above criteria will not be of tonal significance if L_{Zeq} values in those bands are lower than hearing threshold levels as follows:

Band (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
L_{Zeq} (dB)	92	87	83	74	64	56	49	43	42	40	38	36	34

No tones were detected.

Band (Hz)	MP1			MP2		
	1/3	2/3	3/3	1/3	2/3	3/3
	$L_{Zeq\ 30\ min}$	$L_{Zeq\ 30\ min}$	$L_{Zeq\ 30\ min}$	$L_{Zeq\ 30\ min}$	$L_{Zeq\ 30\ min}$	$L_{Zeq\ 30\ min}$
12.50	72	72	77	60	69	72
16	70	69	75	60	67	69
20	67	67	73	56	64	67
25	64	65	71	53	61	64
31.50	62	63	69	52	59	62
40	59	69	67	53	56	59
50	56	67	66	54	56	58
63	56	62	64	53	56	57
80	53	58	60	56	57	55
100	49	55	56	51	51	50
125	48	52	53	46	50	51
160	46	51	52	49	57	53
200	44	49	50	48	54	50
250	45	47	49	50	51	49
315	43	46	48	49	49	49
400	43	46	47	48	47	48
500	44	46	48	49	49	49
630	44	47	48	50	50	50
800	46	49	49	52	51	52
1000	47	49	50	54	53	53
1250	45	48	49	51	52	52
1600	43	46	49	49	50	50
2000	41	44	47	46	48	48
2500	39	43	45	43	46	47
3150	38	42	44	42	44	44
4000	36	40	42	39	42	42
5000	35	38	40	36	39	39
6300	34	37	39	35	37	36
8000	31	35	37	32	34	33
10000	29	32	35	27	30	29
12500	25	33	31	23	25	26
16000	20	25	27	19	21	21
20000	14	19	21	13	15	16
A	54	57	58	60	60	60

Appendix 7: Glossary

Ambient	Total noise environment at a location, including all sounds present.
A-weighting	Weighting or adjustment applied to sound level to approximate non-linear frequency response of human ear. Denoted by suffix A in parameters such as $L_{Aeq\ T}$, $L_{AF10\ T}$, etc.
Background level	A-weighted sound pressure level of residual noise exceeded for 90 % of time interval T. Denoted $L_{AF90\ T}$.
Broadband	Noise which contains roughly equal energy across frequency spectrum. Does not contain tones, and is generally less annoying than tonal noise.
Decibel (dB)	Unit of noise measurement scale. Based on logarithmic scale so cannot be simply added or subtracted. 3 dB difference is smallest change perceptible to human ear. 10 dB difference is perceived as doubling or halving of sound level. Examples of decibel levels are as follows: 20 dB: very quiet room; 30-35 dB: night-time rural environment; 55-65 dB: conversation; 80 dB: busy pub; 100 dB: nightclub. **Throughout this report noise levels are presented as decibels relative to 20 µPa**.
Fast response	0.125 seconds response time of sound level meter to changing noise levels. Denoted by suffix F in parameters such as $L_{AF10\ T}$, $L_{AF90\ T}$, etc.
Free field	Noise environment away from all surfaces other than ground ie. outside near field.
Frequency	Number of cycles per second of a sound or vibration wave. Low frequency noise may be perceived as hum, while whine represents higher frequency. Range of human hearing approaches 20-20,000 Hertz.
Hertz (Hz)	Unit of frequency measurement.
Impulse	Noise which is of short duration, typically less than one second, sound pressure level of which is significantly higher than background.
Interval	Time period T over which noise parameters are measured at position. Denoted by T in $L_{Aeq\ T}$, $L_{AF90\ T}$, etc.
$L_{Aeq\ T}$	Equivalent continuous sound pressure level during interval T, effectively representing average A-weighted noise level of ambient noise environment.
L_{AF}	Sound pressure level averaged over one second, and changing each second in fluctuating noise environment.
$L_{AF10\ T}$	Sound pressure level exceeded for 10% of interval T, usually used to quantify traffic noise.
$L_{AF90\ T}$	Sound pressure level exceeded for 90% of interval T, usually used to quantify background noise. May also be used to describe noise level from continuous steady or almost-steady source, particularly where local noise environment fluctuates.
$L_{Req\ T}$	Rating noise level, derived from $L_{Aeq\ T}$ plus specified adjustments for tonal and impulsive characteristics. Equivalent to $L_{Ar\ T}$ used by EPA.
Masking	The rendering inaudible of one noise source by another noise source(s) which may be louder, or may contain significant acoustic energy in the same part of the frequency spectrum. In the latter case, any tone(s) in the original source emissions may become inaudible.
Near field	Noise levels recorded near walls or other surfaces, artificially increased due to reflections. Levels near walls may be increased by up to 3 dB, and up to 6 dB near corners. Free field conditions may be achieved by maintaining separation distance of at least 3.5 m from walls.
Noise sensitive location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels.
1/3 octave band	Frequency spectrum may be divided into octave bands. Upper limit of each octave is twice lower limit. Each octave may be subdivided into thirds, allowing greater analysis of tones.
Residual level	Noise level remaining when specific source is absent or does not contribute to ambient.

Specific level	$L_{Aeq\ T}$ level produced by specific noise source under consideration during interval T, measured directly or by estimation or calculation.
Tone	Character of noise caused by dominance of one or more frequencies which may result in increased noise nuisance.
Wind vector	May be positive (+), negative (-), neutral (0) or crosswind (x). Positive wind vector blows from source to receptor, within angular range of ±45°, creating conditions more favourable to propagation. During certain conditions, this range may increase to ±60° by day and ±90° at night. Negative wind vector occurs when receptor is upwind of source. Neutral vector arises during still conditions, or upwind when in close proximity to source. Crosswinds typically result in negative vector.
Z-weighting	Standard weighting applied by sound level meters to represent linear scale. Denoted by suffix Z in parameters such as $L_{Zeq\ T}$, $L_{ZF90\ T}$, etc. used to describe 1/3 octave band levels in frequency spectra.

In this report units are generally presented using US National Institute Of Standards & Technology guidelines.