ANNUAL ENVIRONMENTAL REPORT 2011
SUBMITTED TO ENVIRONMENTAL PROTECTION AGENCY
REPORTING PERIOD: JANUARY – DECEMBER 2011

ENVA
CLONMINAM INDUSTRIAL ESTATE
PORTLAOISE
CO. LAOIS

WASTE LICENCE NUMBER W0184-1

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ENVIRONMENTAL, HEALTH, SAFETY & QUALITY POLICY

Health, Safety & Environmental Policy

ENVA is a leading supplier of specialist waste & wastewater related products/services in Ireland and the UK. Our capabilities include waste treatment within our own sites, waste handling, emergency response services, the production and supply of chemical products for water treatment and other purposes, the design/installation of water treatment systems at customer sites, the provision of analytical services as well as other products and services associated with the above.

ENVA operates to OHSAS 18001 and ISO 14001 standards for occupational health and safety and environmental management. Compliance with all applicable legal HSE requirements are only a minimum starting point as we are committed to continually improving our performance in relation to health, safety and the environment.

We seek to do this by;

- Consulting our HSE committee (selected by our employees) on HSE matters.
- Identifying safety hazards including chemical hazards, assessing and managing these so as to minimise risk as far as practicable.
- Seeking to prevent ill health and occupational injury especially those arising from occupational exposure, manual handling, use of equipment/tools, driving, slips, trips and falls.
- Minimising the need for and risks associated with confined space entry and hazardous materials.
- Providing safe places of work and healthy working conditions for employees and visitors.
- Promoting the provision of recovery options for waste in preference to direct disposal.
- Preventing pollution to any environmental media and minimising the environmental impact of emissions to water, land and air.
- Communicating with customers to ensure necessary information is provided and precautions are taken when collecting and handling waste, providing treatment or other services for customers..
- Being prepared for reasonably foreseeable emergency situations.
- Assessing and considering the performance of third parties used by us who may have potential for significant environmental impact.
- Using energy and natural resources efficiently.
- Communicating appropriately with our employees in relation to HSE matters and providing appropriate information and training
- Expecting the cooperation of our employees in relation to HSE management.

We will set improvement objectives and targets on an annual basis in order to achieve goals consistent with the above and monitor the implementation of these.

Declan Ryan, Managing Director

Date. 27/6/11

1.0 INTRODUCTION

1.1. General Description

Enva is located in an Industrial Estate, south of Portlaoise town. Businesses in the immediate vicinity of the plant are mainly light industries of a commercial nature such as vehicle repair and panel beating, light engineering, cable production and food wholesalers.

Since the granting of the waste management licence on the 16th of January 2004 activities on site have increased with an increase in the volume of packaged type wastes being accepted on site for export. The processing activities on site include waste oil re-processing, treatment of contaminated soil, repackaging of oily contaminated wastes and paint wastes. The site also stores wastes in packages (i.e. barrels ASPs, IBCs etc.) prior to transfer off site for recovery or disposal.

1.2 Waste Management Activities carried out at the Facility.

Third Schedule

Class 6. Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule.

Class 7. Physico-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcination) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule (including evaporation, drying and calcination).

Class 12. Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.

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.

Fourth Schedule

Class 2. Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).

Class 4. Recycling or reclamation of other inorganic materials.

Class 5 Regeneration of acids or bases:

Class 8. Oil re-refining or other re-uses of oil. **(P)**

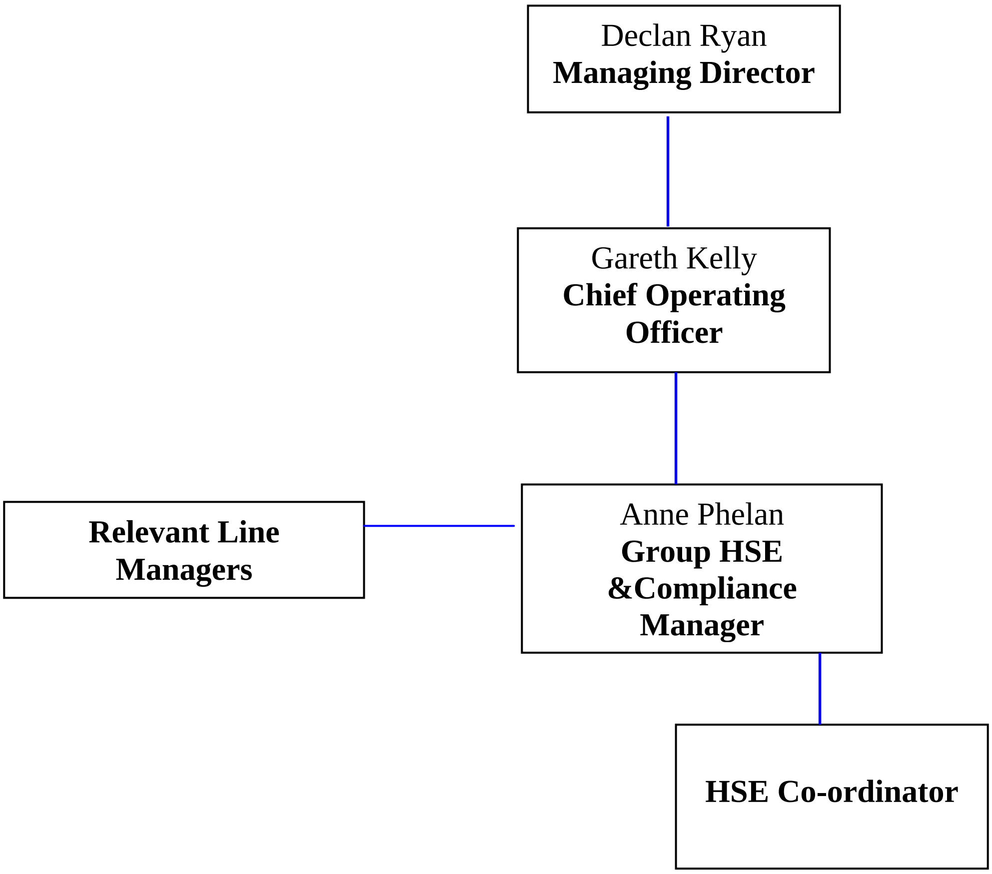
Class 9 Use of any waste principally as a fuel or other means to generate energy

Class 11. Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.

Class 12. Exchange of waste for submission to any activity referred to in a preceding paragraph of this Schedule.

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.

1.3 Management Structure



2.0 WASTE ACTIVITIES

Quantities of waste to be accepted on site as detailed in Schedule A of waste licence 184-1.

Table 1 : Quantities of waste accepted on site in 2011

Waste Type	**Quantity** (tonnes per annum) **Schedule A of W0184-1**	**Quantity** (tonnes per annum) **2011**
Hazardous		
Waste oil and sludge's	35,000	21629
Contaminated soils	60,000	7094
Oil filters	1,000	662
Other hazardous wastes	5,000	4310
Total Hazardous	101,000	33695
Non-Hazardous		
Industrial sludges, Treated Sewage sludge, Waste water treatment sludge	0	0
Other non-hazardous & non putresible waste.	9,000	381
Total Non-Hazardous	9,000	381
Total	110,000	34077

In 2011, 33695 tonnes of hazardous waste were accepted on site for treatment or for export off site. An additional 381 tonnes of non-hazardous waste was accepted on site for onward movement. Please see Section 2 for further details of wastes accepted, processed and exported off site.

2.1 Waste Volumes Received

Volume details for waste streams accepted on site during 2011are included in 2.1.1

2.1.1 Wastes accepted onsite

The table below lists the other wastes accepted on site in 2011

Table 2: Other waste streams accepted on site in 2011

Waste Type	EWC code	Quantities accepted 2011 (tonnes)
Waste oil	13 02 08*	21101
Contaminated Soil	17 05 03*	7094
Solid Flammable waste	15 02 02*	417
Filters	16 01 07*	662
Lead acid batteries	16 06 01*	2686
Fuel oil and diesel	13 07 01*	269.64
Interceptor sludges	13 05 03*	236.54
Tank bottom sludges	05 01 03*	21.28
Fluorescent tubes and other mercury-containing waste	20 01 21*	2.02
Waste paint and varnish containing organic solvents or other dangerous substances	08 01 11*	439.56
Wastes containing oil	16 07 08*	86.18
Water-based developer and activator solutions	09 01 01*	4.04
Water-based offset plate developer solutions	09 01 02*	5.70
Packaging containing residues of or contaminated by dangerous substances	15 01 10*	108.92
Brake fluids	16 01 13*	7.94
Other fuels (including mixtures)	13 07 03*	59.64
Petrol	13 07 02*	53.82
Antifreeze fluids containing dangerous substances	16 01 14*	2.00
Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	25.57
Discarded inorganic chemicals consisting of or containing dangerous substances	16 05 07*	9.43
Paint, inks, adhesives and resins containing dangerous substances	20 01 27*	6.71
Waste adhesives and sealants containing organic solvents or other dangerous substances	08 04 09*	1.05
Sulphuric acid and sulphurous acid	06 01 01*	0.64
Hydrochloric acid	06 01 02*	0.03
Wastes containing mercury	06 04 04*	0.06
Acids	20 01 14*	0.88
Laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	16 05 06*	1.96

Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	13.16
Other bases	06 02 05*	1.50
Other solvents and solvent mixtures	14 06 03*	0.31
Glass, plastic and wood containing or contaminated with dangerous substances	17 02 04*	55.88
Waste ink containing dangerous substances	08 03 12*	9.67
Discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12	16 02 13*	0.04
Other organic solvents, washing liquids and mother liquors	07 01 04*	27.19
Discarded equipment other than those mentioned in 16 02 09 to 16 02 13	16 02 14	0.51
Sodium and potassium hydroxide	06 02 04*	0.22
Pesticides	20 01 19*	0.10
Other acids	06 01 06*	0.04
Oil fly ash and boiler dust	10 01 04*	2.12
Metallic oxides containing heavy metals	06 03 15*	10.13
Photographic film and paper containing silver or silver compounds	09 01 07	0.20
Brake pads other than those mentioned in 16 01 11	16 01 12	30.33
Edible oil and fat	20 01 25	69.49
Plastic packaging	15 01 02	0.07
Waste adhesives and sealants other than those mentioned in 08 04 09	08 04 10	0.28
Grease and oil mixture from oil/water separation containing only edible oil and fats	19 08 09	0.20
Antifreeze fluids other than those mentioned in 16 01 14	16 01 15	164.71
Other batteries and accumulators	16 06 05	0.08
Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	0.66
Metals	20 01 40	7.27
End-of-life tyres	16 01 03	0.06
Soil and stones other than those mentioned in 17 05 03	17 05 04	38.57
Plastic	16 01 19	0.70
Spent activated carbon	19 09 04	9.02
Carbon black	06 13 03	0.18
Waste from sewage cleaning	20 03 06	31.32
Freshwater drilling muds and wastes	01 05 04	6.28
Waste from desanding	19 08 02	23.58

Note: Waste figures submitted in quarterly reports may vary due to reconciliation of waste volumes at year end.

2.2 Waste Volumes Sent Off Site For 2011

The table below details waste sent off site in 2011

Table 3: Waste sent off site in 2011

Waste	EWC Codes	Quantities transferred off – site 2011
Sulphuric acid and sulphurous acid	06 01 01*	0.80
Discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12	06 02 13*	0.02
Other organic solvents, washing liquids and mother liquors	07 01 04*	27.00
Waste paint and varnish containing organic solvents or other dangerous substances	08 01 11*	295.11
Waste ink containing dangerous substances	08 03 12*	0.02
Interceptor sludges	13 05 03*	141.79
Other fuels (including mixtures)	13 07 03*	190.20
Other emulsions	13 08 02*	21.92
Plastic packaging Empty cleaned paint cans comes on site as 08 01 11*)	15 01 02	38.30
Ibcs for reuse	15 01 02	29.63
Packaging containing residues of or contaminated by dangerous substances	15 01 10*	25.38
Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	15 02 02*	245.65
Oil filters	16 01 07*	651.12
Antifreeze fluids containing dangerous substances	16 01 14*	2.00
Antifreeze fluids other than those mentioned in 16 01 14	16 01 15	181.82
Gases in pressure containers (including halons) containing dangerous substances	16 05 04*	17.14
Laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	16 05 06*	0.69
Discarded inorganic chemicals consisting of or containing dangerous substances	16 05 07*	19.39
Discarded organic chemicals consisting of or containing dangerous substances	16 05 08*	41.42

Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	16 05 09	0.35
Lead acid batteries	16 06 01*	2,538.82
Alkaline batteries (except 16 06 03)	16 06 04	1.91
Aqueous liquid wastes other than those mentioned in 16 10 01	16 10 02	117.70
Wood	17 02 01	11.49
Glass, plastic and wood containing or contaminated with dangerous substances	17 02 04*	23.74
Incoming 17 05 03* Soil which has been treated on the Enva Site and is sent off as 17 05 04	17 05 04	5,966.60
Premixed wastes composed only of non-hazardous wastes	19 02 03	98.94
Spent activated carbon	19 09 04	5.74
Effluent generated by the recycling of waste oil process	19 11 03*	6,394.85
Non-ferrous metal	19 12 03	139.18
Other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances	19 12 11*	139.56
Pesticides	20 01 19*	0.08
Fluorescent tubes and other mercury-containing waste	20 01 21*	2.89
Edible oil and fat	20 01 25	36.86
Paint, inks, adhesives and resins containing dangerous substances	20 01 27*	15.02
Paint, inks, adhesives and resins other than those mentioned in 20 01 27	20 01 28	0.65
Detergents containing dangerous substances	20 01 29*	2.34
Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	20 01 33*	0.26
Waste from sewage cleaning	20 03 06	31.32

Products produced from Waste			
Recycled fuel oil	not applicable	11895.6	Reuse as a fuel

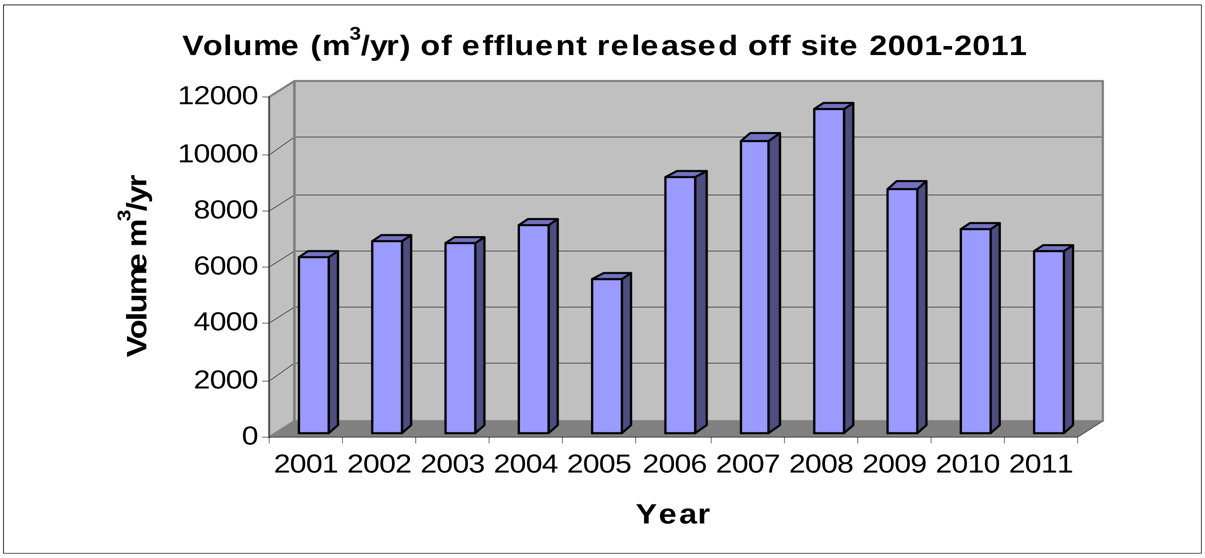
Incoming 17 05 03* Soil and stone which has been treated on the Enva Site and is reused as a stone filler by Enva customers	not applicable	2137.56	Re use as filler material

3.0 EMISSIONS

3.1 Effluent Emissions monitoring (Monitoring location FS 1)

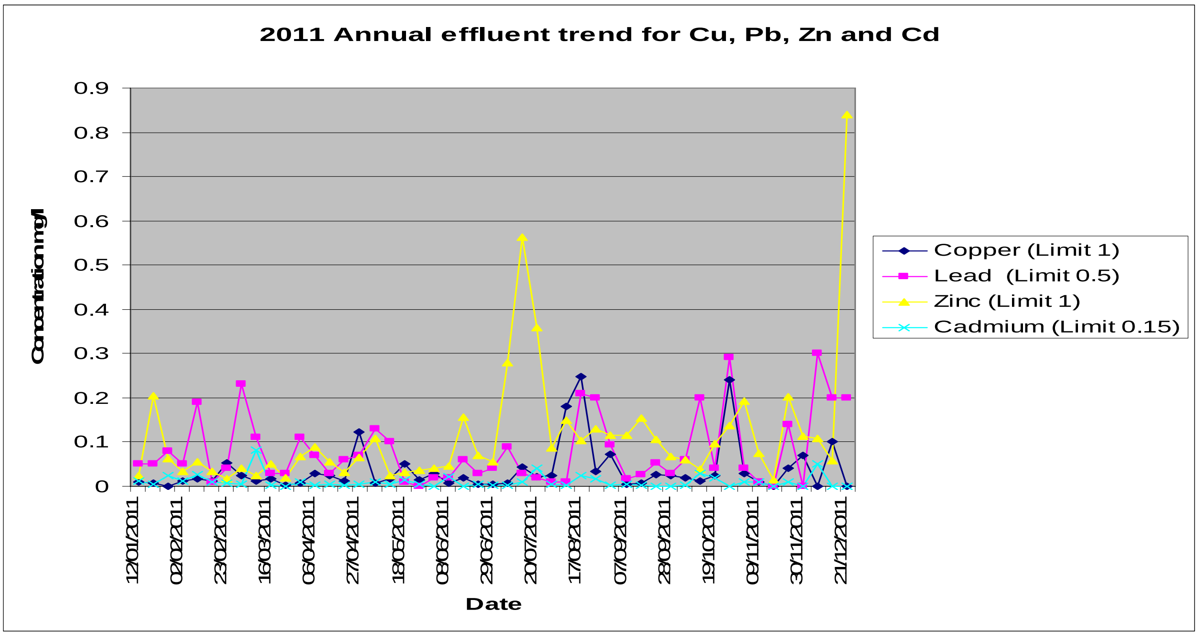
Effluent release volumes have reduced in the last three years. This reduction can be attributed to the reduced volume of waste oil which was accepted on site during the last three years in comparison to previous years.

Figure 3.1(a): Volume of effluent released offsite



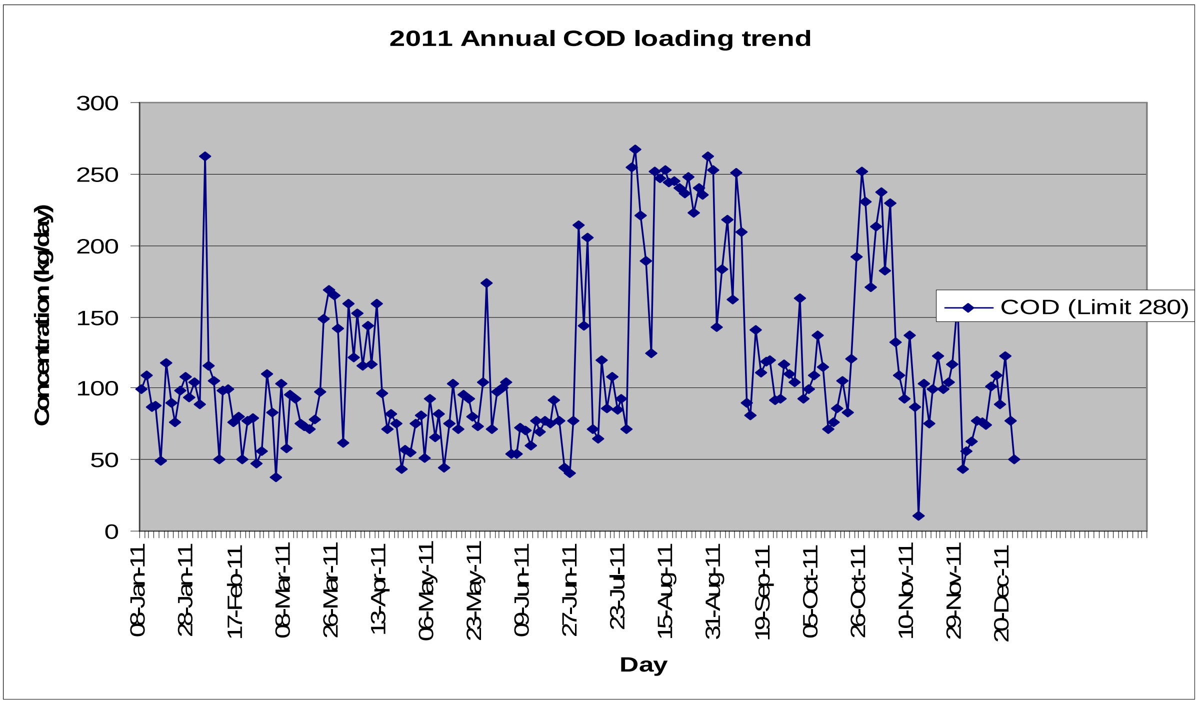
The Figures below illustrate the trends in the monitoring results of the parameters which effluent was tested for during 2011. Appendix 2 details the Quarterly effluent metal screen results for each quarter of 2011. Appendix 17 contains the results of the respirometry testing performed in 2011.

Figure 3.1(b): Copper, Lead, Zinc and Cadmium levels in effluent for 2011.



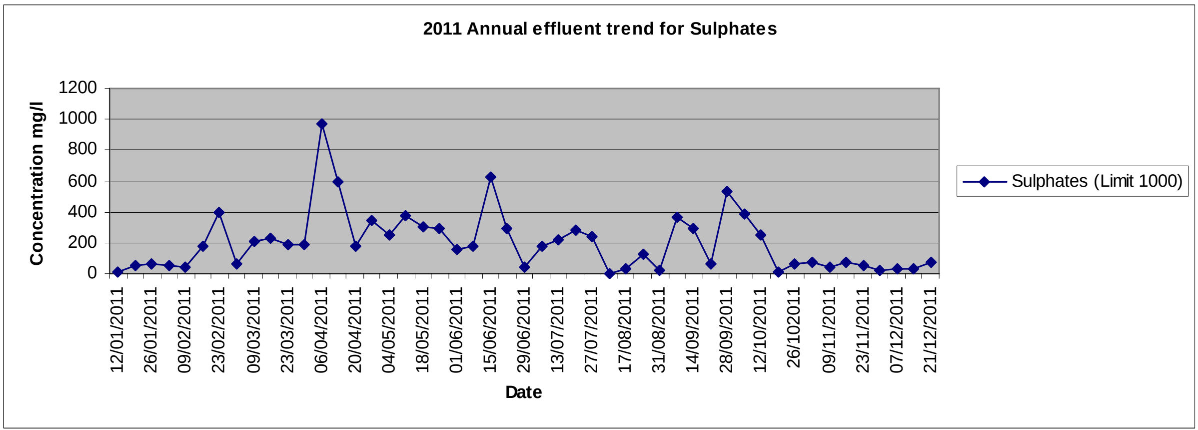
There were no exceedences of licence parameters for Copper, Lead, Zinc and Cadmium as can be see from the graph above

Figure 3.1(c): Daily Effluent COD levels for 2011



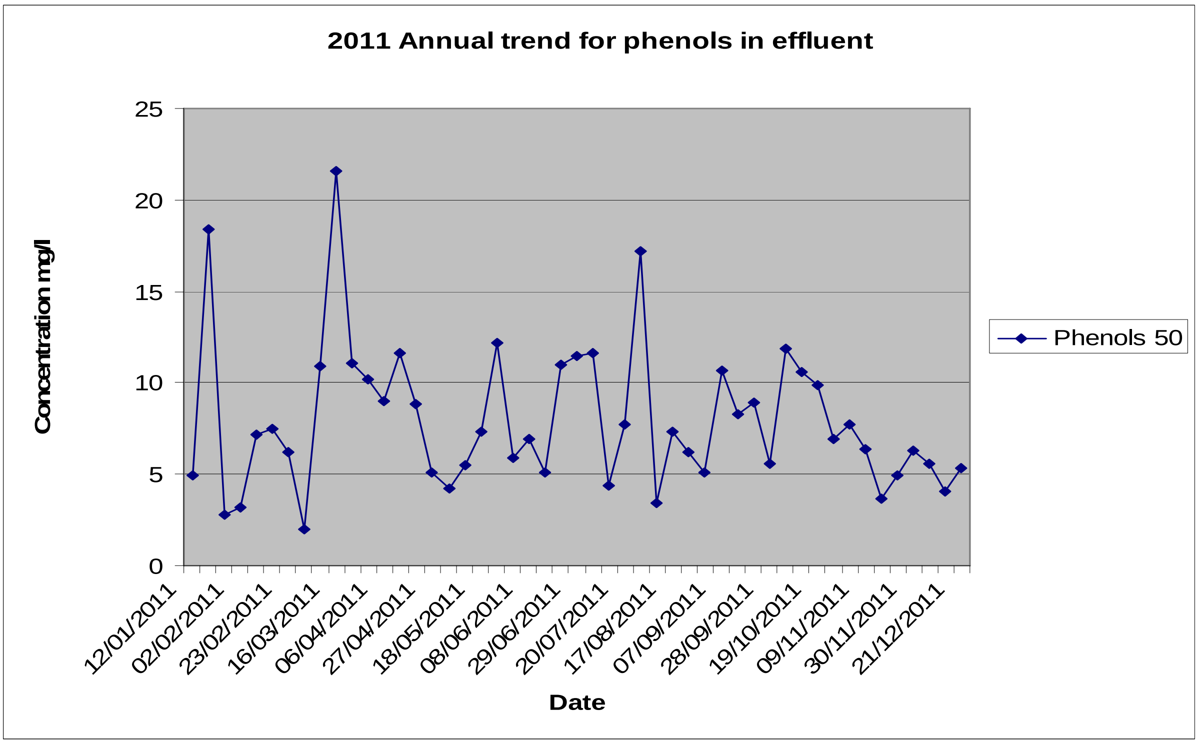
There were no exceedences of emission limit values for COD during 2011 as can be seen from the graph above

Figure 3.1(d): Sulphate levels for 2011



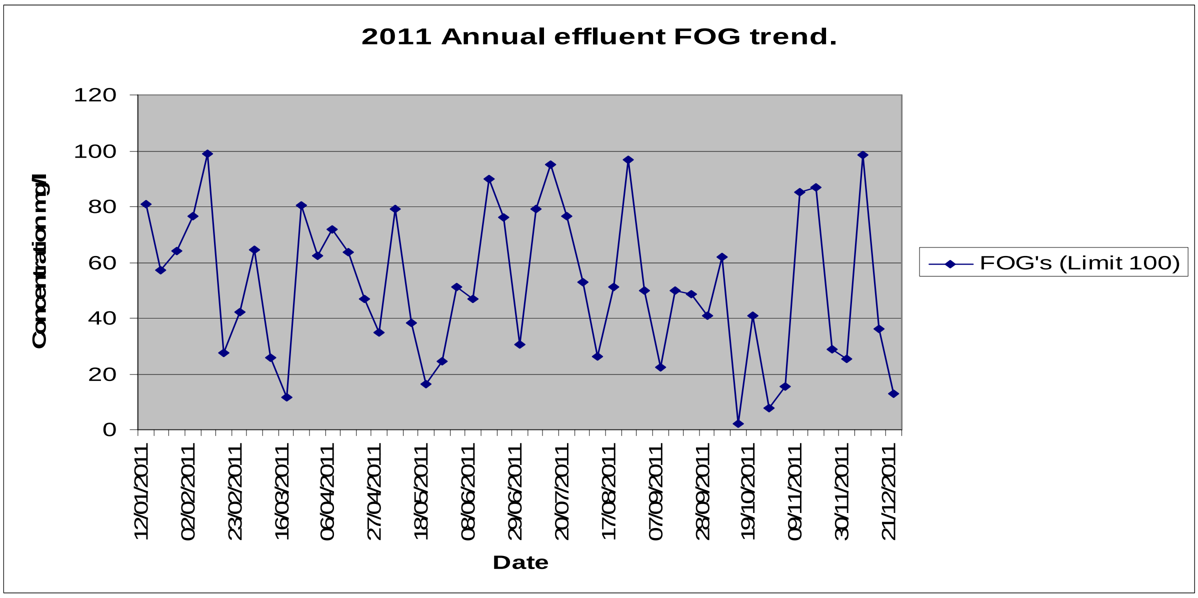
There were no exceedences of emission limit values for Sulphates during 2011 as can be seen from the graph above

Figure 3.1(e): *Phenol levels in effluent for 2011*



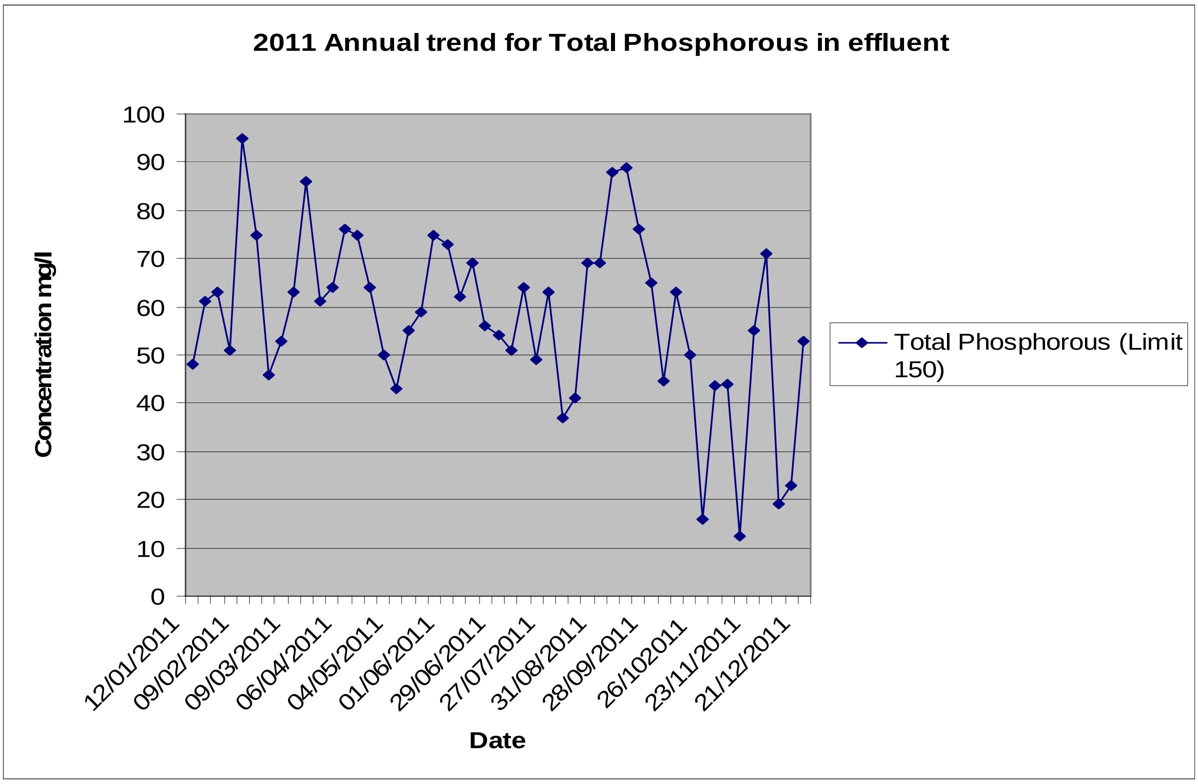
There were no exceedences of emission limit values for Phenols during 2011 as can be seen from the graph above

Figure 3.1(f): FOG levels in effluent for 2011



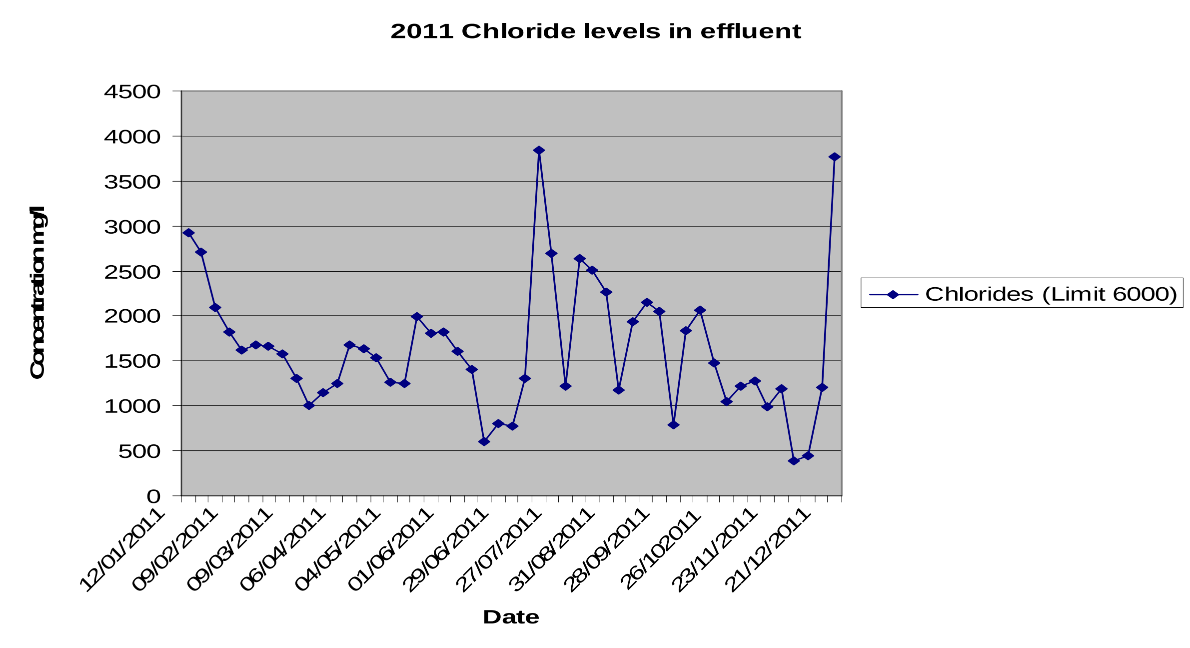
There were no exceedences of emission limit values for FOG's during 2011 as can be seen from the graph above

Figure 3.1(g): Total Phosphorous levels in effluent for 2011



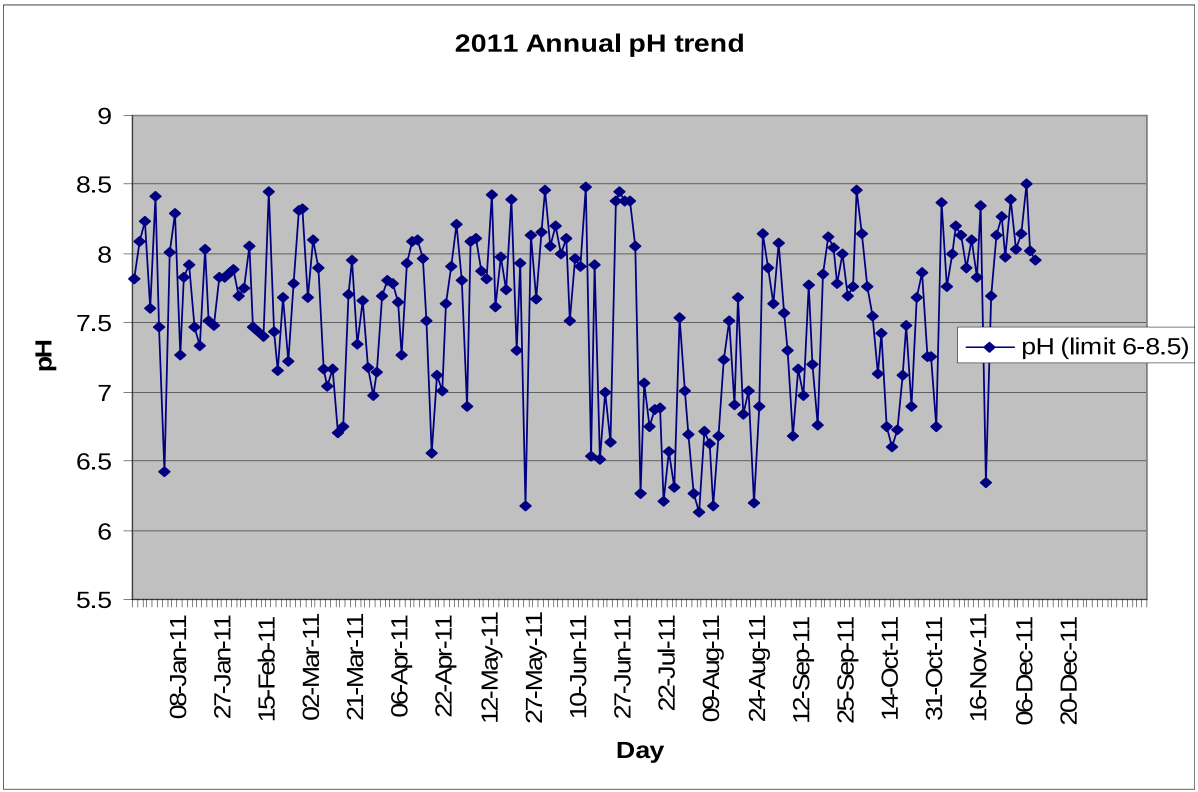
There were no exceedences of emission limit values for Total Phosphorous during 2011 as can be seen from the graph above

Figure 3.1(h): Chloride levels in effluent 2011



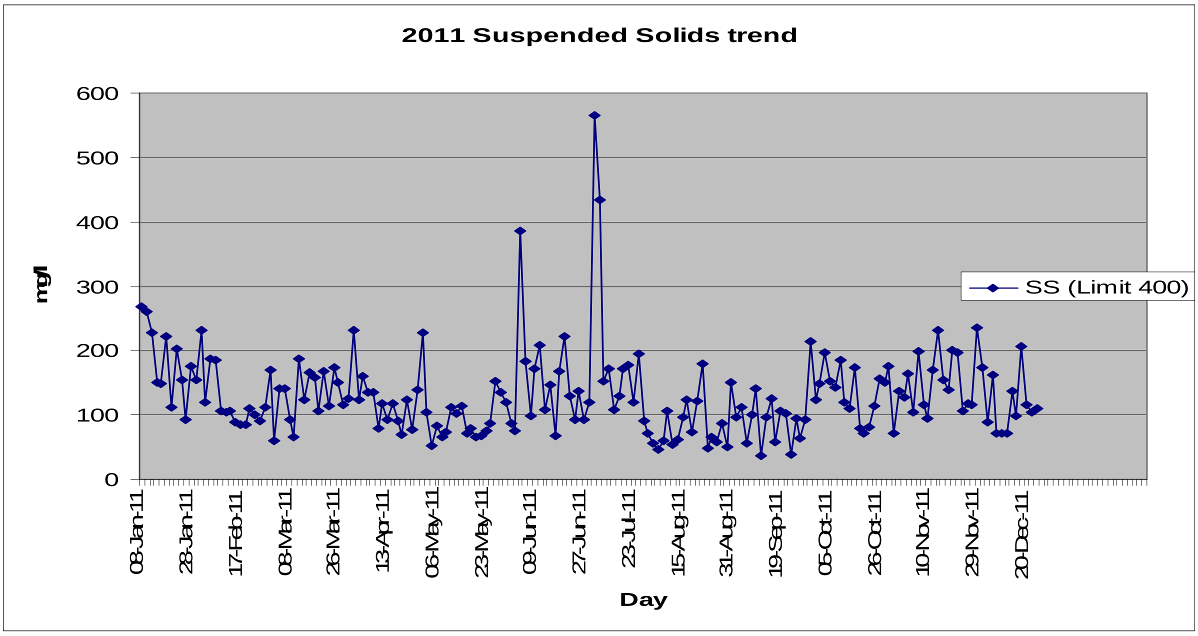
There were no exceedences of emission limit values for Chlorides during 2011 as can be seen from the graph above

Figure 3.1(i): pH levels in effluent 2011



There were no exceedences of emission limit values for PH during 2011 as can be seen from the graph above

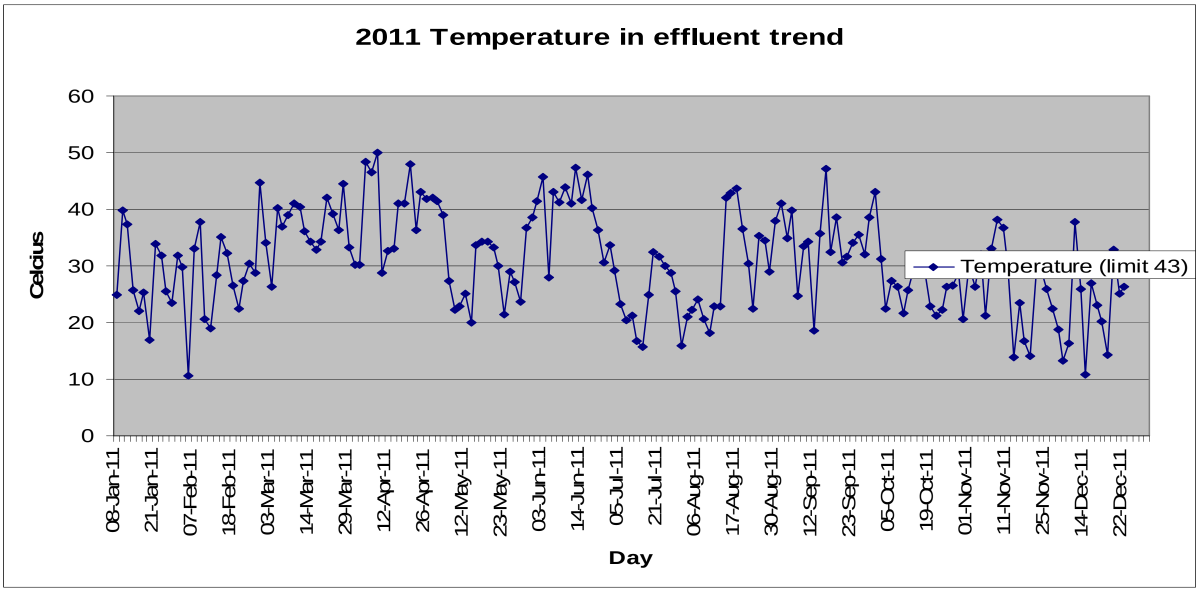
Figure 3.1(j):Suspended Solid levels in effluent 2011



The results of daily analysis in July identified one suspended solids exceedence on the 7th as can be seen in figure 3.1(J) above. This exceedence was reported to the Agency at the time of the occurence. Please refer to section 5 Non Conformances of this report for details.

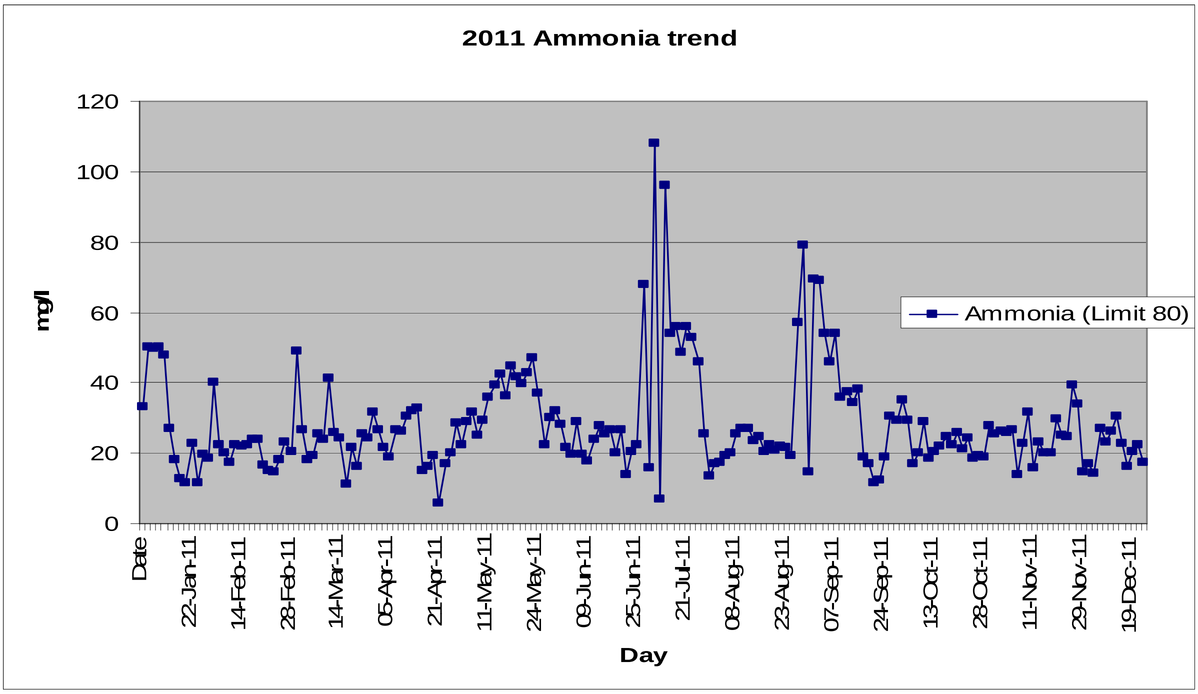
A suspended solid exceedence was also identified on the 8th/9th of July as can be seen above however this exceedence fell within section 6.10 (b) of Waste licence W0 184-1 therefore it was not notifiable.

Figure 3.1(k):Temperature levels in effluent 2011



Temperature exceedences were identified during 2011 as can be seen in figure 3.1(k) above. These exceedence's fell under section 6.10 (b) of Waste licence W0 184-1. While these exceedence's were not notifiable these were investigated by enva management. This investigation identified that the inline temperature probe was exhibiting erroneous temperature patterns while discharge was occurring e.g. sudden increases. The probe was replaced.

Figure 3.1(l):Ammonia levels in effluent 2011



The results of daily analysis in July identified Ammonia exceedences on the 8th/9th of July and the 16th of July as can be seen in the above graph. These exceedences were reported to the Agency at the time of the occurence.

3.2 Groundwater monitoring

Enva currently have eight groundwater monitoring wells on site following the installation of an additional well during 2011. Three of the wells are deep water wells with the remaining five being shallow. Each borehole is sampled by baling the monitoring well or by pumping the well depending on the depth to groundwater. Groundwater quality reports and monitoring results for 2011 are included in Appendix 1. The groundwater report for quarter four contains a summary and interpretation of groundwater results for the 2011 calendar year.

3.3 Dust Monitoring

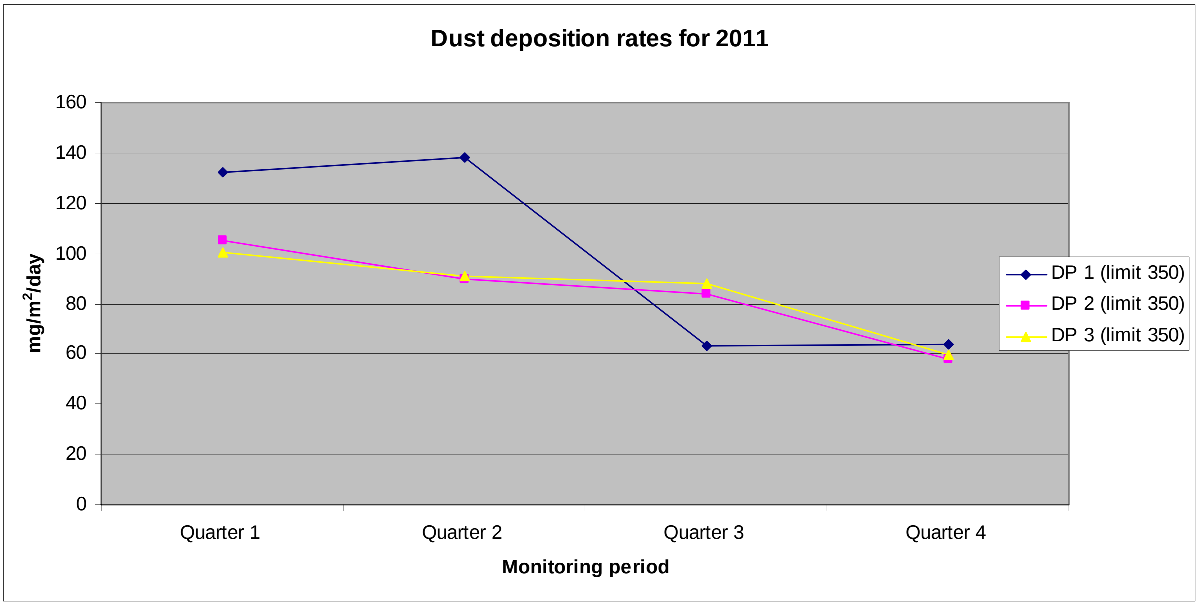
In accordance with Schedule D.1.2. of the WML 184-1 three monitoring locations were established on site in order to determine the ambient dust deposition from site activities.

Table 4: Dust Deposition monitoring

Position	Daily dust Deposition Rate Limit 350 mg/m2/day Quarter 1	Daily dust Deposition Rate Limit 350 mg/m2/day Quarter 2	Daily dust Deposition Rate Limit 350 mg/m2/day Quarter 3	Daily dust Deposition Rate Limit 350 mg/m2/day Quarter 4
DP 1	132.4	138.12	63.11	63.84
DP 2	104.91	89.95	83.62	58.03
DP 3	100.42	91.11	87.83	59.78

The graph below demonstrates the levels of dust recorded at the monitoring locations. All monitoring locations were below the limit for the reporting period.

Figure 3.3: Levels of dust recorded on site during 2011.



3.4 Surface water monitoring

Surface water monitoring was carried out as per Schedule C3 and Table D.4.1 of the waste licence. Appendix 3 details the surface water monitoring results for 2011.

3.5 Boiler Monitoring

The boiler used by Enva is a dual fuel boiler which is largely fuelled by Natural gas. Boiler monitoring was carried out in 2011 by Wright Environmental Services. The following emissions to atmosphere from the boiler were examined in the report as per Schedule D of the Waste Licence.

- Oxides of Sulphur
- Nitrogen Oxides
- Carbon Monoxide
- Combustion Efficiency

A copy of the boiler monitoring report is included in Appendix 4**.**

3.6 Noise monitoring

An environmental noise survey was conducted at the Enva Ireland site in Portlaoise in 2011 by Wright Environmental services. It was found that Enva were in compliance with the Emission limits set out in schedule C of Waste Licence W0184-1. See Appendix 5 attached for the full noise monitoring report.

3.7 Monitoring locations

Appendix 6 attached details the monitoring locations on site. Please note this drawing is not to scale.

4.0 ENVIRONMENTAL MANAGEMENT

4.1 Resource and Energy Depletion

The main energy source required on site is for the main boiler. This boiler is a dual fuel boiler which can be run on either natural gas or gas oil. Figure *4.1.1(a)* and *4.1.1(b)* show natural gas and gas oil consumption in 2011.

4.1.1 Natural Gas and Gas oil usage.

Figure 4.1.1(a): Gas oil consumption of the boiler during 2011

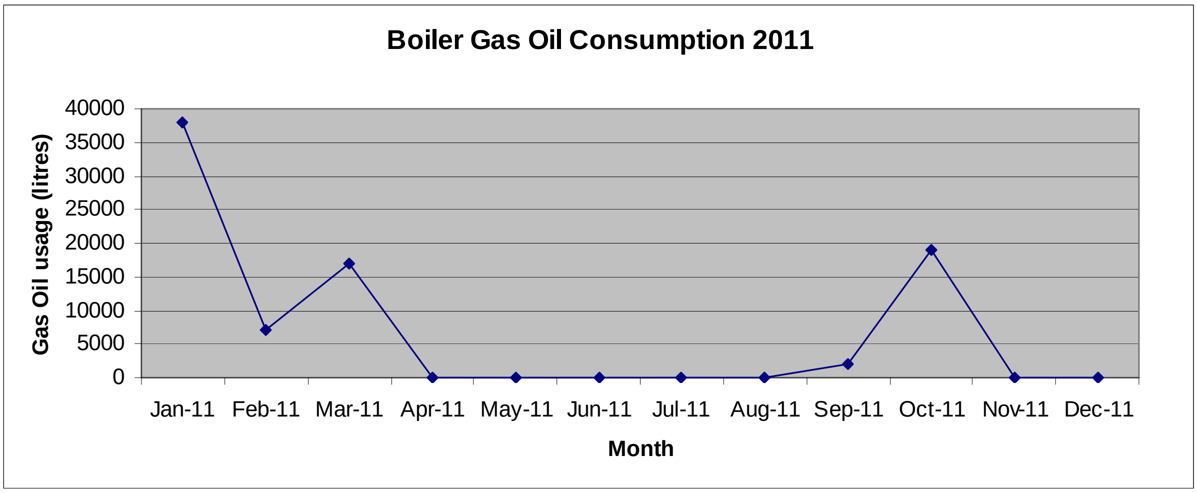
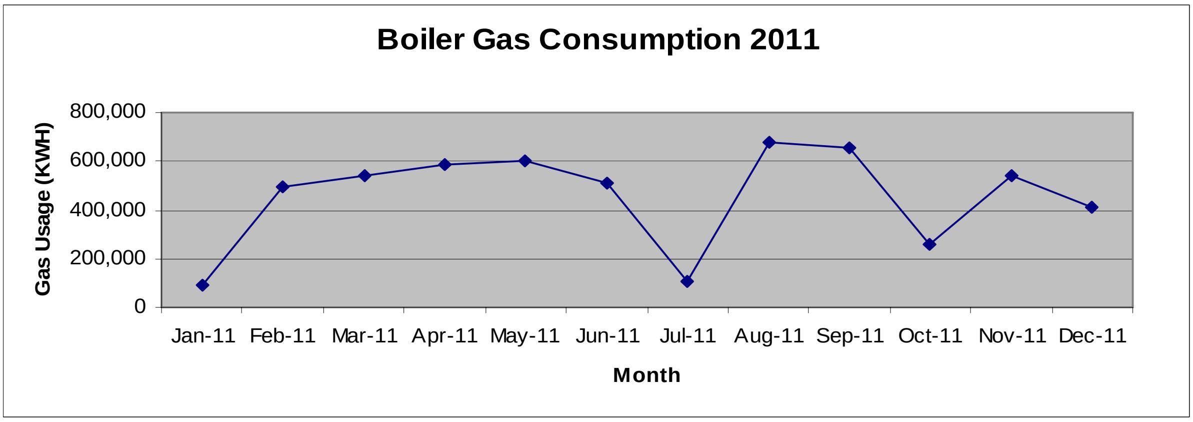


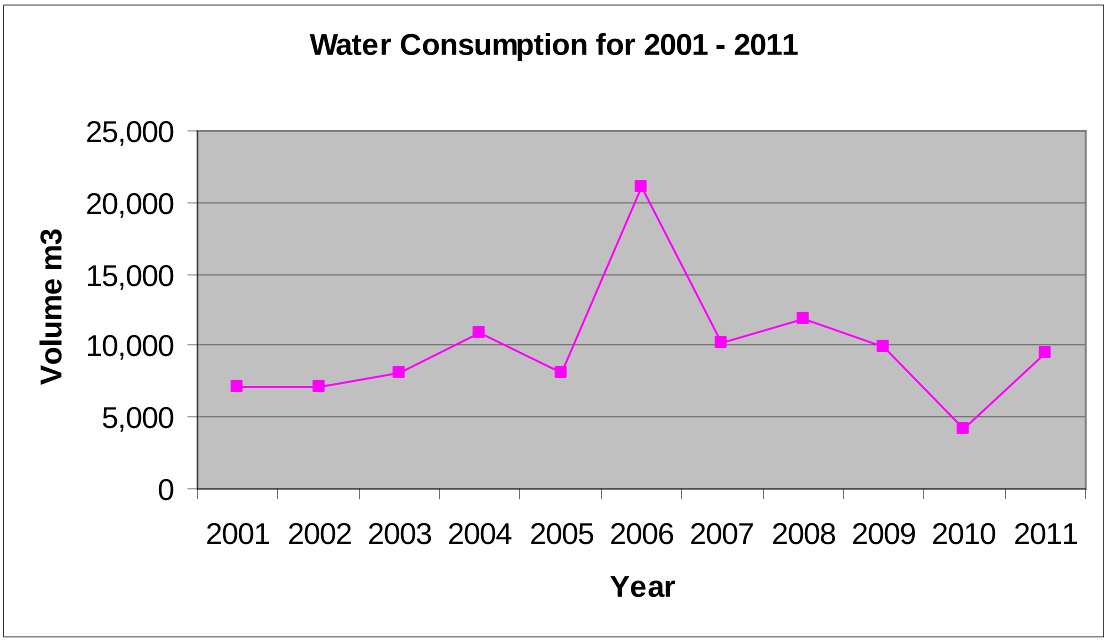
*Figure 4.1.1(b):*Boiler Gas Consumption during 2011



4.1.2 Water Usage

From the graph below it can be seen that there was an increase in the water consumption in 2011 when compared with 2010 figures. This is as a result of leaks in pipes due to heavy frost at the start of 2011. Following the detection and fixing of the leaks the water consumption reduced back to levels of normal consumption for the sites activities.

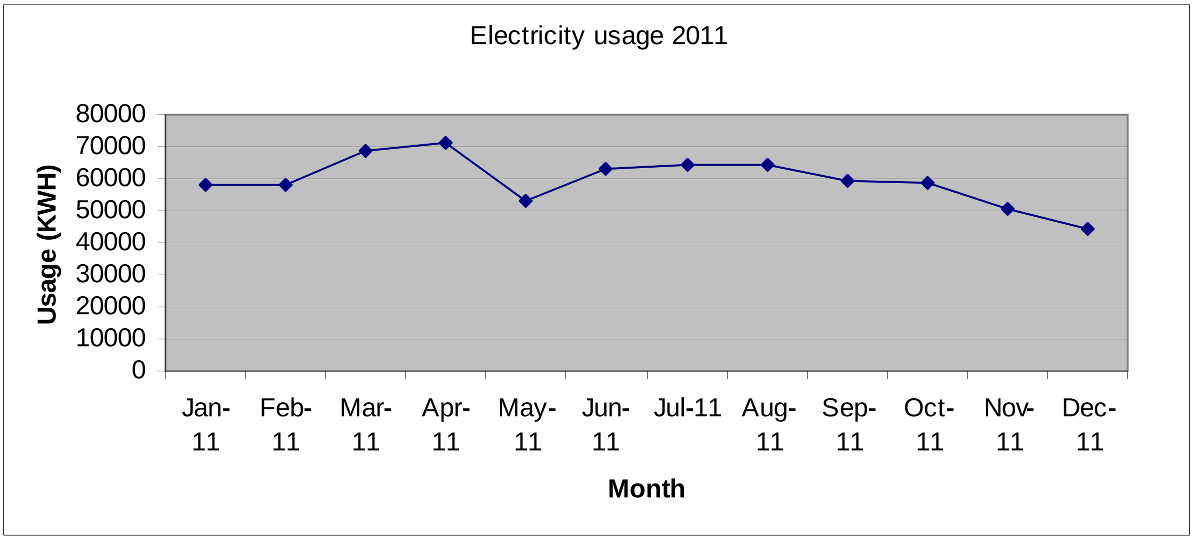
Figure 4.1.2: Water usage on site between 2001 and 2011



4.1.3 Electricity usage

The diagram below illustrates the electricity usage on site during 2011

Figure 4.1.3: Electricity usage during 2011



4.2 Environmental Management programme.

An Environmental Management System is in place and is accredited to the ISO 14001 standard. Appendix 16 attached contains the certificate of accreditation to this standard. Appendix 9 outlines the current objectives and targets.

4.3 Development and Infrastructural works for 2012/13.

No infrastructural works are planned for 2012/2013

4.4 Process Critical equipment

The following table details the critical processing equipment

Table 5: critical processing equipment

Waste Process	**Critical Equipment**	**Function**	**Back up measures**
Waste Oil Processing	Boiler	Provides heat for the waste oil re-processing	Boiler is a duel fuel which can be alternatively run on kerosene or natural gas. In the event of one form of the fuel not being available. In the event of a breakdown the process can be run on a portable boiler which can be sourced from Concord boilers.
	Compressors	Provides air for valves on process equipment also used for dewatering oil.	We have a duty and Stand by compressor and replacements can be hired in from Local hire company (Laois Hire)
	Flanges and valves on over-ground pipe lines	Direction of product	Repaired or replaced by on site fitter.
	Steam Traps	Part of oil heating system	Replacements on site
	Motor Screen	Cleaning of waste oil	Motors can be purchased locally from local supplier (Portlaoise Rewinds) Spare screens are stored on site.
	Airlines	Provision of air to process equipment and storage tanks	Repaired by on site fitters or replaced as necessary
	Oil pumps including Blackmeir and Mono pumps Wording Simpson and submersible pumps.	Pumps are used in loading, unloading, at sump and moving oil during process	Spares on site
	Cat & Mouse gauge	Used to visually determine the volume of oil in tanks	Spare on site, or repaired as necessary by plant fitter.
	Scada	Electronic control of the waste oil processing	Process can be switched to manual control until Scada is fixed. Operational staff have been received training on the trouble shooting and

			working of the Scada system
	Centrifuges	Cleaning of waste oil	Spares Seals will be kept on site and the manufacturers have agreed to carry out any repairs within two days.
Soil Processing	Power Screen logwash Power Screen Trommel	Washing and screening of soil to segregate soil and larger fractions into different streams.	Breakdowns can be repaired by on site fitter. Log wash and trommel can both be hired in the event of a breakdown.
Solid Oily waste re-packaging	Conveyor	Carriage of solid oily waste into drum.	Repaired by on site fitter.
Weighing of waste	Weighbridge	Weighing of waste	A second weighbridge has been installed. Mobile weighbridge can be sourced if required.
Metal Shredder	Shredder comprising of motors, conveyors and jaws.	Essential parts required for shredding of material can be repaired by plant fitter i.e. conveyor and motor	Plant would be repaired as soon as possible.
Surface water Run off	Catchment tank for surface water run off feeding interceptor	Discharge of on site surface water and separation of oil and water prior to discharge	Pumps and Motors can be replaced by plant fitter and can be quickly sourced in local supplier (Portlaoise Motor rewinds). There is a Duty and Standby pump system in place.
Forklift		Movement of waste around the facility	Forklifts can be hired in where necessary.
Loading shovel		Movement of soil on soil pads	Loading shovel can be hired from local plant Hire (Hinch plant hire).
Lime Treatment Plant	Filter press	Pressing of filter cake	Mobile filter press can be hired or brought from within the Enva group.
	Acid dosing pump	Neutralization of eluate	Sourced from supplier. There are other pumps on site which could be used.
	pH probe	Monitoring of pH	There are spare probes on site which could be used until the probe is replaced
	Flash mixer (pH adjustment after filter press)	Monitoring of pH	This is done by air which can be supplied by any of the compressors on site or hire of a mobile compressor. Effluent can be returned to process.
	Lime silo	dust filter	A supply can be accessed within 2 days from a supplier
	Scada	Automatic control of	Manual controls and bunding in

		process	place.
	Filter Press Cloth	Separating solids from effluent	Spear cloths are kept. They are not always new cloths but are cleaned before and inspected use
	Plates		Plate can be removed or spare plate sourced

4.5 Summary of Procedures

A summary of Standard Operating Procedures created since January 2011 is included in the table below.

Table 6: Summary of Standard Operating Procedures created during 2011

SOP title	Brief description
Loading of waste containers	Procedure for loading waste containers for export
Use of power washer	Procedure for use of power washer
Notification of incidents to the EPA	Procedure for notifying incidents to the EPA
Transfer of batteries between containers	Procedure for use of the battery lifter and the transfer of batteries between containers
Removal of batteries from metal casings	Procedure for the removal of batteries from metal casings

4.6 Review of Nuisance Controls

Condition 7 "Nuisances", of the waste management license 184-1 requires all nuisances to be controlled. SOPN 74 the HSE Site Inspections Standard Operating Procedure is used to aid in compliance with this condition. In addition a weekly check is also completed by the operations department to inspect the site for the presence of noise, odour, vermin, dust and mud.

A list of likely nuisances to arise from the activities undertaken on the Enva Ireland site and their controls are detailed below.

Vermin
Vermin control is in place, a contractor is used to inspect and bate the site periodically.

Odours
No significant odours have been detected on the site from the weekly site inspections. In addition to this a daily odour check has commenced.

Dust
Dust monitoring is undertaken on a quarterly basis by Enva laboratory personnel in accordance with VDI 2119 Part 2, "Measurement of particulate Precipitations, Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic"
Enva use a road sweeper to remove any soil or particles from the site which when dried could generate a dust nuisance.

Noise
Noise monitoring is carried out on an annual basis as per Condition D3. of the waste licence W0 184-1. Please see Appendix 5 on Noise Monitoring.

4.7 Bund Integrity testing.

Bund integrity inspection was repeated in 2011 by Kavanagh Ryan and associates at the request of the Agency. The report for this is included in Appendix 11. Two bunds were found to be below retention requirements in the 2010 bund inspection report. This has been addressed. Sumps and pumps pipe-work were installed to allow any possible spillage in these bunds to be pumped to the tank farm bund.

4.8 Calibration of temperature probes

See Appendix 12 for calibration certificates for relevant temperature probes

4.9 Inspection of underground pipelines

The inspection of underground pipelines was carried out in September 2009 and the inspection report was submitted with the 2009 AER

5.0 NON-CONFORMANCES

5.5.1 Reportable Non Conformances which occurred during 2011

Table 7: Summary of reportable non-conformances

Incident category	2011
Effluent	3
Groundwater	0
Odour	7
Dust	0
Surface Water	1
Autosampler faults	2
Other	1

The graph below indicates the incident trends between 2007 and 2011.

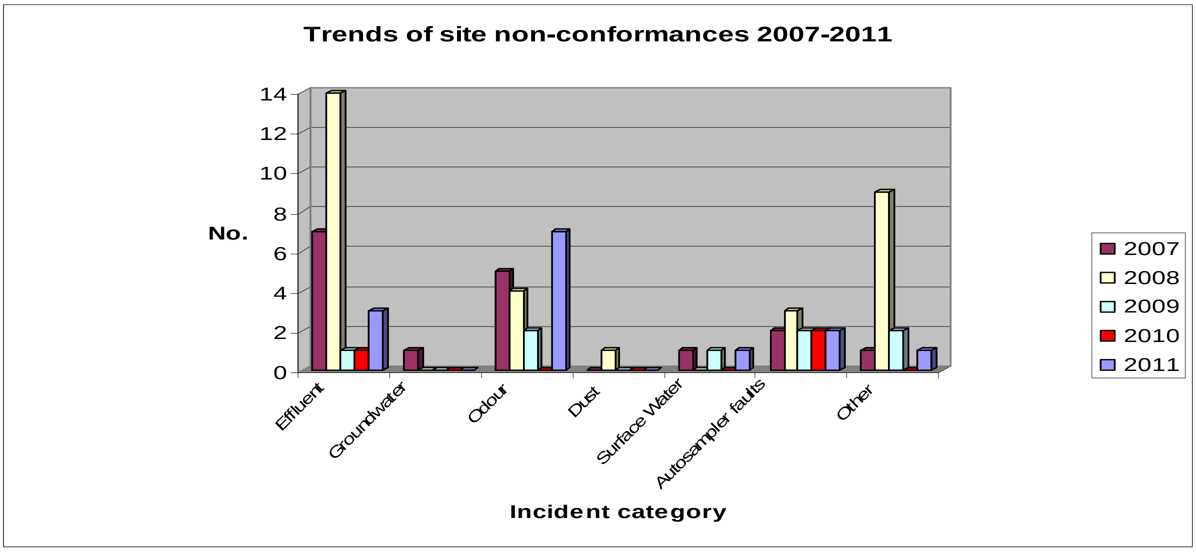

Trends of site non-conformances 2007-2011
No.
14
12
10
8
6
4
2
0
Effluent
Groundwater
Odour
Dust
Surface Water
Autosampler faults
Other
Incident category
2007
2008
2009
2010
2011

Table 8 below gives a brief description of each of the non conformances reported to the EPA in 2011

Category of incident	**Date of incident/ complaint**	**Summary of incident**	**Remedial action taken**
Effluent	15/07/11	Ammonia levels were exceeded on the 15th July 2011	To prevent a reoccurrence the incident was discussed with the operative responsible for mixing the effluent.
	07/07/12	Analysis of effluent released on the 7th of July exceeded the licence limits for suspended solid	Further settlement of the tank following the addition of lime is required in future to prevent this increase in suspended solids.
Effluent and Autosampler	9/07/11	There was an unauthorized release from the autosampler and this lead to an reportable ammonia exceedence in the effluent.	The suspected cause of this was a valve being left open on the electronic Scada system. The operator of the system must now close valves when there is no release planned.
Auto-sampler	05/07/12	A composite sample was not taken by the auto-sampler on the 5th of July.	The incident was an isolated occurrence as a result of testing of the backup generator. The auto-sampler was functioning normally for the next release.
Weather station	01/06/11	It was not possible to download data from the system	The unit was sent back to the supplier so that the error with the software could be investigated. Daily records are downloaded from Met Eireann for the Carlow weather station while the unit is out of operation and the daily wind direction on site is determined via the wind sock.
Odour	various	Odour complaints were received relating to the following dates 04.07.12, 31.07.12, 12.08.11, 14.08.11 and the 07.10.11. There were also two non compliances were issued by the EPA in relation to odour.	1. Enva are currently using a neutralising odour chemical in order to reduce any possible odours generated from processing 2. Enva have also recently implemented the Agency's guidance, Air Guidance Note 5 (AG5) Odour Impact Assessment Guidance for EPA Licensed Sites. Regular inspections are being carried out to determine possible odours in the vicinity of the plant and its surrounds.
Surface water	February	Due to an administrative error by an external laboratory mineral oil analysis was not performed on a sample from SW02.	A visual inspection of the interceptor is carried out by laboratory staff on a weekly basis. A review of this inspection sheet for February found that there was no significant oil present in the surface water discharge.

5.5.2 Non Conformances identified during EPA site visits in 2011

No non conformances were identified in an EPA site visit on the 29h of June 2011. Four observations were made by the Agency and a schedule of corrective actions to address these observations was submitted to the Agency on the 05.08.11. A non conformance was raised in an EPA site visit on the 19/07/11 in relation to odours in the area of the Industrial Estate. A non conformance was issued in an inspection report on the 23/11/11 by the EPA following an odour assessment carried out by independent consultants White, Young, Green on behalf of the Agency.

6.0 PUBLIC INFORMATION

All queries with regard to public information are dealt with as per SOP-N10 HSE Communications Procedure. See Appendix 8**.**

7.0 CLOSURE, RESTORATION, AFTERCARE MANAGEMENT PLAN

The Closure, Restoration, Aftercare Management Plan has not been altered significantly since its submission in 2008. The current bond in place will be updated to take into account the current value on the attached document. This will be forwarded to the Agency upon completion. See Appendix 13 for a copy of the Closure, Restoration, Aftercare Management Plan. The financial bond for enva Portlaoise is included in Appendix 19.

8.0 ENVIRONMENTAL LIABILITY RISK ASSESSMENT

The Environmental Liability Risk Assessment has not been altered significantly since its submission in 2008. See Appendix 14 for a copy of the Environmental Liability Risk Assessment

9.0 OEE METHODOLOGY FOR DETERMINING ENFORCEMENT CATEGORY OF LICENCES

The enforcement category summary page of the OEE Methodology is included in Appendix 10.

10.0 PRTR returns

Appendix 15 includes a copy of the PRTR returns.

Appendix 1

Groundwater Quality

Monthly analysis of field parameters for on site boreholes for January to December are shown in the tables below. Please note that the monitoring results for March, May, August and November are excluded from the tables below as these are included in the groundwater monitoring reports carried out by RPS.

The results of groundwater analysis for the onsite boreholes for April, June and July were within the statutory Irish standards for drinking water for all parameters as can be seen from the tables below. The conductivity for BH104B was in excess of statutory Irish standards for drinking water in both January and February. Conductivity was above the statutory Irish standards for drinking water in borehole BH101 in September and December.

Groundwater quality January

Table Field Measured Parameters Water Analytical Results

Date: 19th January 2011 **Monitoring Wells**

Parameter	Drinking water standards	Units	MW01	MW02	MW03	BH101	BH102	BH103	BH104B
Depth of water in Borehole			23.0	30.45	14.97	6.95	6.63	4.50	4.65
Conductivity	1500	uS/cm	559	616	960	1204	1383	841	1981 (xx)
pH	6.5<pH<9.5	n/a	7.36	7.29	7.18	7.29	6.61	7.46	7.65
Temp.	25	deg C	10.1	10.2	11.0	10.4	9.7	7.9	6.9
DO	-	mg/l	1.4	2.4	1.1	6.3	0.4	7.5	0.7
Visual	N/A		1st bucket cloudy, rest bucket clear.	1st bucket cloud, rest clear.	Clear, slight shiny film.	1st bucket cloudy brown, some solids, 2nd bucket clear.	Cloudy.	Cloudy.	Cloudy with an oily film.
Odour	N/A		Slight sulfur smell.	No odor.	No odor.	No odor.	No odor.	No odor.	Strong sulfur smell.
LEGEND									
xx	Indicates result in excess of statutory Irish standards for drinking water.								

Groundwater quality February

Table Field Measured Parameters Water Analytical Results
Date: February 2011 Monitoring Wells

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole			22.60	30.63	14.96	6.69	6.42	4.42	4.65
Conductivity	1500	uS/cm	662	626	817	1163	1210	817	1780 (xx)
pH	6.5<pH<9.5	n/a	8.00	7.70	7.97	7.65	7.07	7.53	7.33
Temp.	25	deg C	9.5	10.3	9.2	9.7	9.7	7.8	7.5
DO	-	mg/l	2.4	30.1	5.7	7.0	0.1	44.9	9.7
Visual	N/A		1st brown, rest clear. Oily film.	1st cloudy, rest clear.	Clear, oily film.	Brown	1st cloudy rest clear.	1st cloudy, rest clear.	1sr cloudy, rest clear.
Odour	N/A		Slight sulfur smell	No odor.	Sulfur smell	No odor	Slight sulfur smell	No odor	Strong sulfur smell

LEGEND

xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality April 2011

Table Field Measured Parameters Water Analytical Results
Date: 22nd April 2011 **Monitoring Wells**

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole			22.77	30.43	14.97	6.71	6.45	4.41	4.86
Conductivity	1500	uS/cm	645	620	896	1175	1178	837	769
pH	6.5<pH<9.5	n/a	7.50	7.51	7.39	7.52	7.23	7.19	7.68
Temp.	25	deg C	10.4	11.2	12.8	11.3	9.8	12.5	12.6
DO	-	mg/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Visual	N/A	N/A	1st cloudy, rest clear, some solids	Clear	Cloudy, solids, oily film.	Cloudy, some solids.	1st cloudy, rest clear.	Cloudy.	Clear, some solids.
Odour	N/A	N/A	No odor	Strong sulfur smell in 1st bucket only	Sulfur smell.	No Odor.	Sulfur smell.	No Odor.	No odor.

LEGEND
xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality June 2011

Table Field Measured Parameters Water Analytical Results
Date(s): 16th, 21st and 23rd June 2011 **Monitoring Wells**

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole			22.64	30.42	14.98	6.70	6.44	4.60	4.82
Conductivity	1500	uS/cm	655	641	985	1267	985	905	735
pH	6.5<pH<9.5	n/a	7.49	6.84	6.91	7.41	6.98	7.04	7.09
Temp.	25	deg C	11.9	11.0	11.2	16.5	14.2	15.1	11.4
DO	-	mg/l	3.94	3.07	6.77	4.19	3.38	3.07	1.47
Visual	N/A	N/A	Some solids. 1st and 2nd bucket cloudy rest clear.	Clear, no solids	Some sediment. Cloudy, oily film.	1st bucket very cloudy. Remaining buckets not so cloudy.	1st bucket cloudy, rest clear.	Some sediment and all buckets cloudy.	Some solids in 1st bucket.
Odour	N/A	N/A	No odour	No odour	No odour.	No odour	Sulphur smell.	No odour	No odour

LEGEND

xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality July 2011

Table Field Measured Parameters Water Analytical Results
Date: 13th and 14th July 2011 **Monitoring Wells**

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole (m)	N/A	N/A	22.74	30.12	14.99	6.70	6.42	4.43	4.85
Conductivity	1500	uS/cm	662	612	950	417	789	895	552
pH	6.5<pH<9.5	n/a	8.02	7.70	7.96	7.79	7.10	7.51	7.61
Temp.	25	deg C	11.7	22.6	23.1	13.3	15.7	14.1	13.5
DO	-	mg/l	10.22	5.12	8.56	3.51	6.11	2.00	6.11
Visual	N/A	N/A	1st and 2nd bucket brown, rest clear.	Clear	Clear, oily film.	1st bucket cloudy with sediment, clear after.	1st bucket cloudy with sediment, clear after.	1st bucket sediment, clear after	All buckets cloudy/brown in color
Odor	N/A	N/A	No odor	Sulphur smell	Sulfur smell	Sulfur smell	No odor	No odor	Sulfur smell

LEGEND

xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality September 2011

Table Field Measured Parameters Water Analytical Results
Dates: 13th, 20th and 27th September 2011

Parameter	Drinking water standards	Units	MW01	MW02	MW03	BH101	BH102	BH103	BH104B
			Monitoring Wells						
Depth of water in Borehole (m)	N/A	N/A	22.60	30.66	14.99	6.71	6.33	4.45	4.87
Conductivity	1500	uS/cm	664	625	887	1633xx	1267	823	452
pH	6.5<pH<9.5	n/a	7.39	7.62	6.89	6.76	6.81	7.16	7.23
Temp.	25	deg C	11.8	12.7	12.5	14.1	13.3	13.5	13.4
DO	-	mg/l	3.1	5.4	6.49	9.55	5.9	5.9	3.9
Visual	N/A	N/A	Cloudy.	1st bucket cloudy. Clear afterwards.	Oily film. No solids	Cloudy brown with sediment.	1st bucket cloudy with sediment, clear after.	1st bucket sediment, clear after	All buckets cloudy/brown in color
Odor	N/A	N/A	No odor	Sulphur smell	Sulphur smell	No odor.	Sulphur smell	No odor	Sulfur smell

LEGEND

xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality October 2011

Table Field Measured Parameters Water Analytical Results October 2011
Date(s): 18/10/2011 and 20/10/2011 **Monitoring Wells**

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole:	N/A	N/A	22.70	30.43	14.99	6.70	6.42	4.44	4.87
Conductivity	1500	uS/cm	659	794	880	935	997	787	443
pH	6.5<pH<9.5	n/a	7.64	7.51	7.31	7.77	7.04	7.60	7.89
Temp.	25	deg C	11.6	10.8	11.4	13.0	12.7	13.8	12.0
DO	-	mg/l	3.21	2.66	3.87	8.09	3.93	6.41	4.47
Visual	N/A	N/A	Cloudy	Clear	Oily film, no solids	Cloudy	1st bucket cloudy, clear after.	Sediment in 1st bucket, clear after.	Sediment in 1st bucket, clear after.
Odour	N/A	N/A	No smell.	Sulphur smell in 1st bucket	Sulphur smell	Sulphur smell	Sulphur smell	No smell.	Sulphur smell

LEGEND
xx Indicates result in excess of statutory Irish standards for drinking water.

Groundwater quality December 2011

Table Field Measured Parameters Water Analytical Results December 2011

Date(s): **Monitoring Wells**

Parameter	Drinking water standards	Units	**MW01**	**MW02**	**MW03**	**BH101**	**BH102**	**BH103**	**BH104B**
Depth of water in Borehole	N/A	N/A	22.70	30.43	14.99	6.70	6.42	4.44	4.87
Conductivity	1500	uS/cm	519	633	998	1744xx	897	819	388
pH	6.5<pH<9.5	n/a	7.51	7.49	7.14	7.21	6.5	6.90	7.43
Temp.	25	deg C	11.0	9.5	10.1	10.2	10.5	10.5	8.8
DO	-	mg/l	9.85	3.33	2.45	4.12	4.40	8.70	5.44
Visual	N/A	N/A	Cloudy	Clear	Oily film, no solids	Water brown in colour. High sediment	1st bucket cloudy, clear after.	Sediment in 1st bucket, clear after.	Sediment, grey in colour.
Odour	N/A	N/A	No smell.	No smell.	Sulphur smell	No smell.	No smell.	Sulphur smell	Sulphur smell

LEGEND

xx Indicates result in excess of statutory Irish standards for drinking water.

RPS

Enva Portlaoise

2011 Groundwater Compliance Monitoring Quarter 1 (Jan – Mar 2011)

DOCUMENT CONTROL SHEET

Client	Enva Ireland Ltd.					
Project Title	Enva Portlaoise 2011 Groundwater Compliance Monitoring					
Document Title	Quarter 1 (Jan – Mar 2011) Interpretative Report					
Document No.	MDE0973Rp0005A01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	36	1	1	1

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D01	Draft	C. Reilly	N. Mitchell	S. Herlihy	West Pier	29/03/11
A01	Client Approval	C. Reilly	Niall Mitchell	Shane Herlihy	West Pier	15/04/11

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1 INTRODUCTION

1.1 BACKGROUND

RPS has been commissioned by Enva Ireland Ltd to carry out groundwater quality monitoring for environmental compliance, at their facility in the Clonminam Industrial Estate, Portlaoise, Co Laois. Groundwater monitoring has being carried out in strict accordance with criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01.

Enva Ireland has been operating under Waste Licence Register No. W0184-01 since January 2004, and is required to submit a report to the Environmental Protection Agency (EPA) on a quarterly basis, outlining the existing groundwater quality underlying the site.

Suitably qualified environmental consultants from RPS, collected groundwater samples from a series of 7 monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03) within the site boundaries on the 10th of March 2010. The samples underwent laboratory analysis for the suite of parameters specified in Schedule 4(ii) of Waste Licence W0184-01. This report outlines the results of the Quarter 1 monitoring for 2011 and reviews historical data recorded at the site.

1.2 OBJECTIVES & SCOPE OF WORK

The specific objectives and scope of work are as follows:

- Review of previous data as provided by Enva Portlaoise;
- Graphical presentation of key compounds and trends; and
- Discussion of results for Quarter 1 2011 within the context of previous results and available guideline concentrations.

2 REVIEW OF PREVIOUS DATA

2.1 INFORMATION SOURCES

The following documents were reviewed as part of this project:

- Waste Licence W0184-01 and any available EPA documents from the EPA website
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2004)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2005)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2006)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2007)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2008)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2009)
- Summary Report on Trend of Contaminant Levels at Enva Ireland Ltd since 2005, Ref: MDE0647RP0001, RPS (2007)
- Groundwater Risk Assessment, Ref: MDE0788Rp0001, RPS (2008)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0001F02, RPS (2010)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0002F01, RPS (2010)
- Quarter 3 Groundwater Monitoring Report, Ref: MDE0973Rp0003F01, RPS (2010)
- Quarter 4 Groundwater Monitoring Report, Ref: MDE0973Rp0004F01, RPS (2010)

2.2 SITE SETTING

The site is located to the southwest of the town of Portlaoise immediately to the south of the Dublin to Cork railway line. The general area is gently undulating. The site slopes gently to the southwest but to the east of the site the ground slopes gently towards the River Triogue, which is located approximately 1 km to the east. The site occupies an area of approximately 1.5 hectares and comprises of an operational waste oil and contaminated soil treatment plant.

The site is located on the outskirts of Portlaoise in an area of agricultural and light industrial development. The site is bounded to the north and east by land belonging to Irish rail, comprising sidings and general storage areas. To the south is a vehicle repair garage, which is elevated above the level of the site by approximately 1.5 m. To the west the site is adjoined by further industrial land, as well as residential land. The site location is presented on **Figure 1**.

The site has been in operation since 1978, and the layout has remained relatively consistent. The site layout is presented on **Figure 2**. The site is largely covered in hardstanding with some open areas in the far north and northwest of the site. All oil and soil storage areas are suitably bunded and the general standard of housekeeping is good.

2.3 REGIONAL SETTING

2.3.1 Geology

The Geological Survey of Ireland indicates that the regional geology of Portlaoise is typified by Carboniferous Limestone. In the vicinity of the site itself the solid geology comprises the Ballysteen Formation, a micaceous-bioclastic limestone. This well-bedded limestone, with interbeds of shale, is extensively folded, with axes trending north-east to south-west, and becomes increasingly muddy towards the top of the formation. North-east to south-west trending faults are found in the region, with one located approximately 500m to the east of the site. The subsoil's in the region comprise mainly Made Ground, around the industrial area, and Limestone Till in the surrounding regions.

2.3.2 Hydrogeology

The limestones are classified by the Geological survey of Ireland (GSI) as a locally important karstified aquifer. Porosity is predominantly in the form of fractures, in this aquifer, however the muddy nature of this formation greatly reduces permeability. Vulnerability of this aquifer beneath the site is classified as high, with moderate vulnerability to the east of the site.

The public water supply for Portlaoise is derived from groundwater, utilising five extraction wells in total. This supply currently comes from the Straboe area, approximately 5.5 km to the north-east of the site. The source protection zone for this water supply extends north-west south-east with the boundary of the outer protection zone at least 4 km to the north-east of the site. A further public abstraction well-field is currently being developed to the north-west of the current area in the townland of Eyne, approximately 6 km to the north of the site, and will comprise a further five abstraction wells. The Source Protection Zone for these wells has not yet been defined but it is not anticipated to affect the Enva site.

The GSI record a number of other dug wells and boreholes within the Portlaoise area, including the boreholes installed on the site. The accuracy of the locations of these wells varies. One well, which was drilled in 1899 is recorded as being located immediately to the south of the Enva site. The use of this well is not known and its location is only accurate to 1 km. A second borehole, drilled in 1973 is recorded 1.5 km to the north of the site at Clonroosk, the accuracy of this location is also 1 km so that it could be closer or further from the site. The use of this well is not known but its yield is recorded as being poor. There are no other wells recorded within 1 km of the site.

Enva is not aware of any abstraction boreholes within the immediate vicinity of their site.

2.4 SITE GROUND CONDITIONS

A total of eight boreholes have been drilled at the site and the general sequence of ground conditions is presented in **Table 2**.

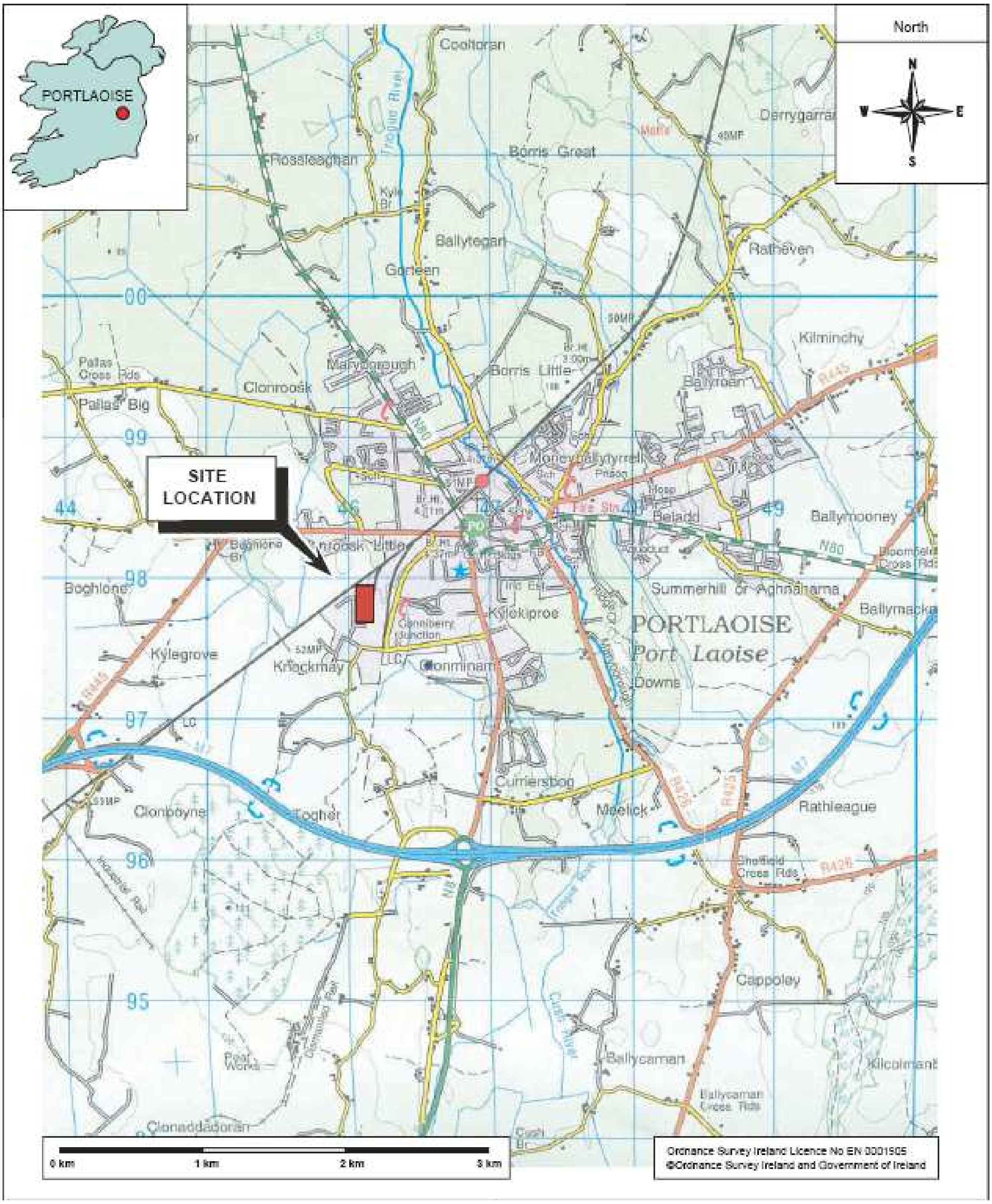
Table 2.1: Ground Conditions

Strata	Extent	Thickness	Description
Made Ground	BH104	0-3.5 m	Predominantly concrete, with hardcore fill, and clay.
Boulder Clay	All boreholes	<8.5 m	Includes fine to medium, well rounded gravels.
Sand and Gravel	Confined to	0-2 m	In general the transition from boulder clay to

Strata	Extent	Thickness	Description
	south east corner of site (BH101, BH104 and MW03)		sand is gradual with changes from gravel, to sandy gravel, to sand.
Limestone Bedrock	Encountered in MW01, MW02 and MW03	Top of limestone ranges from 7.7m to 9m below ground level.	Pale grey, fine-grained bedrock, differentiated from boulders by its un-weathered nature.

The logs for each of the boreholes were previously presented as Appendix B in the RPS Groundwater Risk Assessment Report (Ref: MDE0788Rp0001).

Figure 1 Site Location



2.4.1 Licence Conditions

The waste management licence requires the regular monitoring and sampling of boreholes BH101, BH102, BH103, BH104B, MW01, MW02 and MW03. The parameters requiring measurement or analysis are presented in Table 2.2.

Table 2.2: Licence Parameters

Group	Parameters requiring Quarterly Measurement	Parameters requiring Annual Measurement
Field Parameters	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection
Organics	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's
Inorganics	-	Total Alkalinity, Calcium, Manganese, Sulphate, Cyanide (Total), Chloride, Sodium,

3 METHODOLOGY

Groundwater samples were collected from 7 no. on-site groundwater-monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03), (See Figure 2) using dedicated Waterra tubing, in accordance with RPS's standard sampling protocol. A non-return foot valve was fixed to the bottom of the tubing and inserted into the well, close to the base of the borehole. Separate tubing and foot valves were used at each monitoring well to eliminate the possibility of cross contamination.

Groundwater in the well casing is not considered representative of the groundwater quality at a given location. For this reason, three well volumes were purged from each well prior to collection of the groundwater sample. By the time purging was complete all field test water parameters (namely pH, Temperature, Electrical Conductivity and Dissolved Oxygen) were within 10% variance in three consecutive measurements. This ensured that the groundwater sample extracted from the monitoring borehole was representative of the water held in the subsurface strata and not water held stagnant in the borehole casing. The purged volumes were calculated on-site from the measured static water levels and total well depths using an electronic dip meter.

Groundwater samples were collected in laboratory supplied containers and stored in chilled cool boxes following sampling and during transit to the laboratory. A rigorous chain of custody procedure was used during the sample round.

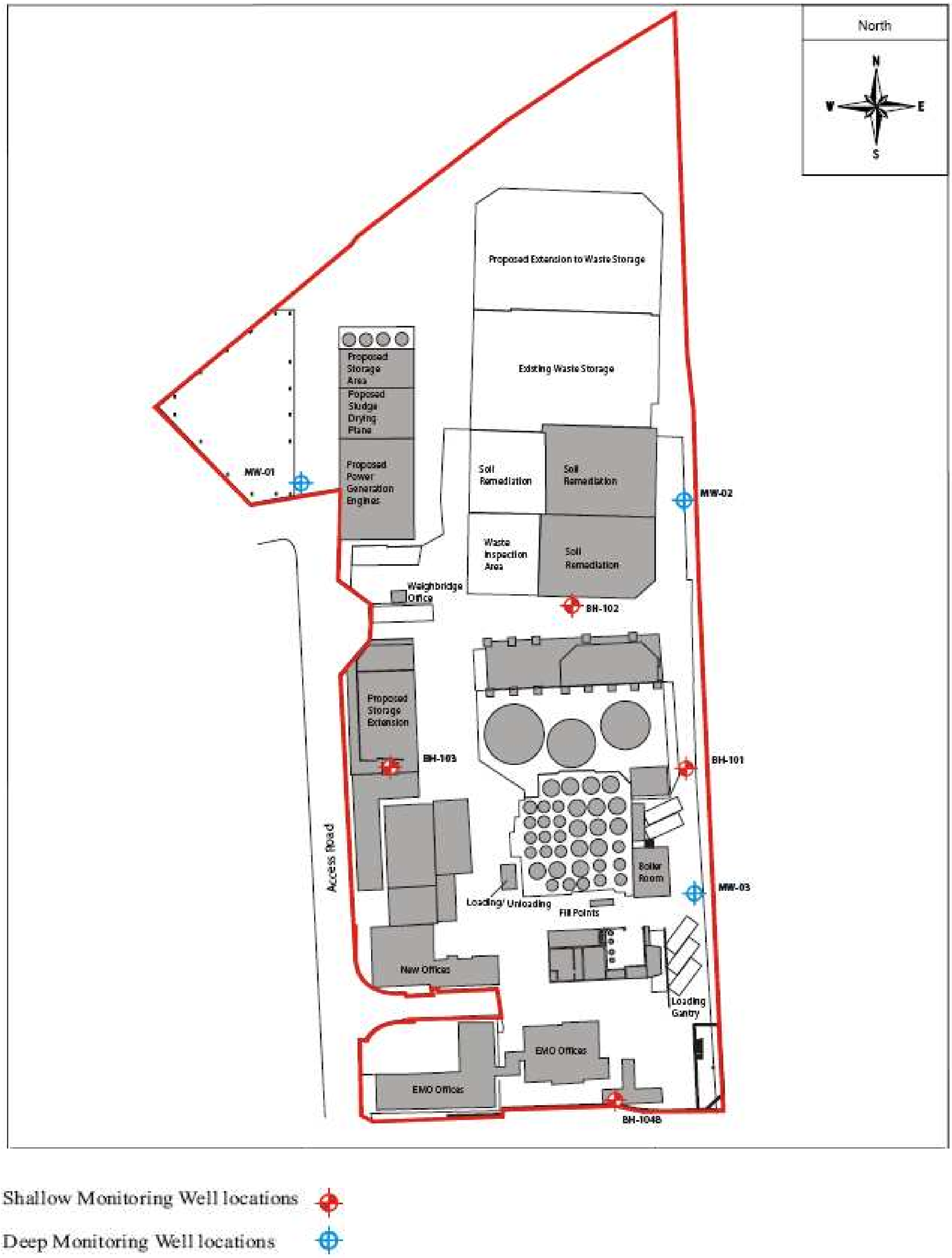
3.1 LABORATORY ANALYSIS

All groundwater samples were analysed at a UKAS accredited laboratory, I2 Analytical Ltd for the suite of analyses listed in Table 3.1. Table 3.1 also indicates the analytical techniques used by the laboratory.

Table 3.1: Analytical Methodologies – I2 Analytical Ltd

Parameter	Analytical Methodology
Phenols	GC-MS
Speciated PAHs	GC-MS
BTEX & MTBE	Headspace GC-MS
Petroleum Hydrocarbons	Headspace GC-MS
Volatile Organic compounds & Tentatively Identified Organic Compounds (VOCs & TICs)	Headspace GC-MS
Semi-Volatile Organic compounds & Tentatively Identified Organic Compounds (SVOCs & TICs)	GC-MS

Figure 2 Site Layout Plan with groundwater monitoring well locations



Source: *URS Environmental Consultants (Ref: 45078497 Issue No. 1)*

3.2 PRESENTATION & INTERPRETATION OF RESULTS

The Quarter 1 2011 results are tabulated in Section 4 and discussed with respect to previous results. The results have been compared to the EPA Interim Guideline Values (IGV) as set out in the Report 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004. It is important to note that the IGVs are based on the lowest acceptable value for either drinking water or environmental quality in surface water and is therefore conservative in nature.

Previous monitoring reports (as listed in Section 2.1) provide details of contaminant concentrations since 2004. The data available within these reports has been reviewed and time series plots of key parameters have been compiled. Trends for chlorinated solvents, petroleum hydrocarbons and phenol parameters have been plotted.

Time series plots are presented in Section 6 and include the results of this Quarter 1 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds used to illustrate the results.

Time series plots are also provided for manual water levels where available from previous reports.

4 QUARTER 1 RESULTS DECEMBER 2011

The results of all field measurements and laboratory analysis are presented in this section.

The results are discussed in relation to appropriate guideline values in Section 5. Results that are shown to be above the relevant guideline values are highlighted in bold and shaded. Results that are shown to be above the relevant laboratory detection limits are highlighted in italics.

Site-specific field parameter measurements were collected during the site visit as per RPS Water sampling protocol.

Table 4.1: Groundwater Levels (Quarter 1, 2011)

Monitoring Well	BH101	BH102	BH103	BH104B	MW01	MW02	MW03
Depth (mbgl)	6.86	6.60	4.58	4.80	23.0	30.0	15.10
Static Water Level (mbgl)	4.30	3.35	1.89	1.11	3.81	5.01	4.23
Ground Level (mAOD)	103.06	102.55	101.16	101.52	102.1	103.12	102.77
Water Level (mAOD)	98.76	99.71	101.17	101.95	99.25	98.05	98.83
Free Phase Oil (mm)	No detection	No detection	No detection	No detection	No detection	No detection	No detection

mbgl = metres below ground level

Table 4.2: Results of Field Parameters Measured at each Groundwater Monitoring Well (Quarter 1, 2011)

Monitoring Well	pH (pH Units)	Temperature (℃)	Conductivity (µS/cm)	Dissolved O_2 (ppm)	Observations
BH101	7.22	10.4	**1300**	6.46	Purged water grey in colour on purging, slight H_2S odour detected. Some fine sandy sediment noted.
BH102	6.80	10.2	**1346**	5.91	Purged water pale yellow in colour, slight H_2S odour detected on purging after 10L. Some sandy sediment noted.
BH103	**5.80**	8.5	986	4.68	Purged water dirty in colour, some fine sediment noted. After 30L purged water grey in colour, no odour, fine sediment noted.
BH104B	7.28	7.7	935	3.70	Purged water grey turning clearer on purging, strong H_2S odour detected. Some sandy sediment noted.
MW01	7.50	10.0	685	6.48	Purged water grey in colour, cloudy in nature, no sediment noted, no odour detected.
MW02	7.84	11.3	678	4.02	Purged water clear in colour, slight yellow colour, clearer after 10L. No odour or sediment noted.
MW03	7.29	11.4	**1096**	3.69	Purged water dirty grey in colour, oily sheen noted on surface of purged water, no odour detected, some black sediment noted.
Interim EPA Guideline Values (Units as indicated)	**>6.5 & <9.5**	**25℃**	**1000**	**No abnormal change**	**-**

Note: Results above the relevant IGV are highlighted in bold and shaded.

Table 4.3: Results of BTEX & MTBE

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 [Note 1]
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 [Note 1]
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30

Note 1: No specific IGV for parameter. IGV for Total Xylenes is used as guideline.

Table 4.4: Results of Speciated PAH's

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	< 0.01	1.0
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Total EPA-16 PAH's	µg/l	0.2	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	0.1

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.5: Results of Total Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Total Phenols (monohydric)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	0.5
Total Phenols (GC-MS)	µg/l	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.5

Table 4.6: Results of Speciated Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.7: Results of Semi-Volatile Organic Compounds (sVOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aniline	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2-Chlorophenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	200
Bis(2-chloroethyl)ether	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
1,3-Dichlorobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
1,2-Dichlorobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10
1,4-Dichlorobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2-Methylphenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Hexachloroethane	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Nitrobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10
4-Methylphenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Isophorone	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2-Nitrophenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2,4-Dimethylphenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bis(2-chloroethoxy)methane	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.40
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
2,4-Dichlorophenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
4-Chloroaniline	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Hexachlorobutadiene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10
4-Chloro-3-methylphenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	200
2,4,5-Trichlorophenol	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2-Methylnaphthalene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2-Chloronaphthalene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Dimethylphthalate	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
2,6-Dinitrotoluene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
2,4-Dinitrotoluene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Dibenzofuran	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
4-Chlorophenyl phenyl ether	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Diethyl phthalate	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
4-Nitroaniline	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Azobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bromophenyl phenyl ether	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Hexachlorobenzene	µg/l	0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.03

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Carbazole	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Dibutyl phthalate	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.0
Anthraquinone	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Butyl benzyl phthalate	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05

Note: Results above the relevant laboratory limit of detection in italics.

Table 4.8: Results of Volatile Organic Compounds (VOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Chloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Vinyl Chloride	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichlorofluoromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2,2-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12
1,1,1-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	500
1,2-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-Dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Tetrachloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0
1,2-dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Trichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70
Dibromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromodichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,1,2-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Dibromochloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tetrachloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40
1,2-Dibromoethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
1,1,1,2-Tetrachloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Styrene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tribromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Isopropylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
N-Propylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
4-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3,5-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tert-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Sec-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
P-Isopropyltoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,4-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-Dibromo-3-chloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.40
Hexachlorobutadiene	µg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10
1,2,3-Trichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.9: Results of Total Petroleum Hydrocarbons (Aliphatic/Aromatic)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aliphatic > C5-C6	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C6-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C16-C21	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic >C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	10
Aromatic > C5-C7	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C7-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C16-C21	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	10

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are highlighted in bold italics.

5 DISCUSSION OF QUARTER 1 RESULTS

The results of the Quarter 1 monitoring event for 2011 are presented in Table 4.1 to 4.9 of this report. For the purpose of this report, the results are compared to the EPA Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.* A discussion of the results and their significance is included below.

5.1 FIELD PARAMETERS

The results of the field parameters measured at each groundwater monitoring well are presented in Table 4.1. Groundwater samples recorded pH levels ranging between 5.80 and 7.84. All pH measurements were within the EPA Interim guideline range of ≥6.5 to ≤9.5 with the exception of BH103, which recorded a pH level of 5.80. Temperature measurements ranged from 7.7 to 11.4℃ and were within the EPA IGV of 25℃.

Field measurements of Electrical conductivity levels ranged between 678 µS/cm and 1346 µS/cm and were below the Interim Guideline Value of 1000 µS/cm at all locations with the exception of BH101 (1300 µS/cm), BH102 (1346 µS/cm) and MW03 (1096 µS/cm).

Dissolved oxygen levels ranged between 3.69 and 6.48 ppm. Factors such as climate, nutrients in the water, suspended solids; organic wastes and groundwater inflow can all influence the dissolved oxygen values. Observations relating to colour and odour varied from well to well as detailed in Table 4.2.

5.2 RESULTS OF BTEX & MTBE

The results of the **BTEX** and **MTBE** analysis are presented in Table 4.3 and demonstrate concentrations below the laboratory limit of detections and associated IGV's at all locations.

Previous monitoring events detected MTBE above the laboratory limit of detection at a concentration of 16 µg/l during Quarter 1 and Quarter 2 of 2010 at BH103. During Quarter 3 and Quarter 4 of 2010 concentrations were below the laboratory limit of detection. Prior to these monitoring events, concentrations of MTBE at BH103 were recorded at 6.3 µg/l in December 2009. However, no exceedances of the IGV were recorded at any stage.

5.3 RESULTS OF SPECIATED PAH'S

The results of the Speciated PAH analysis during this monitoring period are presented in Table 4.4.

The laboratory limit of detection for Total EPA-16 PAH's is 0.2 µg/l. This laboratory limit of detection is above the EPA IGV of 0.1 µg/l. To identify the compounds, which attributed to these concentrations, speciated PAH analysis was carried out, which reduces the limit of detection for individual parameters to 0.01 µg/l.

The results of the speciated polycyclic aromatic hydrocarbon analysis detected no parameters above the laboratory limits of detection and all other parameters were below the EPA IGV's. In future, the laboratory has confirmed that the detection limit for total EPA-16 PAH's will be lowered to 0.1 µg/l for comparison with the EPA IGV of 0.1 µg/l.

5.4 RESULTS OF SPECIATED PHENOLS

The results of Total Phenol analysis are presented in Table 4.5. All samples detected concentrations of monohydric phenol below the laboratory limit of detection of 10 µg/l. It should be noted that the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols.

For this reason, samples were analysed for phenols to include chlorophenols. The results of the speciated phenols analysis are presented in Table 4.6. The speciated phenol analysis reduces the laboratory limit of detection to 0.05 µg/l for individual parameters.

The results of the current Quarter 1 2011 speciated phenol analysis confirm concentrations of phenols were below the laboratory limit of detection of 0.05 µg/l at all locations. This is consistent with the results from the previous 2010 monitoring events.

5.5 RESULTS OF SEMI-VOLATILE ORGANIC COMPOUNDS

The results of the Semi-Volatile Organic Compound analysis are presented in Table 4.7.

No SVOC's were detected during this monitoring period above the relevant IGV's.

5.6 RESULTS OF VOLATILE ORGANIC COMPOUNDS

The results of the Volatile Organic Compound analysis are presented in Table 4.8. The results of the current Quarter 1 2011 monitoring event indicate that there were no exceedances of VOC parameters detected above the relevant IGV's.

In November 2009, corresponding to Quarter 4 of 2009, no VOC's were detected above the relevant IGV's. However some parameters were detected above the laboratory limits of detection (1,1-Dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, MTBE, n-butylbenzene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene and tert-butylbenzene).

The results of the Quarter 3 and Quarter 4 monitoring events of 2010 indicate that there were no exceedances of the IGV for specific parameters.

5.7 RESULTS OF TOTAL PETROLEUM HYDROCARBONS

In order to provide a more accurate profile of TPH within the groundwater, speciated hydrocarbon analysis using the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) method was carried out on samples taken at all boreholes. The results of the TPH analysis are presented in Table 4.9.

No detections were observed in the monitoring well locations during the current monitoring event. The EPA IGV of 10 µg/l for Total hydrocarbons is deemed comparable with the results for total petroleum hydrocarbons (TPH). The results are consistent with the results of the previous Q4 monitoring event of 2010.

Hydrocarbons have been detected in borehole MW03 during Quarter 1 2010, in borehole BH104B during the Quarter 2 2010 monitoring event and in borehole BH104B and MW03 during the Quarter 3 2010 monitoring events. These detections are discussed in Section 6.2.3.

6 HISTORICAL RESULTS & TRENDS

Time series plots are presented in this section and include the results of the Quarter 1 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds and used to illustrate the results.

6.1 GROUNDWATER LEVELS OVER TIME

Figure 3 to Figure 5 below illustrates the manually recorded water levels using an electronic probe. The graphs show that groundwater levels can vary considerably between monitoring rounds.

Figure 4 illustrates groundwater elevations (mAOD) in shallow groundwater wells (BH101 to BH104B) ranging between approximately 98 mAOD and 102 mAOD.

Figure 5 illustrates groundwater elevation (mAOD) in the deeper groundwater wells (MW01 to MW03). The groundwater elevation (mAOD) for these deeper groundwater wells ranges from approximately 98 mAOD to approximately 99 mAOD.

Figure 3 Groundwater Elevation (mAOD) in all Monitoring Wells

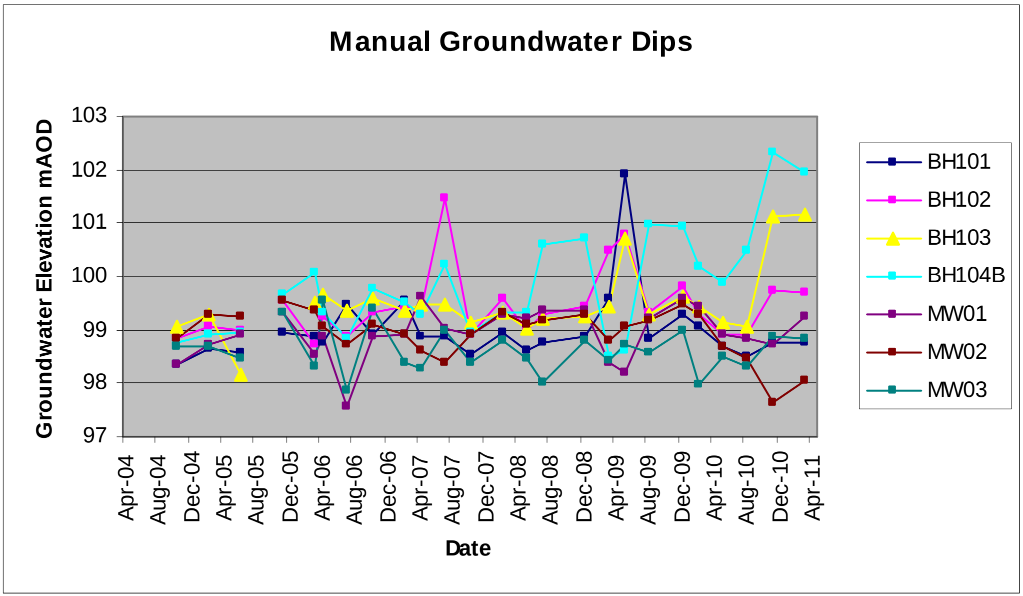


Figure 4 Groundwater Elevation (mAOD) in Shallow Monitoring Wells

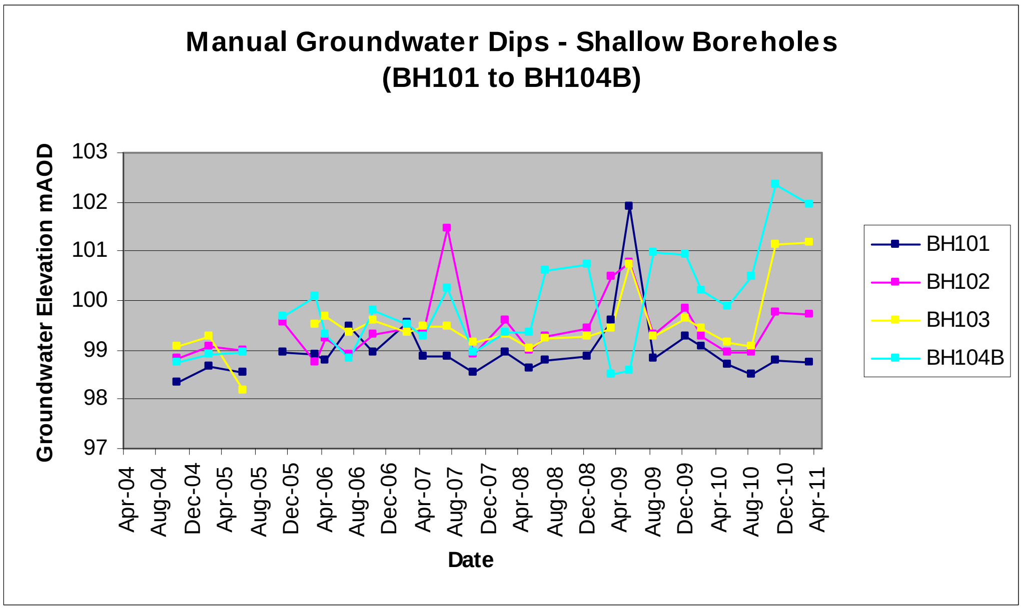
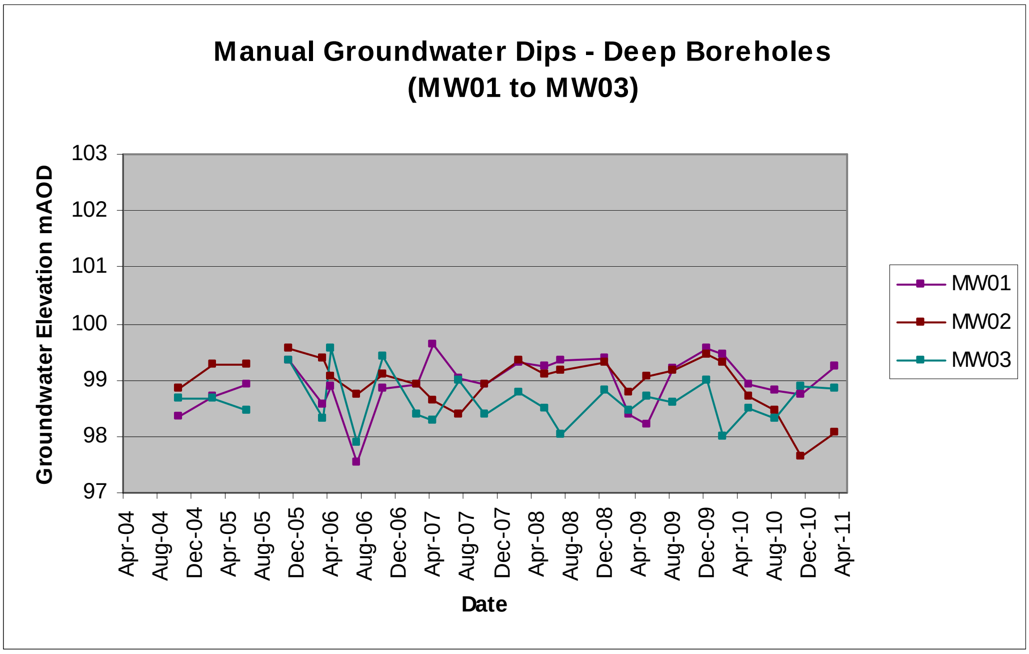


Figure 5 Groundwater Elevation (mAOD) in Deep Monitoring Wells



The groundwater levels generally show a similar pattern of fluctuation over time indicating a degree of connection between boreholes. The graphs demonstrate that groundwater levels can vary considerably between monitoring rounds; however, the general direction of flow in the shallow and deeper groundwater bearing unit is predominantly in a south easterly direction and occasionally in a southerly direction. Figure 1 and Figure 2 in Appendix A present the groundwater contours and flow direction for the Quarter 1 2011 Monitoring event.

In addition, monthly rainfall data for Oak Park, Carlow have been tabulated from Met Eireann to examine the relationship between compounds and rainfall events. The data from Oak Park was chosen as the weather station at Birr, Co. Offaly closed in October 2009. A summary of the rainfall data is in Tables 5.1, 5.2 and 5.3.

Table 5.1: Monthly Rainfall data for Year 2009 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	113.4	29.2	32.6	102.4	69.0	65.4	152.4	100.9	41.8	127.8	215.5	73.7

Table 5.2: Monthly Rainfall data for 2010 to date for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec
Rainfall (mm)	71.5	48.0	80.7	49.0	51.4	37.7	93.6	25.5	108.7	68.9	87.7	52.2

Table 5.3: Monthly Rainfall data for 2011 to date for Oak Park, Carlow

Month	Jan	Feb	Mar
Rainfall (mm)	50.6	121.9	11.3

Note: Data for the most recent months are provisional.

6.2 GROUNDWATER CONCENTRATIONS OVER TIME

Groundwater quality trends have previously been examined in two reports (URS 2005 and RPS 2007). In addition, RPS carried out a groundwater risk assessment (Ref: MDE0788RP0001, dated November 2008) in which the general trend of contaminant concentrations over time was observed to be erratic with compounds rarely being detected in the same borehole on two consecutive monitoring rounds.

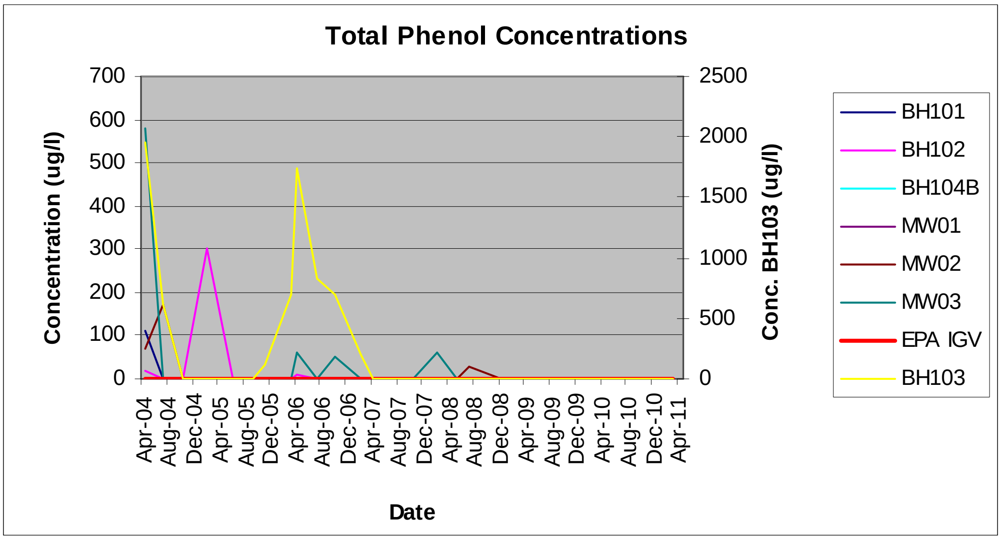
The data available within these reports has been reviewed and time series plots of key parameters have been compiled based on notable trends. Trends for phenols, petroleum hydrocarbons and chlorinated solvents have been plotted as outlined in the following sections.

6.2.1 Phenols

Phenols have been detected historically in all boreholes with the highest concentrations recorded in BH103. However concentrations in BH103 have declined since April 2007. Phenol concentrations have since been recorded below the IGV of 0.5 µg/l in all monitoring wells since December 2008 indicating natural attenuating conditions within the groundwater.

2,4-Dimethylphenol was detected at a concentration of 0.12 µg/l during the Quarter 1, 2010 monitoring event. There is no recommended IGV for this parameter. No detections of this parameter were noted in the subsequent Quarter 2, Quarter 3, Quarter 4 monitoring events of 2010 and the current Quarter 1 monitoring event of 2011.

Figure 6 Phenol Concentrations in all Monitoring Wells



6.2.2 Polycyclic Aromatic Hydrocarbons (PAH's)

Figure 7 below illustrates that PAH's (Polycyclic Aromatic Hydrocarbons) have previously been detected within all monitoring wells above the recommended EPA IGV of 0.1 µg/l. Historically the highest concentrations have been detected within MW03 and BH104B. In addition, a range of PAH's including Benzo(a)pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3)cd pyrene, Fluoranthene and

Napthalene have previously been detected in MW03 with Figures 8 to 11 illustrating some of the PAH compounds which were detected above their respective IGV's.

Figure 7 illustrates that **Total PAH** has been detected in all groundwater monitoring wells at the site above the IGV of 0.1 µg/l since 2005. Elevated concentrations have been detected in MW03 and BH104B, with the highest concentration detected in March 2006 (107 µg/l) and in October 2007 (19.72 µg/l) respectively. Since then, the concentrations have shown a marked decrease with no elevated Total PAH concentrations in this current Quarter 1 monitoring period of 2011.

The results from the Quarter 4, 2009 monitoring round in December 2009 recorded total EPA-16 PAH concentrations above the IGV at all locations with the exception of MW02. These concentrations may be linked to the heavy rainfall event, which occurred in November of 2009 and which may have mobilized traces of these compounds from soil.

The results from the Quarter 1 monitoring round, 2010 recorded Total PAH concentrations below the IGV of 0.2 µg/l at all locations with the exception of MW03, which detected a concentration of 0.3 µg/l. There has been a decrease in Total PAH concentrations at all locations since the Quarter 4 event in December 2009 with the most notable decrease at MW03 reducing from 4.58 µg/l to <0.1 µg/l.

The only concentrations of Total PAH above the IGV in 2010 were detected during the Quarter 1 monitoring event in MW03 (0.3 µg/l), Quarter 2 monitoring event in BH104B (1.2 µg/l) and Quarter 3 monitoring event in MW02 (2.0 µgl) and BH104B (0.2 µgl). There were no elevated concentrations of Total PAH during the Quarter 4 2010 and the current Q1 2011 monitoring event.

Figure 7 PAH (Total) Concentrations in all Monitoring Wells

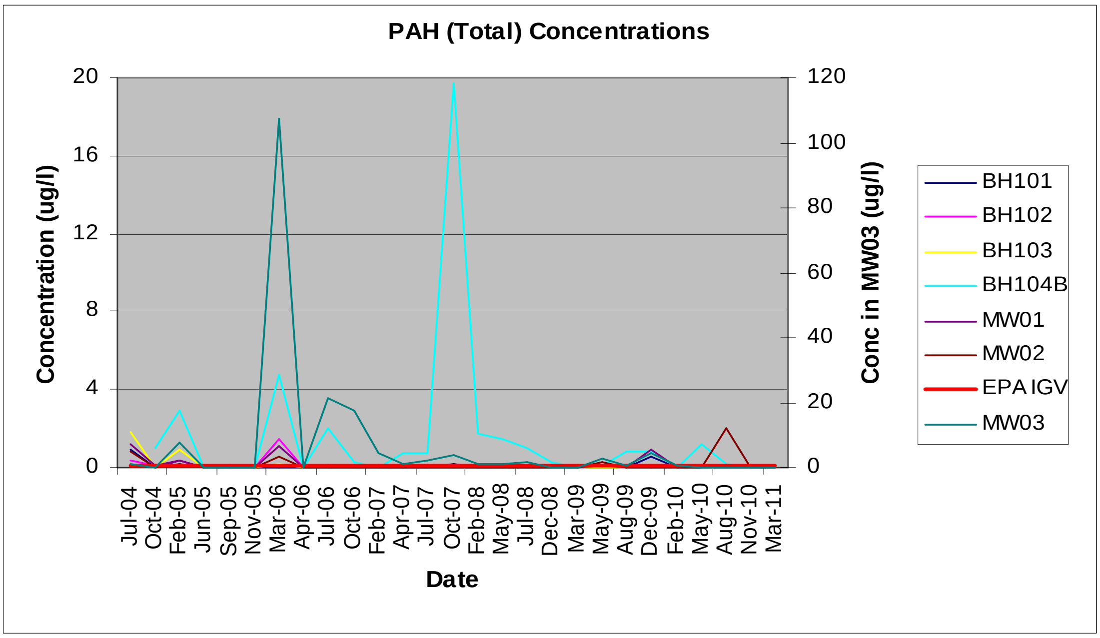


Figure 8 Fluoroanthene Concentrations in all Monitoring Wells

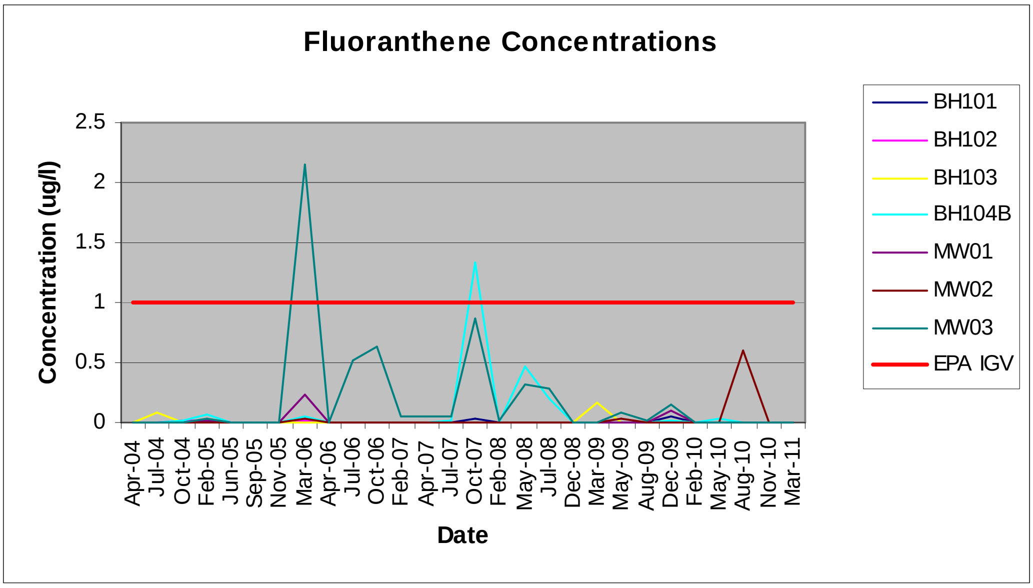
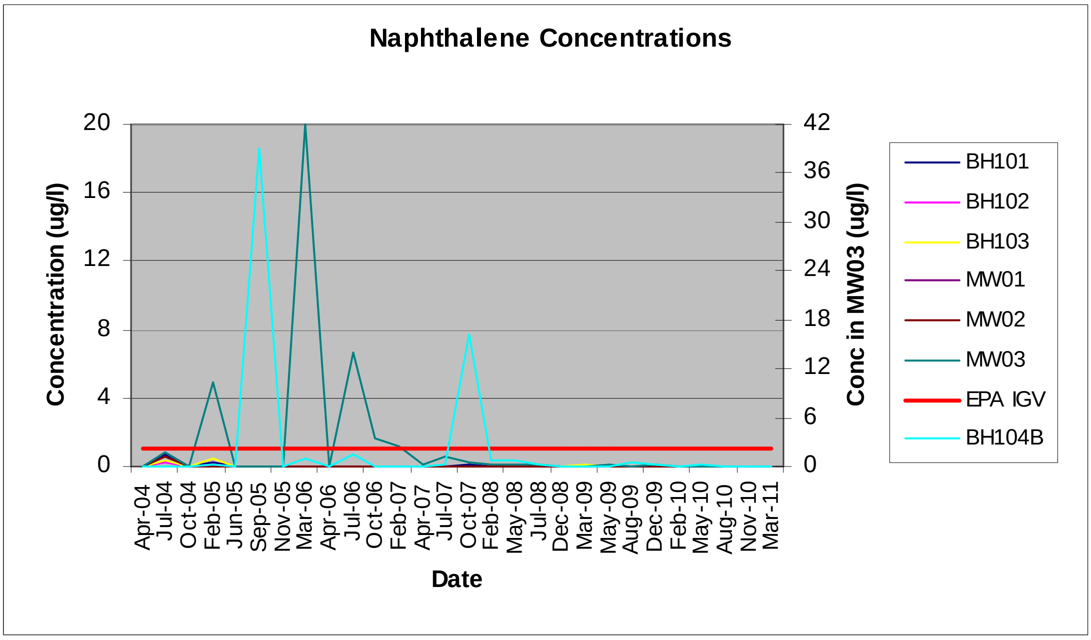


Figure 8 illustrates that **Fluoroanthene** was previously detected above the IGV of 1.0 µg/l in groundwater monitoring wells BH104B (October 2007, 1.33 µg/l) and MW03 (March 2006, 2.158 µg/l) only. The remaining monitoring wells recorded concentrations below the IGV of 1.0 µg/l.

Figure 9 Naphthalene Concentrations in all Monitoring Wells



A similar trend to Fluoroanthene has been noted in Figure 9, with concentrations of **Naphthalene** recorded above the IGV of 1.0 µg/l in BH104B and MW03 only. 4 no. exceedances of the IGV were noted in BH104B in September 2005 (39 µg/l), March 2006 (1.069 µg/l), July 2006 (1.594 µg/l) and October 2007 (16.31 µg/l). Since October 2007, the concentrations in BH104B have decreased below the IGV. There have been 5 exceedances of the IGV of 1.0 µg/l in MW03, with the highest concentration detected in March 2006 (19.986 µg/l). Naphthalene concentrations have been recorded below the IGV of 1.0 µg/l since April 2007. The concentrations detected in August 2010 were slightly above the laboratory limit of detection of 0.01 µg/l at BH104B (0.08 µg/l) and MW03 (0.05 µg/l);

however these levels are deemed low. Concentrations of Naphthalene were below the EPA IGV limit of detection of 1.0 µg/l at all locations during the previous Quarter 4 2010 and the current Quarter 1 2011 monitoring period.

Figure 10 Benzo (g,h,i) perylene in all Monitoring Wells

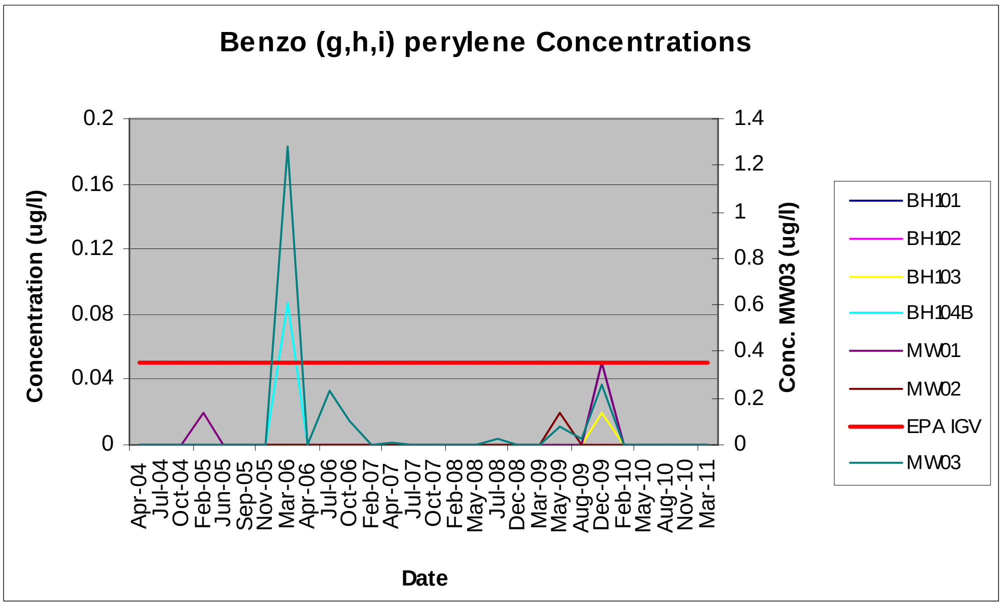


Figure 10 illustrates the concentrations of **Benzo(g,h,i)perylene** in BH104B and MW03 over time. Elevated concentrations above the IGV were recorded at BH104B (0.087 µg/l) on one occasion only in March 2006.

Figure 10a illustrates elevated concentrations above the IGV recorded at MW03 on 5 no. occasions with the most recent elevated concentration detected in December 2009 (0.26 µg/l). The results of monitoring events in May, August, November 2010 and the current Quarter 1, 2011 monitoring event recorded concentrations below the laboratory limit of detection of 0.01 µg/l at all locations.

Figure 10a Benzo (g,h,i) perylene in Monitoring Wells BH104b & MW03

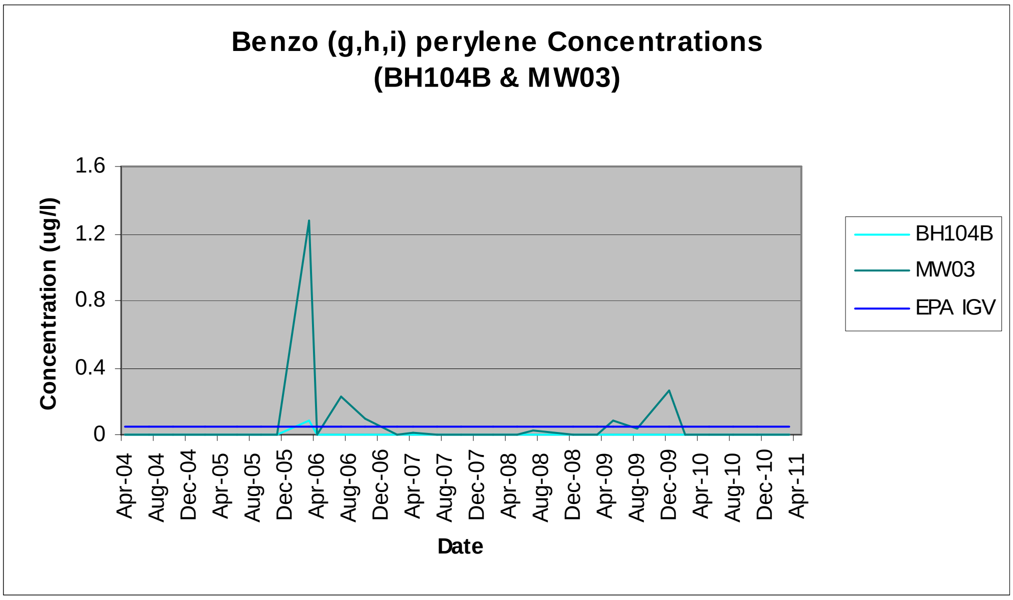
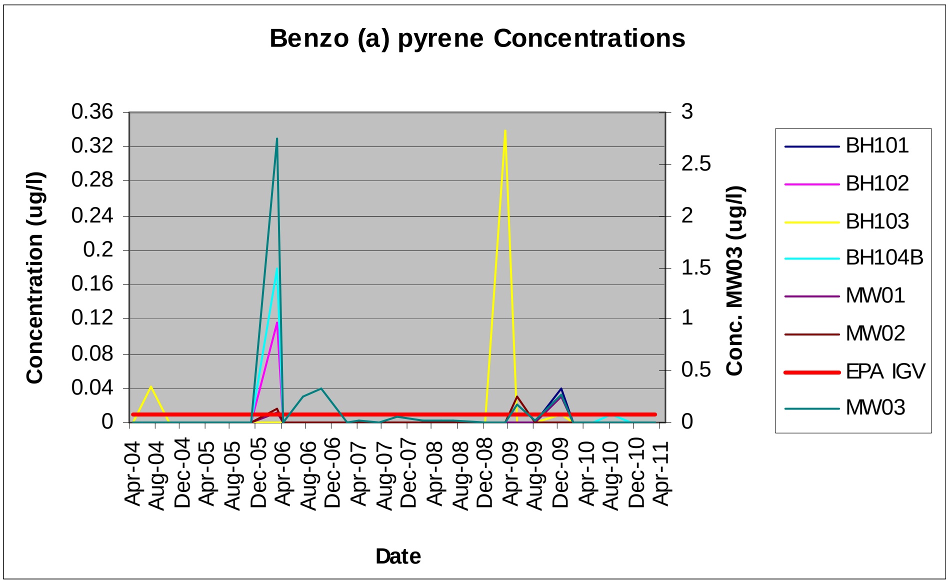


Figure 11 illustrates the concentrations of **Benzo(a)pyrene** in all groundwater monitoring wells and indicates that Benzo(a)pyrene has been detected historically in all boreholes above the IGV of 0.01 µg/l. Similarly with the above mentioned trends, the highest concentrations have been detected in MW03 and BH104B. Concentrations have markedly decreased since March 2006 when an elevated concentration of 2.751 µg/l was detected in MW03, however there have been a number of detections above the IGV, with the most recent elevated level detected in December 2009. Elevated concentrations above the IGV were recorded in BH101, BH103 and MW01 during this same period. The results of all monitoring events in 2010 (February, May, August and November) indicate concentrations below the IGV. The results of the current Quarter 1, 2011 monitoring event also recorded concentrations below the IGV.

The slightly higher concentrations of Benzo(g,h,i)perylene and Benzo(a)pyrene detected in Quarter 4, 2009 may be attributed to heavy rainfall, which occurred in November of 2009 and as a result possibly mobilized traces of these compounds from the soil. The static water levels for December 2009 ranged between 0.58 and 3.78 mbgl. Since December 2009, concentrations of compounds have notably decreased to below the IGV's.

Figure 11 Benzo(a)pyrene in all Monitoring Wells

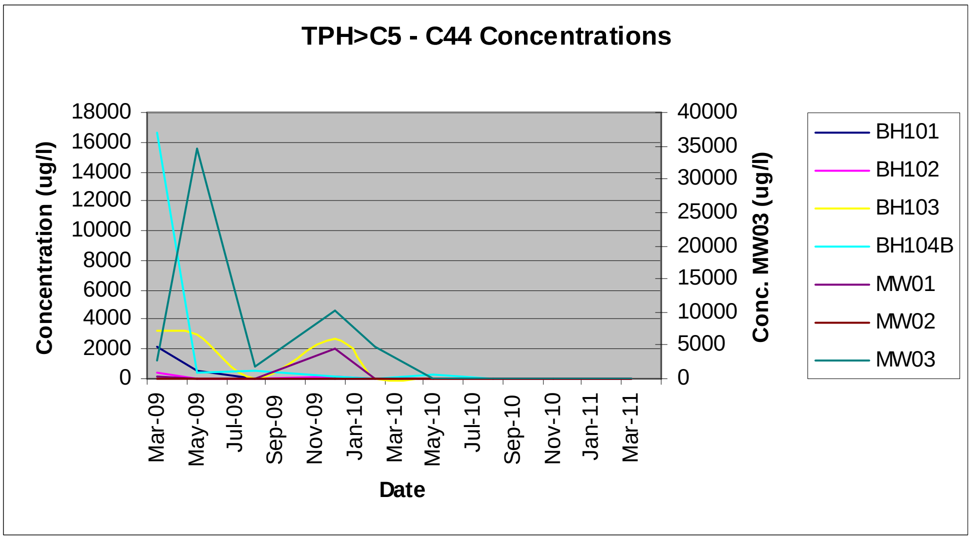


6.2.3 Petroleum Hydrocarbons (TPH)

Historically **Total Petroleum Hydrocarbons (TPH)** including mineral oil, petrol range organics (PRO) and diesel range organics (DRO) have been detected within BH103, BH104B and MW03. Since 2009, speciated hydrocarbon analysis using the Total Hydrocarbon Criteria Working Group (TPHCWG) method has been carried out on all samples to obtain a more accurate profile of TPH within groundwater.

The results of the TPHCWG analysis has indicated that the predominant hydrocarbons detected are in the heavier chain carbon fractions, most notably in the carbon range C16 - C21, C21 - C35 and C35 - C44. Figure 12 illustrates the TPH analysis for the total TPH analysis from C5 - C44 in all monitoring wells since 2009. The highest concentrations detected historically are at monitoring wells MW03, BH104 and BH103 respectively.

Figure 12 TPH (Carbon Range C5-C44) in all Monitoring Wells



During the Quarter 1, 2010 monitoring event, hydrocarbons were detected in borehole MW03. The predominant aliphatic carbon range in MW03 comprised of C16-C21 (1000 µg/l), C21-C35 (2300 µg/l) and C25-C44 (990 µg/l). The predominant aromatic carbon range in MW03 comprised of C16-C21 (220 µg/l) and C21-C35 (620 µg/l). No detections were observed at other locations.

During the Quarter 2, 2010 monitoring event, hydrocarbons were detected in borehole BH104B, with the predominant aliphatic carbon range comprising C12-C16 (130 µg/l) and C16-C21 (130 µg/l), while the predominant aromatic carbon range comprising C12-C16 (21 µg/l) and C16-C21 (47 µg/l). There were no detections of hydrocarbons in MW03 during the Quarter 2 monitoring event.

During the Quarter 3, 2010 monitoring event, hydrocarbons were detected in borehole BH104B and MW03. The predominant aliphatic carbon range in BH104B comprised of C12-C16 (12 µg/l) and C16-C21 (19 µg/l). The predominant aliphatic carbon range in MW03 comprised of C16-C21 (35 µg/l) and C21-C34 (46 µg/l). No aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the previous Quarter 4, 2010 and the current Quarter 1, 2011 monitoring event, there were no detections of TPH concentrations above the laboratory limit of detection of 10 µg/l at any location. No aliphatic or aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

7 CONCLUSIONS

- In accordance with the criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01, groundwater monitoring was carried out at the ENVA Ireland site on the 10th March 2011 corresponding to Quarter 1 of 2011. A Suitably qualified consultant from RPS collected groundwater samples from 7 on-site monitoring wells and submitted these samples to an accredited laboratory for analysis.

- The results presented have been referenced against the Environmental Protection Agency's (EPA) Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.*

- Results of the BTEX and MTBE demonstrate that the levels of Benzene, Toluene, Ethylbenzene, Xylene and MTBE were below the recommended EPA IGV's. The Quarter 1 and Quarter 2, 2010 monitoring events detected a MTBE concentration of 16 µg/l at BH103. However it was below the recommended IGV of 30 µg/l. No detections of MTBE have been recorded since the Quarter 2, 2010 monitoring event.

- The Quarter 1 results of the speciated polycyclic aromatic hydrocarbons indicate that the laboratory limit of detection of 0.2 µg/l for Total PAH's was above the EPA IGV of 0.1 µg/l. There were no detections of speciated PAHs at any location. The general trend of PAH concentrations appear to be reducing over time. Further monitoring at these locations is recommended to determine the persistency of these detections.

- There have been no exceedances of the IGV for SVOC's and VOC's since Quarter 1 2010.

- The results of the phenol analysis by GC-MS detected concentrations below the laboratory limit of detection of 1.0 µg/l at all locations. However, the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols. Samples were subsequently also analysed for phenols to include chlorophenols and the results indicate that there were no detections above the laboratory limit of detection of 0.05 µg/l. A low level of 2,4-Dimethylphenol (0.12 µg/l) was detected in MW03 during the Quarter 1, 2010 monitoring event. There have been no detections of this compound since February 2010.

- Hydrocarbons were detected in boreholes BH104B and MW03 in the aliphatic carbon ranges during the Quarter 3, 2010 monitoring event. There were no detections of aromatic carbon above the laboratory limit of detection of 10 µg/l in BH104B and MW03. During the current Quarter 1, 2011 monitoring event, there were no detections of hydrocarbons at any location. This is consistent with the results of the previous Quarter 4, 2010 monitoring event. Further monitoring at these locations is recommended to determine the persistency of these detections.

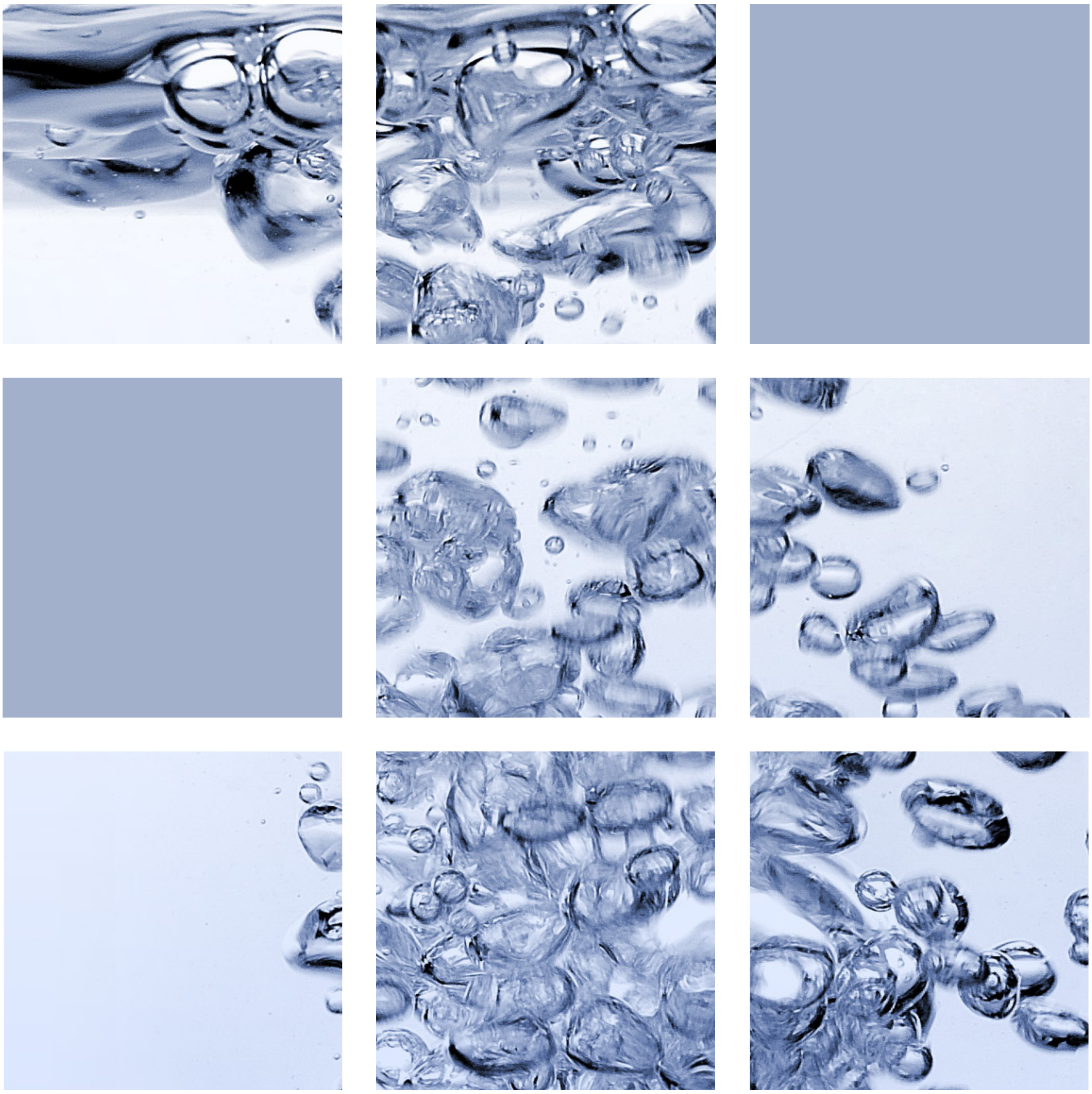
- The general trend of contaminant concentrations over time continues to be somewhat variable with compounds not being continually detected in the same borehole on two consecutive monitoring rounds. In general, the contaminant levels detected at the Enva facility appear to indicate reducing contaminant concentrations over time and further monitoring is recommended to confirm these reductions.

RPS

Enva Portlaoise Groundwater Compliance Monitoring

Quarter 2(April - June 2011) Interpretative Report

June 2011



Enva Portlaoise

2011 Groundwater Compliance Monitoring Quarter 2 (Apr – June 2011)

DOCUMENT CONTROL SHEET

Client	Enva Ireland Ltd.					
Project Title	Enva Portlaoise 2011 Groundwater Compliance Monitoring					
Document Title	Quarter 2 (Apr – June 2011) Interpretative Report					
Document No.	MDE0973Rp0006D01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	36	1	1	1

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D01	Draft	C. Reilly	S. Herlihy	S. Herlihy	West Pier	29/05/11
F01	Final	C. Reilly	S. Herlihy	Shane Herlihy	West Pier	10/10/11

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1 INTRODUCTION

1.1 BACKGROUND

RPS has been commissioned by Enva Ireland Ltd to carry out groundwater quality monitoring for environmental compliance, at their facility in the Clonminam Industrial Estate, Portlaoise, Co Laois. Groundwater monitoring has being carried out in strict accordance with criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01.

Enva Ireland has been operating under Waste Licence Register No. W0184-01 since January 2004, and is required to submit a report to the Environmental Protection Agency (EPA) on a quarterly basis, outlining the existing groundwater quality underlying the site.

Suitably qualified environmental consultants from RPS, collected groundwater samples from a series of 7 monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03) within the site boundaries on the 24th of May 2011. The samples underwent laboratory analysis for the suite of parameters specified in Schedule 4(ii) of Waste Licence W0184-01. This report outlines the results of the Quarter 2 monitoring for 2011 and reviews historical data recorded at the site.

1.2 OBJECTIVES & SCOPE OF WORK

The specific objectives and scope of work are as follows:

- Review of previous data as provided by Enva Portlaoise;
- Graphical presentation of key compounds and trends; and
- Discussion of results for Quarter 2 2011 within the context of previous results and available guideline concentrations.

2 REVIEW OF PREVIOUS DATA

2.1 INFORMATION SOURCES

The following documents were reviewed as part of this project:

- Waste Licence W0184-01 and any available EPA documents from the EPA website
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2004)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2005)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2006)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2007)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2008)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2009)
- Summary Report on Trend of Contaminant Levels at Enva Ireland Ltd since 2005, Ref: MDE0647RP0001, RPS (2007)
- Groundwater Risk Assessment, Ref: MDE0788Rp0001, RPS (2008)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0001F02, RPS (2010)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0002F01, RPS (2010)
- Quarter 3 Groundwater Monitoring Report, Ref: MDE0973Rp0003F01, RPS (2010)
- Quarter 4 Groundwater Monitoring Report, Ref: MDE0973Rp0004F01, RPS (2010)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0005F01, RPS (2011)

2.2 SITE SETTING

The site is located to the southwest of the town of Portlaoise immediately to the south of the Dublin to Cork railway line. The general area is gently undulating. The site slopes gently to the southwest but to the east of the site the ground slopes gently towards the River Triogue, which is located approximately 1 km to the east. The site occupies an area of approximately 1.5 hectares and comprises of an operational waste oil and contaminated soil treatment plant.

The site is located on the outskirts of Portlaoise in an area of agricultural and light industrial development. The site is bounded to the north and east by land belonging to Irish rail, comprising sidings and general storage areas. To the south is a vehicle repair garage, which is elevated above the level of the site by approximately 1.5 m. To the west the site is adjoined by further industrial land, as well as residential land. The site location is presented on **Figure 1**.

The site has been in operation since 1978, and the layout has remained relatively consistent. The site layout is presented on **Figure 2**. The site is largely covered in hardstanding with some open areas in the far north and northwest of the site. All oil and soil storage areas are suitably bunded and the general standard of housekeeping is good.

2.3 REGIONAL SETTING

2.3.1 Geology

The Geological Survey of Ireland indicates that the regional geology of Portlaoise is typified by Carboniferous Limestone. In the vicinity of the site itself the solid geology comprises the Ballysteen Formation, a micaceous-bioclastic limestone. This well-bedded limestone, with interbeds of shale, is extensively folded, with axes trending north-east to south-west, and becomes increasingly muddy towards the top of the formation. North-east to south-west trending faults are found in the region, with one located approximately 500m to the east of the site. The subsoil's in the region comprise mainly Made Ground, around the industrial area, and Limestone Till in the surrounding regions.

2.3.2 Hydrogeology

The limestones are classified by the Geological survey of Ireland (GSI) as a locally important karstified aquifer. Porosity is predominantly in the form of fractures, in this aquifer, however the muddy nature of this formation greatly reduces permeability. Vulnerability of this aquifer beneath the site is classified as high, with moderate vulnerability to the east of the site.

The public water supply for Portlaoise is derived from groundwater, utilising five extraction wells in total. This supply currently comes from the Straboe area, approximately 5.5 km to the north-east of the site. The source protection zone for this water supply extends north-west south-east with the boundary of the outer protection zone at least 4 km to the north-east of the site. A further public abstraction well-field is currently being developed to the north-west of the current area in the townland of Eyne, approximately 6 km to the north of the site, and will comprise a further five abstraction wells. The Source Protection Zone for these wells has not yet been defined but it is not anticipated to affect the Enva site.

The GSI record a number of other dug wells and boreholes within the Portlaoise area, including the boreholes installed on the site. The accuracy of the locations of these wells varies. One well, which was drilled in 1899 is recorded as being located immediately to the south of the Enva site. The use of this well is not known and its location is only accurate to 1 km. A second borehole, drilled in 1973 is recorded 1.5 km to the north of the site at Clonroosk, the accuracy of this location is also 1 km so that it could be closer or further from the site. The use of this well is not known but its yield is recorded as being poor. There are no other wells recorded within 1 km of the site.

Enva is not aware of any abstraction boreholes within the immediate vicinity of their site.

2.4 SITE GROUND CONDITIONS

A total of eight boreholes have been drilled at the site and the general sequence of ground conditions is presented in **Table 2**.

Table 2.1: Ground Conditions

Strata	Extent	Thickness	Description
Made Ground	BH104	0-3.5 m	Predominantly concrete, with hardcore fill, and clay.
Boulder Clay	All boreholes	<8.5 m	Includes fine to medium, well rounded gravels.
Sand and Gravel	Confined to	0-2 m	In general the transition from boulder clay to

Strata	Extent	Thickness	Description
	south east corner of site (BH101, BH104 and MW03)		sand is gradual with changes from gravel, to sandy gravel, to sand.
Limestone Bedrock	Encountered in MW01, MW02 and MW03	Top of limestone ranges from 7.7m to 9m below ground level.	Pale grey, fine-grained bedrock, differentiated from boulders by its un-weathered nature.

The logs for each of the boreholes were previously presented as Appendix B in the RPS Groundwater Risk Assessment Report (Ref: MDE0788Rp0001).

Figure 1 Site Location

2.4.1 Licence Conditions

The waste management licence requires the regular monitoring and sampling of boreholes BH101, BH102, BH103, BH104B, MW01, MW02 and MW03. The parameters requiring measurement or analysis are presented in Table 2.2.

Table 2.2: Licence Parameters

Group	Parameters requiring Quarterly Measurement	Parameters requiring Annual Measurement
Field Parameters	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection
Organics	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's
Inorganics	-	Total Alkalinity, Calcium, Manganese, Sulphate, Cyanide (Total), Chloride, Sodium,

3 METHODOLOGY

Groundwater samples were collected from 7 no. on-site groundwater-monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03), (See Figure 2) using dedicated Waterra tubing, in accordance with RPS's standard sampling protocol. A non-return foot valve was fixed to the bottom of the tubing and inserted into the well, close to the base of the borehole. Separate tubing and foot valves were used at each monitoring well to eliminate the possibility of cross contamination.

Groundwater in the well casing is not considered representative of the groundwater quality at a given location. For this reason, three well volumes were purged from each well prior to collection of the groundwater sample. By the time purging was complete all field test water parameters (namely pH, Temperature, Electrical Conductivity and Dissolved Oxygen) were within 10% variance in three consecutive measurements. This ensured that the groundwater sample extracted from the monitoring borehole was representative of the water held in the subsurface strata and not water held stagnant in the borehole casing. The purged volumes were calculated on-site from the measured static water levels and total well depths using an electronic dip meter.

Groundwater samples were collected in laboratory supplied containers and stored in chilled cool boxes following sampling and during transit to the laboratory. A rigorous chain of custody procedure was used during the sample round.

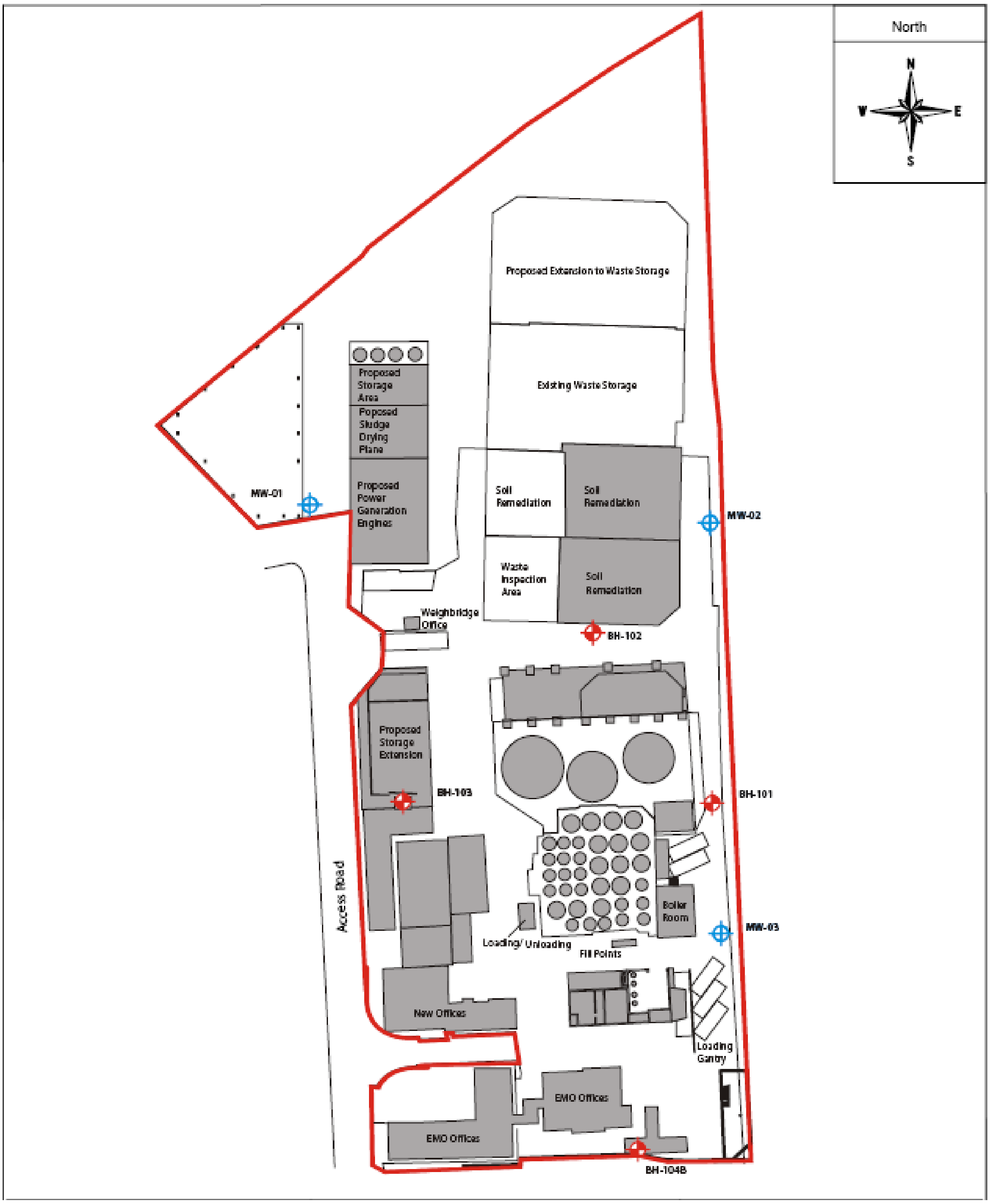
3.1 LABORATORY ANALYSIS

All groundwater samples were analysed at a UKAS accredited laboratory, I2 Analytical Ltd for the suite of analyses listed in Table 3.1. Table 3.1 also indicates the analytical techniques used by the laboratory.

Table 3.1: Analytical Methodologies – I2 Analytical Ltd

Parameter	Analytical Methodology
Phenols	GC-MS
Speciated PAHs	GC-MS
BTEX & MTBE	Headspace GC-MS
Petroleum Hydrocarbons	Headspace GC-MS
Volatile Organic compounds & Tentatively Identified Organic Compounds (VOCs & TICs)	Headspace GC-MS
Semi-Volatile Organic compounds & Tentatively Identified Organic Compounds (SVOCs & TICs)	GC-MS

Figure 2 Site Layout Plan with groundwater monitoring well locations



Shallow Monitoring Well locations

Deep Monitoring Well locations

Source: *URS Environmental Consultants (Ref: 45078497 Issue No. 1)*

3.2 PRESENTATION & INTERPRETATION OF RESULTS

The Quarter 2 2011 results are tabulated in Section 4 and discussed with respect to previous results. The results have been compared to the EPA Interim Guideline Values (IGV) as set out in the Report 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004. It is important to note that the IGVs are based on the lowest acceptable value for either drinking water or environmental quality in surface water and is therefore conservative in nature.

Previous monitoring reports (as listed in Section 2.1) provide details of contaminant concentrations since 2004. The data available within these reports has been reviewed and time series plots of key parameters have been compiled. Trends for chlorinated solvents, petroleum hydrocarbons and phenol parameters have been plotted.

Time series plots are presented in Section 6 and include the results of this Quarter 2 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds used to illustrate the results.

Time series plots are also provided for manual water levels where available from previous reports.

4 QUARTER 2 RESULTS MAY 2011

The results of all field measurements and laboratory analysis are presented in this section.

The results are discussed in relation to appropriate guideline values in Section 5. Results that are shown to be above the relevant guideline values are highlighted in bold and shaded. Results that are shown to be above the relevant laboratory detection limits are highlighted in italics.

Site-specific field parameter measurements were collected during the site visit as per RPS Water sampling protocol.

Table 4.1: Groundwater Levels (Quarter 2, 2011)

Monitoring Well	BH101	BH102	BH103	BH104B	MW01	MW02	MW03
Depth (mbgl)	6.82	6.53	4.56	4.84	22.94	30.0	15.05
Static Water Level (mbgl)	4.37	3.45	1.83	1.04	3.49	4.75	4.30
Ground Level (mAOD)	103.06	102.55	101.16	101.52	102.1	103.12	102.77
Water Level (mAOD)	98.69	99.10	99.33	100.48	98.61	98.37	98.47
Free Phase Oil (mm)	No detection	No detection	No detection	No detection	No detection	No detection	No detection

mbgl = metres below ground level

Table 4.2: Results of Field Parameters Measured at each Groundwater Monitoring Well (Quarter 2, 2011)

Monitoring Well	pH (pH Units)	Temperature (°C)	Conductivity (µS/cm)	Dissolved O_2 (ppm)	Observations
BH101	7.50	13.7	**1284**	-	Purged water brown/grey in colour on purging, clearer after 10L. Sandy sediment noted, no odour detected.
BH102	6.68	11.6	**1256**	-	Purged water yellow/brownish in colour, H_2S odour detected, some fine floating sediment noted.
BH103	6.69	10.4	882	-	Purged water dirty in colour with sandy sediment noted, no odour detected.
BH104B	6.95	11.3	727	-	Purged water grey in colour on purging. After 10L clearer with greenish tint. H_2S odour detected with sandy sediment noted.
MW01	7.43	10.7	653	-	Purged water brown/grey in colour, slight H_2S odour detected, sandy sediment noted.
MW02	7.68	11.0	659	-	Purged water clear in colour, some fine floating sediment, no odour detected. Samples as above.
MW03	7.38	12.1	**1040**	-	Purged water dirty in colour with oily residue noted at the surface. After 50L, observations remained the same, with traces of black oily residue noted.
Interim EPA Guideline Values (Units as indicated)	**>6.5 & <9.5**	**25°C**	**1000**	**No abnormal change**	**-**

Note: Results above the relevant IGV are highlighted in bold and shaded.

Table 4.3: Results of BTEX & MTBE

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 Note 1
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 Note 1
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30

Note 1: No specific IGV for parameter. IGV for Total Xylenes is used as guideline.

Table 4.4: Results of Speciated PAH's

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	< 0.01	1.0
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Total EPA-16 PAH's	µg/l	0.2	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	0.1

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.5: Results of Total Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Total Phenols (monohydric)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	0.5
Total Phenols (GC-MS)	µg/l	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.5

Table 4.6: Results of Speciated Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.7: Results of Semi-Volatile Organic Compounds (sVOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
Bis(2-chloroethyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
1,4-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachloroethane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Nitrobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Isophorone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroethoxy)methane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
4-Chloroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachlorobutadiene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylnaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chloronaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dimethylphthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,6-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
2,4-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibenzofuran	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chlorophenyl phenyl ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Diethyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Nitroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Azobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bromophenyl phenyl ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachlorobenzene	µg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Carbazole	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibutyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.0
Anthraquinone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Butyl benzyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05

Note: Results above the relevant laboratory limit of detection in italics.

Table 4.8: Results of Volatile Organic Compounds (VOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Chloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Vinyl Chloride	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichlorofluoromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2,2-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12
1,1,1-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	500
1,2-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-Dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Tetrachloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0
1,2-dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Trichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70
Dibromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromodichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,1,2-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Dibromochloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tetrachloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40
1,2-Dibromoethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
1,1,1,2-Tetrachloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Styrene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tribromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Isopropylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
N-Propylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
4-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3,5-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tert-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Sec-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
P-Isopropyltoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,4-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-Dibromo-3-chloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40
Hexachlorobutadiene	µg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10
1,2,3-Trichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.9: Results of Total Petroleum Hydrocarbons (Aliphatic/Aromatic)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aliphatic > C5-C6	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C6-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	***13***	-
Aliphatic > C16-C21	µg/l	10	<10	<10	***340***	***20***	<10	<10	***46***	-
Aliphatic >C21-C35	µg/l	10	<10	<10	***420***	***96***	<10	<10	***150***	-
Aliphatic (C5-C35)	µg/l	10	<10	<10	**760**	**120**	<10	<10	**210**	10
Aromatic > C5-C7	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C7-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C12-C16	µg/l	10	<10	<10	<10	***34***	<10	<10	***39***	-
Aromatic > C16-C21	µg/l	10	<10	<10	***78***	***52***	<10	<10	***50***	-
Aromatic > C21-C35	µg/l	10	<10	<10	***110***	***49***	<10	<10	***93***	-
Aromatic (C5-C35)	µg/l	10	<10	<10	**180**	**140**	<10	<10	**180**	10

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are highlighted in bold italics.

5 DISCUSSION OF QUARTER 2 RESULTS

The results of the Quarter 2 monitoring event for 2011 are presented in Table 4.1 to 4.9 of this report. For the purpose of this report, the results are compared to the EPA Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.* A discussion of the results and their significance is included below.

5.1 FIELD PARAMETERS

The results of the field parameters measured at each groundwater monitoring well are presented in Table 4.1. Groundwater samples recorded pH levels ranging between 6.68 and 7.68. All pH measurements were within the EPA Interim guideline range of ≥6.5 to ≤9.5. Temperature measurements ranged from 10.4 to 13.7°C and were within the EPA IGV of 25°C.

Field measurements of Electrical conductivity levels ranged between 653 µS/cm and 1284 µS/cm and were below the Interim Guideline Value of 1000 µS/cm at all locations with the exception of BH101 (1284 µS/cm), BH102 (1256 µS/cm) and MW03 (1040 µS/cm).

The dissolved oxygen probe was unable to be calibrated which resulted in a lack of field measurements for dissolved oxygen.

Observations relating to colour and odour varied from well to well as detailed in Table 4.2.

5.2 RESULTS OF BTEX & MTBE

The results of the **BTEX** and **MTBE** analysis are presented in Table 4.3 and demonstrate concentrations below the laboratory limit of detections and associated IGV's at all locations.

Previous monitoring events detected MTBE above the laboratory limit of detection at a concentration of 16 µg/l during Quarter 1 and Quarter 2 of 2010 at BH103. During Quarter 3 and Quarter 4 of 2010 concentrations were below the laboratory limit of detection. Prior to these 2010 monitoring events, concentrations of MTBE at BH103 were recorded at 6.3 µg/l in December 2009. However, no exceedances of the IGV were recorded at any stage.

All concentrations of BTEX and MTBE were recorded below the laboratory limit of detection during the current Quarter 2 monitoring event.

5.3 RESULTS OF SPECIATED PAH'S

The results of the Speciated PAH analysis during this monitoring period are presented in Table 4.4.

The laboratory limit of detection for Total EPA-16 PAH's is 0.2 µg/l. This laboratory limit of detection is above the EPA IGV of 0.1 µg/l. To identify the compounds, which attributed to these concentrations, speciated PAH analysis was carried out, which reduces the limit of detection for individual parameters to 0.01 µg/l.

The results of the speciated polycyclic aromatic hydrocarbon analysis detected no parameters above the laboratory limits of detection and all other parameters were below the EPA IGV's. The laboratory is accredited to achieve a detection limit of 0.2 µg/l for EPA-16 PAH's. The laboratory has confirmed that the detection limit for total EPA-16 PAH's can be lowered to 0.1 µg/l for comparison with the EPA IGV of 0.1 µg/l, however this will not be accredited.

5.4 RESULTS OF SPECIATED PHENOLS

The results of Total Phenol analysis are presented in Table 4.5. All samples detected concentrations of monohydric phenol below the laboratory limit of detection of 10 µg/l. It should be noted that the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols.

For this reason, samples were analysed for phenols to include chlorophenols. The results of the speciated phenols analysis are presented in Table 4.6. The speciated phenol analysis reduces the laboratory limit of detection to 0.05 µg/l for individual parameters.

The results of the current Quarter 2 2011 speciated phenol analysis confirm concentrations of phenols were below the laboratory limit of detection of 0.05 µg/l at all locations. This is consistent with the results from the previous Quarter 1 and 2010 monitoring events.

5.5 RESULTS OF SEMI-VOLATILE ORGANIC COMPOUNDS

The results of the Semi-Volatile Organic Compound analysis are presented in Table 4.7.

No SVOC's were detected during this monitoring period above the relevant IGV's.

5.6 RESULTS OF VOLATILE ORGANIC COMPOUNDS

The results of the Volatile Organic Compound analysis are presented in Table 4.8. The results of the current Quarter 2 2011 monitoring event indicate that there were no exceedances of VOC parameters detected above the relevant IGV's.

In November 2009, corresponding to Quarter 4 of 2009, no VOC's were detected above the relevant IGV's. However some parameters were detected above the laboratory limits of detection (1,1-Dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, MTBE, n-butylbenzene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene and tert-butylbenzene).

The Quarter 1 and Quarter 2 monitoring results of 2010 detected MTBE in BH103 raised above the laboratory limit of detection of 1.0 µg/l at a concentration of 16 µg/l.

The results of the Quarter 3 and Quarter 4 monitoring events of 2010 indicate that there were no exceedances of the IGV for specific parameters.

5.7 RESULTS OF TOTAL PETROLEUM HYDROCARBONS

In order to provide a more accurate profile of TPH within the groundwater, speciated hydrocarbon analysis using the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) method was carried out on samples taken at all boreholes. The results of the TPH analysis are presented in Table 4.9.

No detections were observed in the monitoring well locations during the current monitoring event with the exception of BH103, BH104B and MW03. The EPA IGV of 10 µg/l for Total hydrocarbons is deemed comparable with the results for total petroleum hydrocarbons (TPH). The results are consistent with the results of the Q3 monitoring event of 2010, in which hydrocarbons were detected in BH104B and MW03.

Hydrocarbons have been detected in borehole MW03 during Quarter 1 2010, in borehole BH104B during the Quarter 2 2010 monitoring event and in borehole BH104B and MW03 during the Quarter 3 2010 monitoring events. These detections are discussed in Section 6.2.3.

6 HISTORICAL RESULTS & TRENDS

Time series plots are presented in this section and include the results of the Quarter 2 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds and used to illustrate the results.

6.1 GROUNDWATER LEVELS OVER TIME

Figure 3 to Figure 5 below illustrates the manually recorded water levels using an electronic probe. The graphs show that groundwater levels can vary considerably between monitoring rounds.

Figure 4 illustrates groundwater elevations (mAOD) in shallow groundwater wells (BH101 to BH104B) ranging between approximately 99 mAOD and 100 mAOD.

Figure 5 illustrates groundwater elevation (mAOD) in the deeper groundwater wells (MW01 to MW03). The groundwater elevation (mAOD) for these deeper groundwater wells ranges from approximately 98 mAOD to approximately 99 mAOD.

Figure 3 Groundwater Elevation (mAOD) in all Monitoring Wells

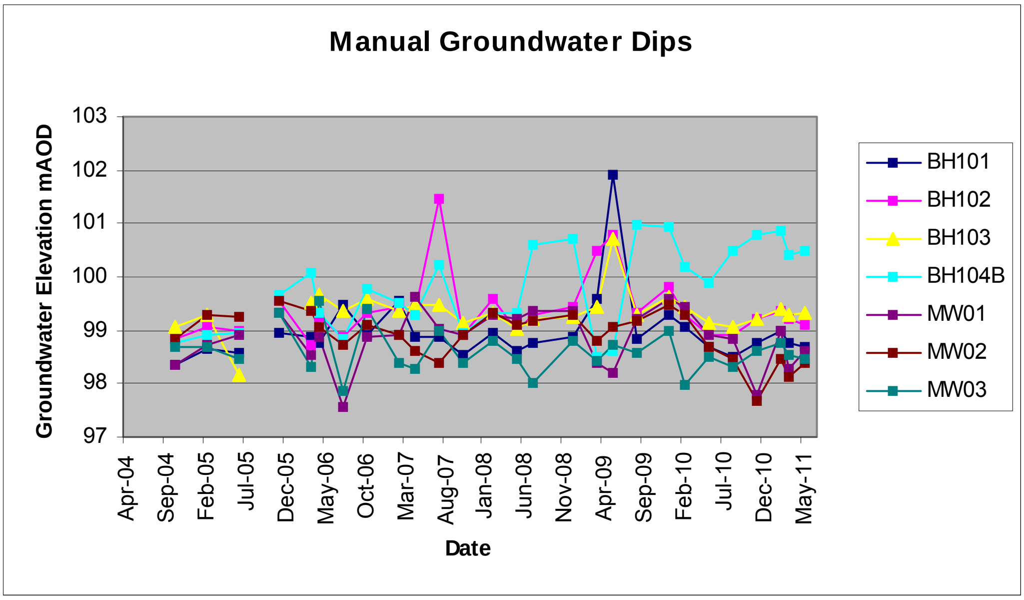


Figure 4 Groundwater Elevation (mAOD) in Shallow Monitoring Wells

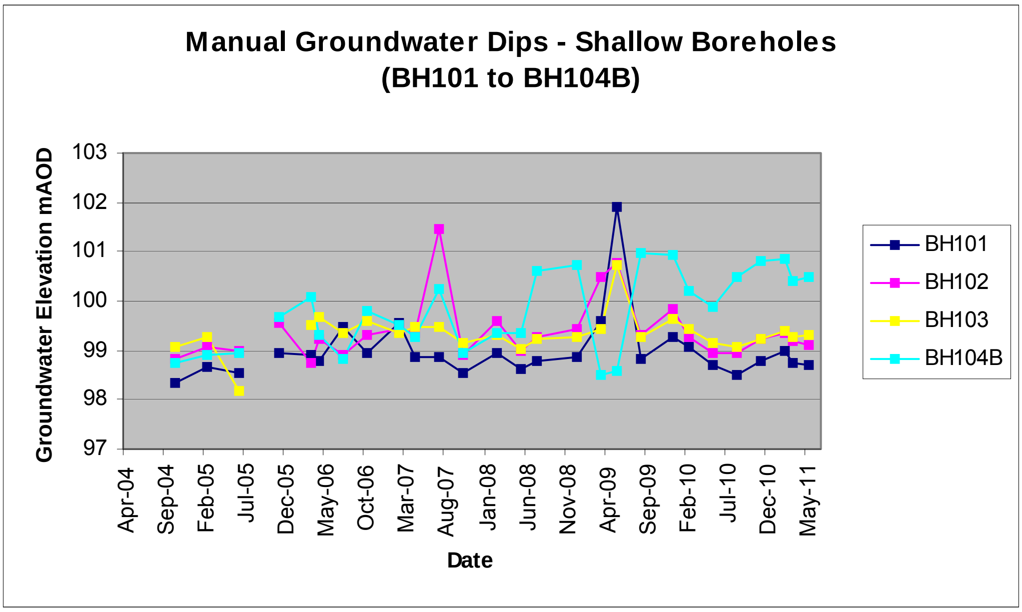
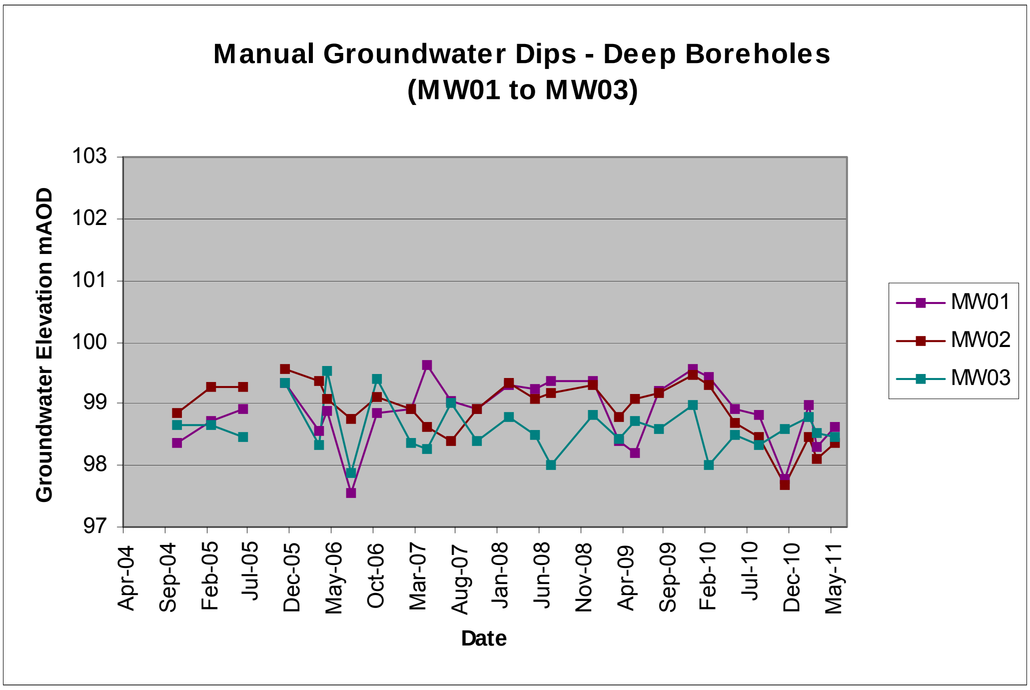


Figure 5 Groundwater Elevation (mAOD) in Deep Monitoring Wells



The groundwater levels generally show a similar pattern of fluctuation over time indicating a degree of connection between boreholes. The graphs demonstrate that groundwater levels can vary considerably between monitoring rounds; however, the general direction of flow in the shallow and deeper groundwater bearing unit is predominantly in a south easterly direction and occasionally in a southerly direction.

In addition, monthly rainfall data for Oak Park, Carlow have been tabulated from Met Eireann to examine the relationship between compounds and rainfall events. The data from Oak Park was chosen as the weather station at Birr, Co. Offaly closed in October 2009. A summary of the rainfall data is in Tables 5.1, 5.2 and 5.3.

Table 5.1: Monthly Rainfall data for Year 2009 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	113.4	29.2	32.6	102.4	69.0	65.4	152.4	100.9	41.8	127.8	215.5	73.7

Table 5.2: Monthly Rainfall data for 2010 to date for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec
Rainfall (mm)	71.5	48.0	80.7	49.0	51.4	37.7	93.6	25.5	108.7	68.9	87.7	52.2

Table 5.3: Monthly Rainfall data for 2011 to date for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May
Rainfall (mm)	50.6	121.9	16.0	19.5	51.2

Note: Data for the most recent months are provisional.

6.2 GROUNDWATER CONCENTRATIONS OVER TIME

Groundwater quality trends have previously been examined in two reports (URS 2005 and RPS 2007). In addition, RPS carried out a groundwater risk assessment (Ref: MDE0788RP0001, dated November 2008) in which the general trend of contaminant concentrations over time was observed to be erratic with compounds rarely being detected in the same borehole on two consecutive monitoring rounds.

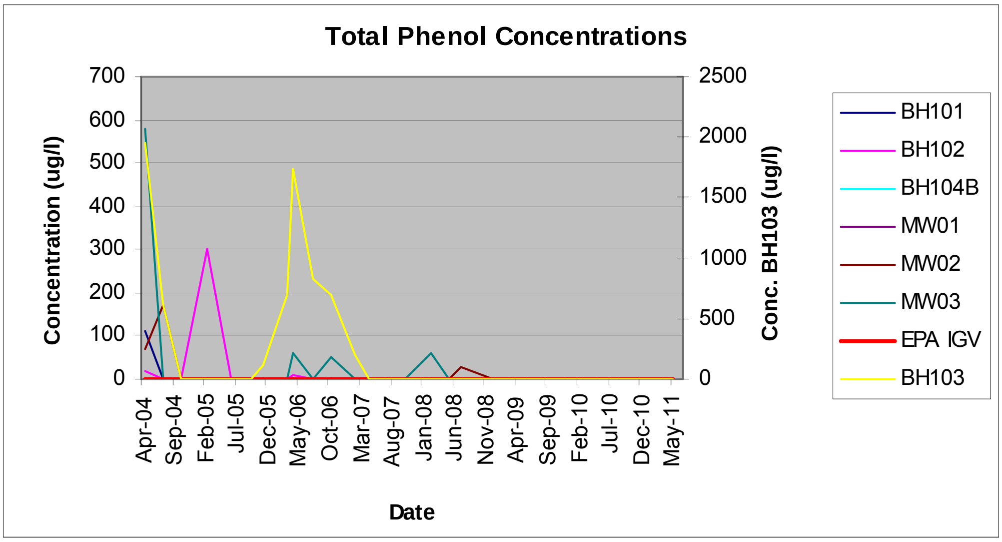
The data available within these reports has been reviewed and time series plots of key parameters have been compiled based on notable trends. Trends for phenols, petroleum hydrocarbons and chlorinated solvents have been plotted as outlined in the following sections.

6.2.1 Phenols

Phenols have been detected historically in all boreholes with the highest concentrations recorded in BH103. However concentrations in BH103 have declined since April 2007. Phenol concentrations have since been recorded below the IGV of 0.5 μg/l in all monitoring wells since December 2008 indicating natural attenuating conditions within the groundwater.

2,4-Dimethylphenol was detected at a concentration of 0.12 μg/l during the Quarter 1, 2010 monitoring event. There is no recommended IGV for this parameter. No detections of this parameter were noted in the subsequent Quarter 2, Quarter 3, Quarter 4 monitoring events of 2010, the Quarter 1 monitoring event of 2011 and the current Quarter 2 monitoring event.

Figure 6 Phenol Concentrations in all Monitoring Wells



6.2.2 Polycyclic Aromatic Hydrocarbons (PAH's)

Figure 7 below illustrates that PAH's (Polycyclic Aromatic Hydrocarbons) have previously been detected within all monitoring wells above the recommended EPA IGV of 0.1 µg/l. Historically the highest concentrations have been detected within MW03 and BH104B. In addition, a range of PAH's including Benzo(a)pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3)cd pyrene, Fluoranthene and Napthalene have previously been detected in MW03 with Figures 8 to 11 illustrating some of the PAH compounds which were detected above their respective IGV's.

Figure 7 illustrates that **Total PAH** has been detected in all groundwater monitoring wells at the site above the IGV of 0.1 µg/l since 2005. Elevated concentrations have been detected in MW03 and BH104B, with the highest concentration detected in March 2006 (107 µg/l) and in October 2007 (19.72 µg/l) respectively. Since then, the concentrations have shown a marked decrease with no elevated Total PAH concentrations in this current Quarter 2 monitoring period of 2011.

The results from the Quarter 4, 2009 monitoring round in December 2009 recorded total EPA-16 PAH concentrations above the IGV at all locations with the exception of MW02. These concentrations may be linked to the heavy rainfall event, which occurred in November of 2009 and which may have mobilized traces of these compounds from soil.

The results from the Quarter 1 monitoring round, 2010 recorded Total PAH concentrations below the IGV of 0.2 µg/l at all locations with the exception of MW03, which detected a concentration of 0.3 µg/l. There has been a decrease in Total PAH concentrations at all locations since the Quarter 4 event in December 2009 with the most notable decrease at MW03 reducing from 4.58 µg/l to <0.1 µg/l.

The only concentrations of Total PAH above the IGV in 2010 were detected during the Quarter 1 monitoring event in MW03 (0.3 µg/l), Quarter 2 monitoring event in BH104B (1.2 µg/l) and Quarter 3 monitoring event in MW02 (2.0 µgl) and BH104B (0.2 µgl). There were no elevated concentrations of Total PAH during the Quarter 4 2010, the previous Q1 2011 monitoring event and the current Q2 monitoring event.

Figure 7 PAH (Total) Concentrations in all Monitoring Wells

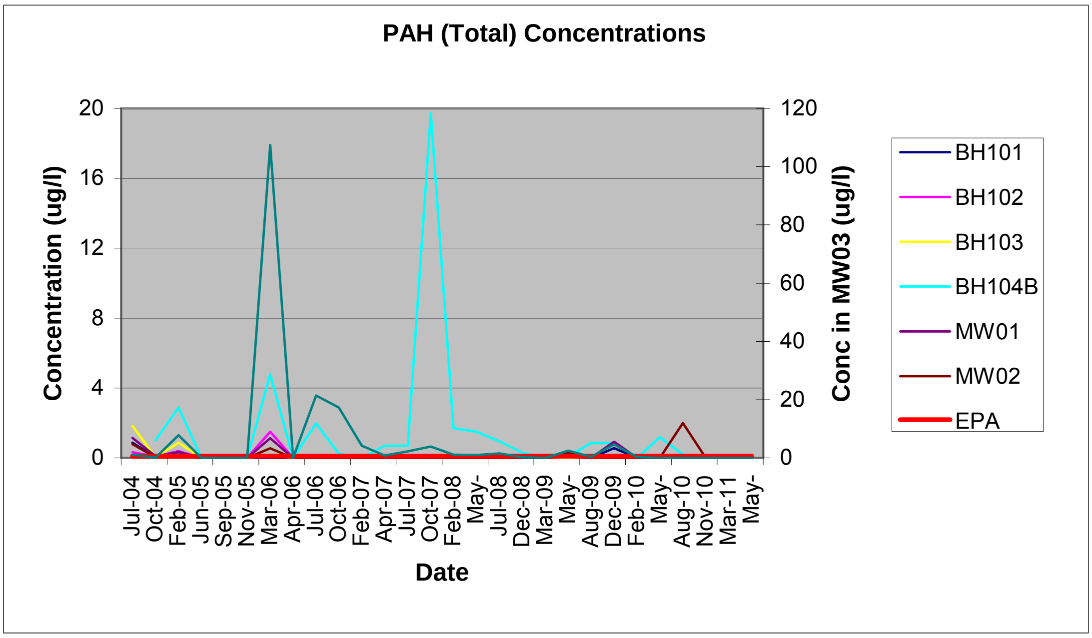


Figure 8 Fluoroanthene Concentrations in all Monitoring Wells

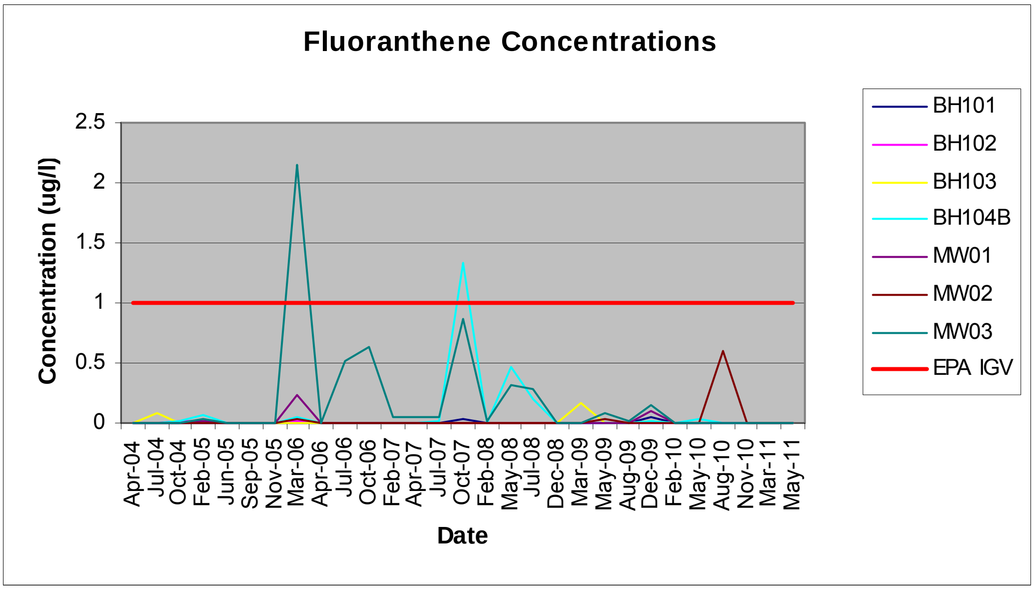
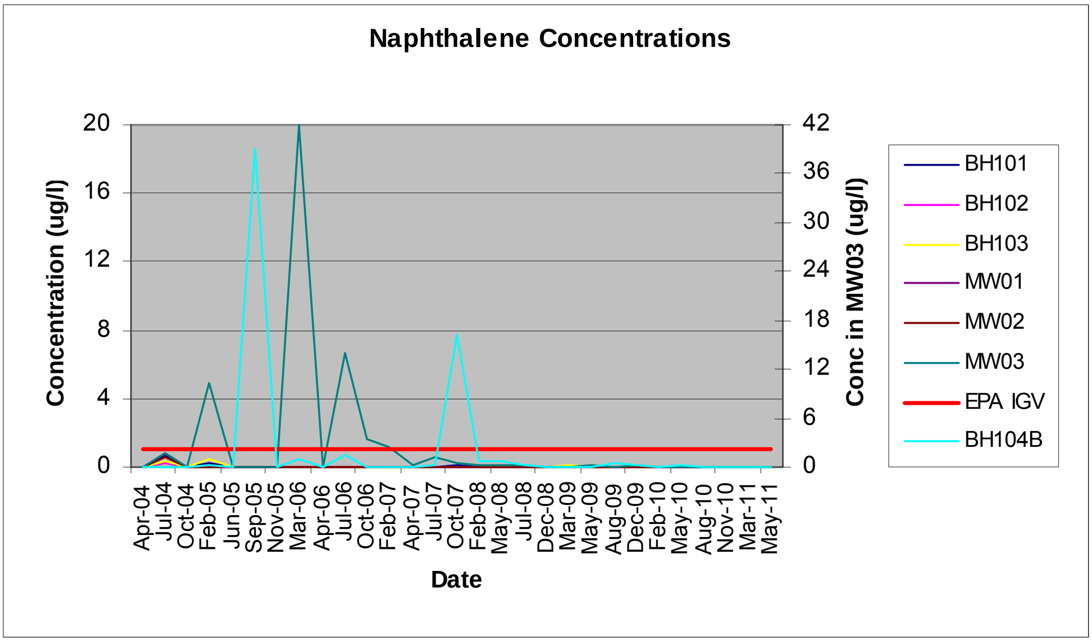


Figure 8 illustrates that **Fluoroanthene** was previously detected above the IGV of 1.0 µg/l in groundwater monitoring wells BH104B (October 2007, 1.33 µg/l) and MW03 (March 2006, 2.158 µg/l) only. The remaining monitoring wells recorded concentrations below the IGV of 1.0 µg/l.

Figure 9 Naphthalene Concentrations in all Monitoring Wells



A similar trend to Fluoroanthene has been noted in Figure 9, with concentrations of **Naphthalene** recorded above the IGV of 1.0 µg/l in BH104B and MW03 only. 4 no. exceedances of the IGV were noted in BH104B in September 2005 (39 µg/l), March 2006 (1.069 µg/l), July 2006 (1.594 µg/l) and October 2007 (16.31 µg/l). Since October 2007, the concentrations in BH104B have decreased below the IGV. There have been 5 exceedances of the IGV of 1.0 µg/l in MW03, with the highest concentration detected in March 2006 (19.986 µg/l). Naphthalene concentrations have been recorded below the IGV of 1.0 µg/l since April 2007. The concentrations detected in August 2010 were slightly above the laboratory limit of detection of 0.01 µg/l at BH104B (0.08 µg/l) and MW03 (0.05 µg/l); however these levels are deemed low. Concentrations of Naphthalene were below the EPA IGV limit of detection of 1.0 µg/l at all locations during the Quarter 4 2010, the previous Quarter 1 2011 monitoring period and the current Quarter 2 monitoring period.

Figure 10 Benzo (g,h,i) perylene in all Monitoring Wells

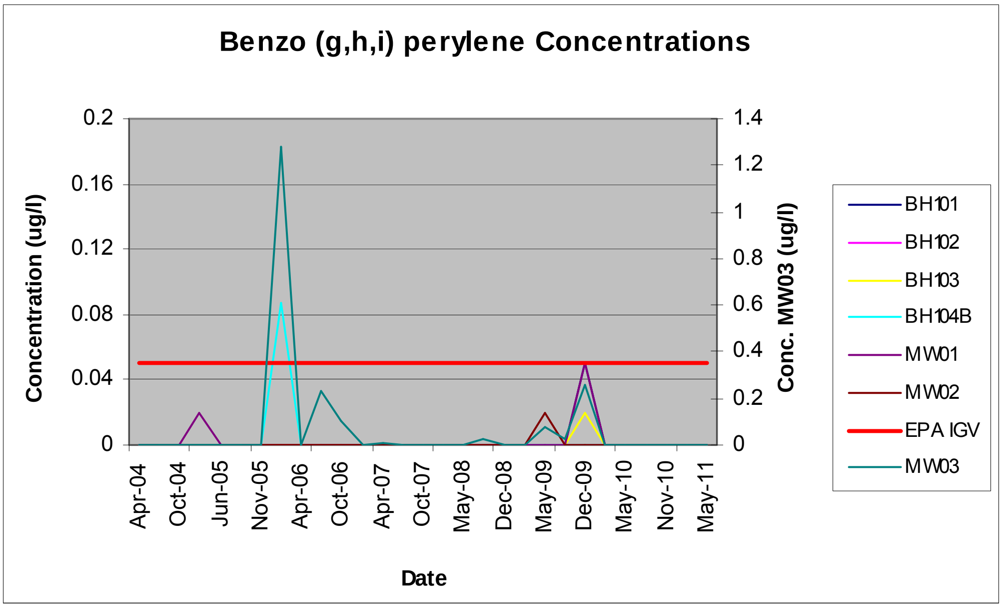


Figure 10 illustrates the concentrations of **Benzo(g,h,i)perylene** in BH104B and MW03 over time. Elevated concentrations above the IGV were recorded at BH104B (0.087 µg/l) on one occasion only in March 2006.

Figure 10a illustrates elevated concentrations above the IGV recorded at MW03 on 5 no. occasions with the most recent elevated concentration detected in December 2009 (0.26 µg/l). The results of monitoring events in May, August, November 2010, March 2011 and the current Quarter 2, 2011 monitoring event recorded concentrations below the laboratory limit of detection of 0.01 µg/l at all locations.

Figure 10a Benzo (g,h,i) perylene in Monitoring Wells BH104B & MW03

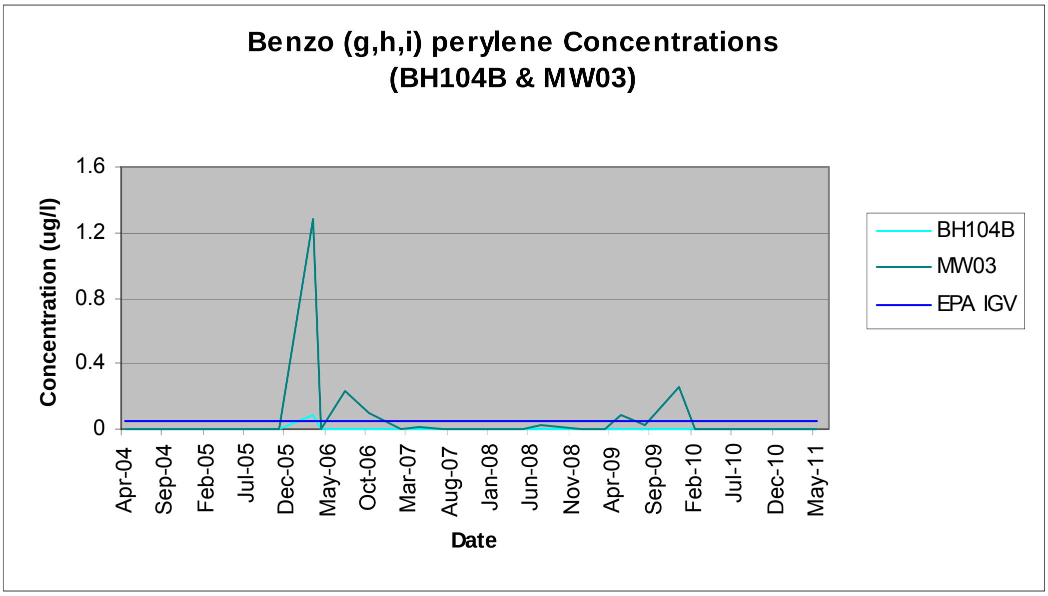
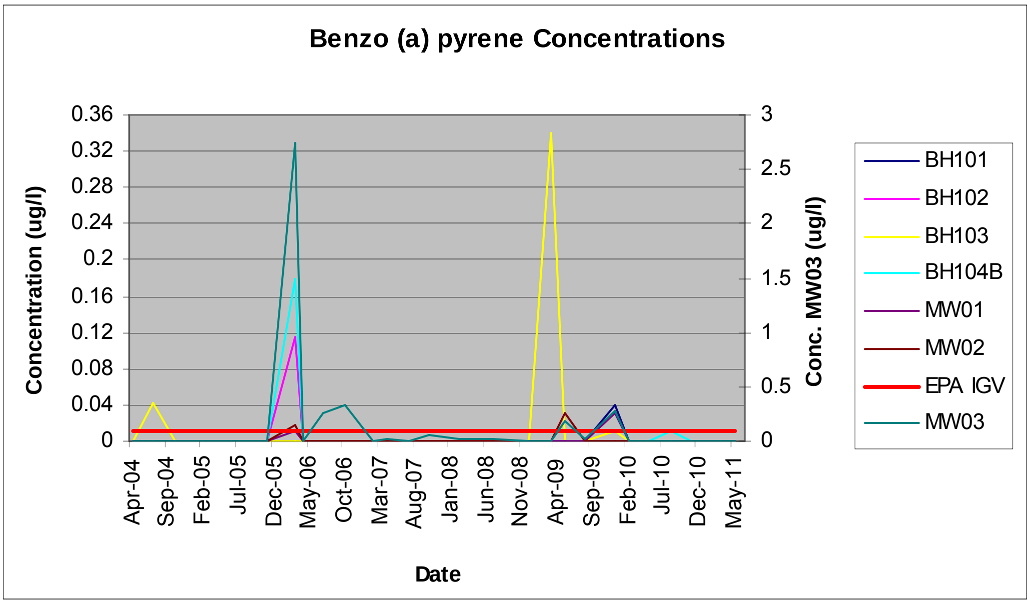


Figure 11 illustrates the concentrations of **Benzo(a)pyrene** in all groundwater monitoring wells and indicates that Benzo(a)pyrene has been detected historically in all boreholes above the IGV of 0.01 µg/l. Similarly with the above mentioned trends, the highest concentrations have been detected in MW03 and BH104B. Concentrations have markedly decreased since March 2006 when an elevated concentration of 2.751 µg/l was detected in MW03, however there have been a number of detections above the IGV, with the most recent elevated level detected in December 2009. Elevated concentrations above the IGV were recorded in BH101, BH103 and MW01 during this same period. The results of all monitoring events in 2010 (February, May, August and November) indicate concentrations below the IGV. The results of the previous Quarter 1, 2011 monitoring event and the current Quarter 2 event also recorded concentrations below the IGV.

The slightly higher concentrations of Benzo(g,h,i)perylene and Benzo(a)pyrene detected in Quarter 4, 2009 may be attributed to heavy rainfall, which occurred in November of 2009 and as a result possibly mobilized traces of these compounds from the soil. The static water levels for December 2009 ranged between 0.58 and 3.78 mbgl. Since December 2009, concentrations of compounds have notably decreased to below the IGV's.

Figure 11 Benzo(a)pyrene in all Monitoring Wells

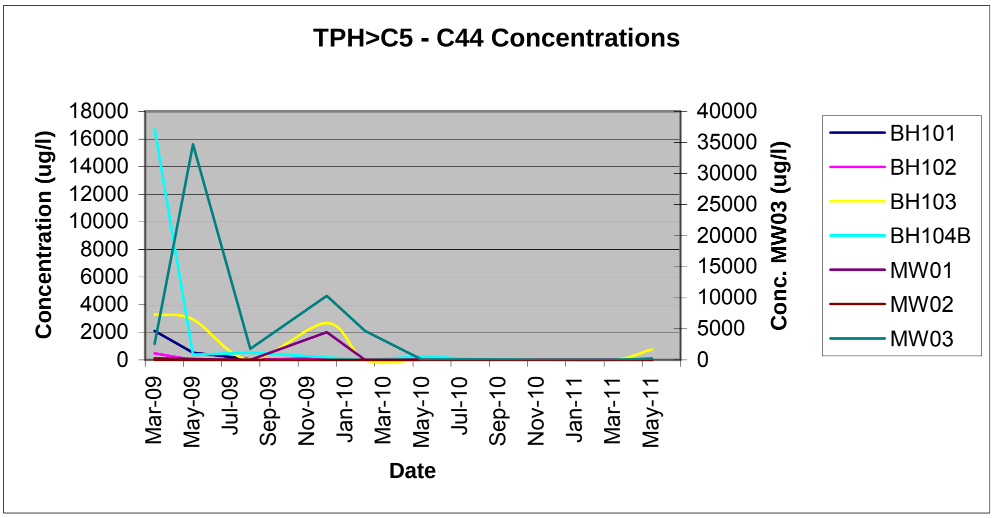


6.2.3 Petroleum Hydrocarbons (TPH)

Historically **Total Petroleum Hydrocarbons (TPH)** including mineral oil, petrol range organics (PRO) and diesel range organics (DRO) have been detected within BH103, BH104B and MW03. Since 2009, speciated hydrocarbon analysis using the Total Hydrocarbon Criteria Working Group (TPHCWG) method has been carried out on all samples to obtain a more accurate profile of TPH within groundwater.

The results of the TPHCWG analysis has indicated that the predominant hydrocarbons detected are in the heavier chain carbon fractions, most notably in the carbon range C16 - C21, C21 - C35 and C35 - C44. Figure 12 illustrates the TPH analysis for the total TPH analysis from C5 - C44 in all monitoring wells since 2009. The highest concentrations detected historically are at monitoring wells MW03, BH104 and BH103 respectively.

Figure 12 TPH (Carbon Range C5-C44) in all Monitoring Wells



During the Quarter 1, 2010 monitoring event, hydrocarbons were detected in borehole MW03. The predominant aliphatic carbon range in MW03 comprised of C16-C21 (1000 µg/l), C21-C35 (2300 µg/l) and C25-C44 (990 µg/l). The predominant aromatic carbon range in MW03 comprised of C16-C21 (220 µg/l) and C21-C35 (620 µg/l). No detections were observed at other locations.

During the Quarter 2, 2010 monitoring event, hydrocarbons were detected in borehole BH104B, with the predominant aliphatic carbon range comprising C12-C16 (130 µg/l) and C16-C21 (130 µg/l), while the predominant aromatic carbon range comprising C12-C16 (21 µg/l) and C16-C21 (47 µg/l). There were no detections of hydrocarbons in MW03 during the Quarter 2 monitoring event.

During the Quarter 3, 2010 monitoring event, hydrocarbons were detected in borehole BH104B and MW03. The predominant aliphatic carbon range in BH104B comprised of C12-C16 (12 µg/l) and C16-C21 (19 µg/l). The predominant aliphatic carbon range in MW03 comprised of C16-C21 (35 µg/l) and C21-C34 (46 µg/l). No aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the Quarter 4, 2010 and the previous Quarter 1, 2011 monitoring event, there were no detections of TPH concentrations above the laboratory limit of detection of 10 µg/l at any location. No aliphatic or aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the current Quarter 2 monitoring event, hydrocarbons were detected in borehole BH103, BH104B and MW03. The predominant aliphatic carbon range comprised of C16-C21 (340 µg/l, 20 µg/l and 46 µg/l) and C21-C35 (420 µg/l, 96 µg/l and 150 µg/l in BH103, BH104B and MW03 respectively). The predominant aromatic carbon range also comprised of C16-C21 (78 µg/l, 52 µg/l and 50 µg/l) and C21-C35 (110 µg/l, 49 µg/l and 93 µg/l in BH103, BH104B and MW03 respectively).

7 CONCLUSIONS

- In accordance with the criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01, groundwater monitoring was carried out at the ENVA Ireland site on the 24th May 2011 corresponding to Quarter 2 of 2011. A Suitably qualified consultant from RPS collected groundwater samples from 7 on-site monitoring wells and submitted these samples to an accredited laboratory for analysis.

- The results presented have been referenced against the Environmental Protection Agency's (EPA) Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.*

- Results of the BTEX and MTBE demonstrate that the levels of Benzene, Toluene, Ethylbenzene, Xylene and MTBE were below the recommended EPA IGV's. The Quarter 1 and Quarter 2, 2010 monitoring events detected a MTBE concentration of 16 µg/l at BH103. However it was below the recommended IGV of 30 µg/l. No detections of MTBE have been recorded since the Quarter 2, 2010 monitoring event.

- The Quarter 2 results of the speciated polycyclic aromatic hydrocarbons indicate that the laboratory limit of detection of 0.2 µg/l for Total PAH's was above the EPA IGV of 0.1 µg/l. There were no detections of speciated PAHs at any location. The general trend of PAH concentrations appear to be reducing over time. Further monitoring at these locations is recommended to determine the persistency of these detections.

- There have been no exceedances of the IGV for SVOC's and VOC's since Quarter 1 2010.

- The results of the phenol analysis by GC-MS detected concentrations below the laboratory limit of detection of 1.0 µg/l at all locations. However, the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols. Samples were subsequently also analysed for phenols to include chlorophenols and the results indicate that there were no detections above the laboratory limit of detection of 0.05 µg/l. A low level of 2,4-Dimethylphenol (0.12 µg/l) was detected in MW03 during the Quarter 1, 2010 monitoring event. There have been no detections of this compound since February 2010.

- Hydrocarbons were detected in boreholes BH104B and MW03 in the aliphatic carbon ranges during the Quarter 3, 2010 monitoring event. There were no detections of aromatic carbon above the laboratory limit of detection of 10 µg/l in BH104B and MW03. During the current Quarter 2, 2011 monitoring event, there were detections of hydrocarbons in the heavier chain carbon ranges of C16-C21 and C21-C35 above the IGV of 10 µg/l at BH103, BH104B and MW03. This is consistent with the results of the Quarter 3, 2010 monitoring event. Further monitoring at these locations is recommended to determine the persistency of these detections.

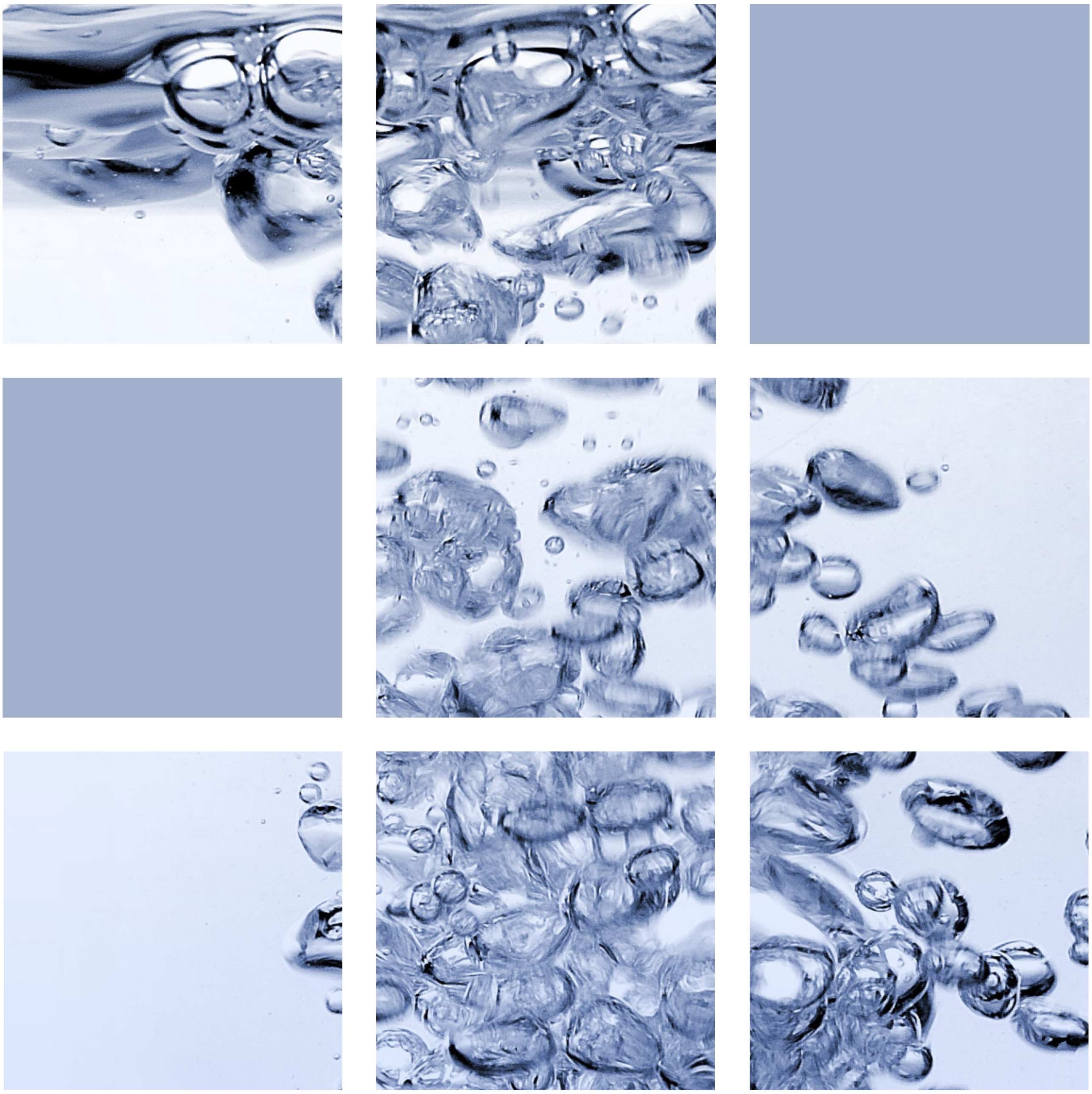
- The general trend of contaminant concentrations over time continues to be somewhat variable with compounds not being continually detected in the same borehole on two consecutive monitoring rounds. In general, the contaminant levels detected at the Enva facility appear to indicate reducing contaminant concentrations over time and further monitoring is recommended to confirm these reductions.

RPS

Enva Portlaoise Groundwater Compliance Monitoring

Quarter 3 (July - September 2011) Interpretative Report

September 2011



Enva Portlaoise

2011 Groundwater Compliance Monitoring Quarter 3 (July – Sept 2011)

DOCUMENT CONTROL SHEET

Client	Enva Ireland Ltd.					
Project Title	Enva Portlaoise 2011 Groundwater Compliance Monitoring					
Document Title	Quarter 3 (July – Sept 2011) Interpretative Report					
Document No.	MDE0973Rp0007F01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	36	1	1	1

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D01	Draft	C. Reilly	S. Herlihy	S. Herlihy	West Pier	22/08/11
A01	Client Approval	C. Reilly	S. Herlihy	S. Herlihy	West Pier	16/09/2011
F01	Final	C. Reilly	S. Herlihy		West Pier	10/10/2011

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1 INTRODUCTION

1.1 BACKGROUND

RPS has been commissioned by Enva Ireland Ltd to carry out groundwater quality monitoring for environmental compliance, at their facility in the Clonminam Industrial Estate, Portlaoise, Co Laois. Groundwater monitoring has being carried out in strict accordance with criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01.

Enva Ireland has been operating under Waste Licence Register No. W0184-01 since January 2004, and is required to submit a report to the Environmental Protection Agency (EPA) on a quarterly basis, outlining the existing groundwater quality underlying the site.

Suitably qualified environmental consultants from RPS, collected groundwater samples from a series of 7 monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03) within the site boundaries on the 3rd of August 2011. The samples underwent laboratory analysis for the suite of parameters specified in Schedule 4(ii) of Waste Licence W0184-01. This report outlines the results of the Quarter 3 monitoring for 2011 and reviews historical data recorded at the site.

1.2 OBJECTIVES & SCOPE OF WORK

The specific objectives and scope of work are as follows:

- Review of previous data as provided by Enva Portlaoise;
- Graphical presentation of key compounds and trends; and
- Discussion of results for Quarter 3 2011 within the context of previous results and available guideline concentrations.

2 REVIEW OF PREVIOUS DATA

2.1 INFORMATION SOURCES

The following documents were reviewed as part of this project:

- Waste Licence W0184-01 and any available EPA documents from the EPA website
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2004)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2005)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2006)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2007)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2008)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2009)
- Summary Report on Trend of Contaminant Levels at Enva Ireland Ltd since 2005, Ref: MDE0647RP0001, RPS (2007)
- Groundwater Risk Assessment, Ref: MDE0788Rp0001, RPS (2008)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0001F02, RPS (2010)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0002F01, RPS (2010)
- Quarter 3 Groundwater Monitoring Report, Ref: MDE0973Rp0003F01, RPS (2010)
- Quarter 4 Groundwater Monitoring Report, Ref: MDE0973Rp0004F01, RPS (2010)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0005F01, RPS (2011)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0006F01, RPS (2011)

2.2 SITE SETTING

The site is located to the southwest of the town of Portlaoise immediately to the south of the Dublin to Cork railway line. The general area is gently undulating. The site slopes gently to the southwest but to the east of the site the ground slopes gently towards the River Triogue, which is located approximately 1 km to the east. The site occupies an area of approximately 1.5 hectares and comprises of an operational waste oil and contaminated soil treatment plant.

The site is located on the outskirts of Portlaoise in an area of agricultural and light industrial development. The site is bounded to the north and east by land belonging to Irish rail, comprising sidings and general storage areas. To the south is a vehicle repair garage, which is elevated above the level of the site by approximately 1.5 m. To the west the site is adjoined by further industrial land, as well as residential land. The site location is presented on **Figure 1**.

The site has been in operation since 1978, and the layout has remained relatively consistent. The site layout is presented on **Figure 2**. The site is largely covered in hardstanding with some open areas in the far north and northwest of the site. All oil and soil storage areas are suitably bunded and the general standard of housekeeping is good.

2.3 REGIONAL SETTING

2.3.1 Geology

The Geological Survey of Ireland indicates that the regional geology of Portlaoise is typified by Carboniferous Limestone. In the vicinity of the site itself the solid geology comprises the Ballysteen Formation, a micaceous-bioclastic limestone. This well-bedded limestone, with interbeds of shale, is extensively folded, with axes trending north-east to south-west, and becomes increasingly muddy towards the top of the formation. North-east to south-west trending faults are found in the region, with one located approximately 500m to the east of the site. The subsoil's in the region comprise mainly Made Ground, around the industrial area, and Limestone Till in the surrounding regions.

2.3.2 Hydrogeology

The limestone is classified by the Geological survey of Ireland (GSI) as a locally important karstified aquifer. Porosity is predominantly in the form of fractures, in this aquifer, however the muddy nature of this formation greatly reduces permeability. Vulnerability of this aquifer beneath the site is classified as high, with moderate vulnerability to the east of the site.

The public water supply for Portlaoise is derived from groundwater, utilising five extraction wells in total. This supply currently comes from the Straboe area, approximately 5.5 km to the north-east of the site. The source protection zone for this water supply extends north-west south-east with the boundary of the outer protection zone at least 4 km to the north-east of the site. A further public abstraction well-field is currently being developed to the north-west of the current area in the townland of Eyne, approximately 6 km to the north of the site, and will comprise a further five abstraction wells. The Source Protection Zone for these wells has not yet been defined but it is not anticipated to affect the Enva site.

The GSI record a number of other dug wells and boreholes within the Portlaoise area, including the boreholes installed on the site. The accuracy of the locations of these wells varies. One well, which was drilled in 1899 is recorded as being located immediately to the south of the Enva site. The use of this well is not known and its location is only accurate to 1 km. A second borehole, drilled in 1973 is recorded 1.5 km to the north of the site at Clonroosk, the accuracy of this location is also 1 km so that it could be closer or further from the site. The use of this well is not known but its yield is recorded as being poor. There are no other wells recorded within 1 km of the site.

Enva is not aware of any abstraction boreholes within the immediate vicinity of their site.

2.4 SITE GROUND CONDITIONS

A total of eight boreholes have been drilled at the site and the general sequence of ground conditions is presented in **Table 2**.

Table 2.1: Ground Conditions

Strata	Extent	Thickness	Description
Made Ground	BH104	0-3.5 m	Predominantly concrete, with hardcore fill, and clay.
Boulder Clay	All boreholes	<8.5 m	Includes fine to medium, well rounded gravels.
Sand and Gravel	Confined to	0-2 m	In general the transition from boulder clay to

Strata	Extent	Thickness	Description
	south east corner of site (BH101, BH104 and MW03)		sand is gradual with changes from gravel, to sandy gravel, to sand.
Limestone Bedrock	Encountered in MW01, MW02 and MW03	Top of limestone ranges from 7.7m to 9m below ground level.	Pale grey, fine-grained bedrock, differentiated from boulders by its un-weathered nature.

The logs for each of the boreholes were previously presented as Appendix B in the RPS Groundwater Risk Assessment Report (Ref: MDE0788Rp0001).

Figure 1 Site Location

2.4.1 Licence Conditions

The waste management licence requires the regular monitoring and sampling of boreholes BH101, BH102, BH103, BH104B, MW01, MW02 and MW03. The parameters requiring measurement or analysis are presented in Table 2.2.

Table 2.2: Licence Parameters

Group	Parameters requiring Quarterly Measurement	Parameters requiring Annual Measurement
Field Parameters	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection
Organics	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's
Inorganics	-	Total Alkalinity, Calcium, Manganese, Sulphate, Cyanide (Total), Chloride, Sodium,

3 METHODOLOGY

Groundwater samples were collected from 7 no. on-site groundwater-monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03), (See Figure 2) using dedicated Waterra tubing, in accordance with RPS's standard sampling protocol. A non-return foot valve was fixed to the bottom of the tubing and inserted into the well, close to the base of the borehole. Separate tubing and foot valves were used at each monitoring well to eliminate the possibility of cross contamination.

Groundwater in the well casing is not considered representative of the groundwater quality at a given location. For this reason, three well volumes were purged from each well prior to collection of the groundwater sample. By the time purging was complete all field test water parameters (namely pH, Temperature, Electrical Conductivity and Dissolved Oxygen) were within 10% variance in three consecutive measurements. This ensured that the groundwater sample extracted from the monitoring borehole was representative of the water held in the subsurface strata and not water held stagnant in the borehole casing. The purged volumes were calculated on-site from the measured static water levels and total well depths using an electronic dip meter.

Groundwater samples were collected in laboratory supplied containers and stored in chilled cool boxes following sampling and during transit to the laboratory. A rigorous chain of custody procedure was used during the sample round.

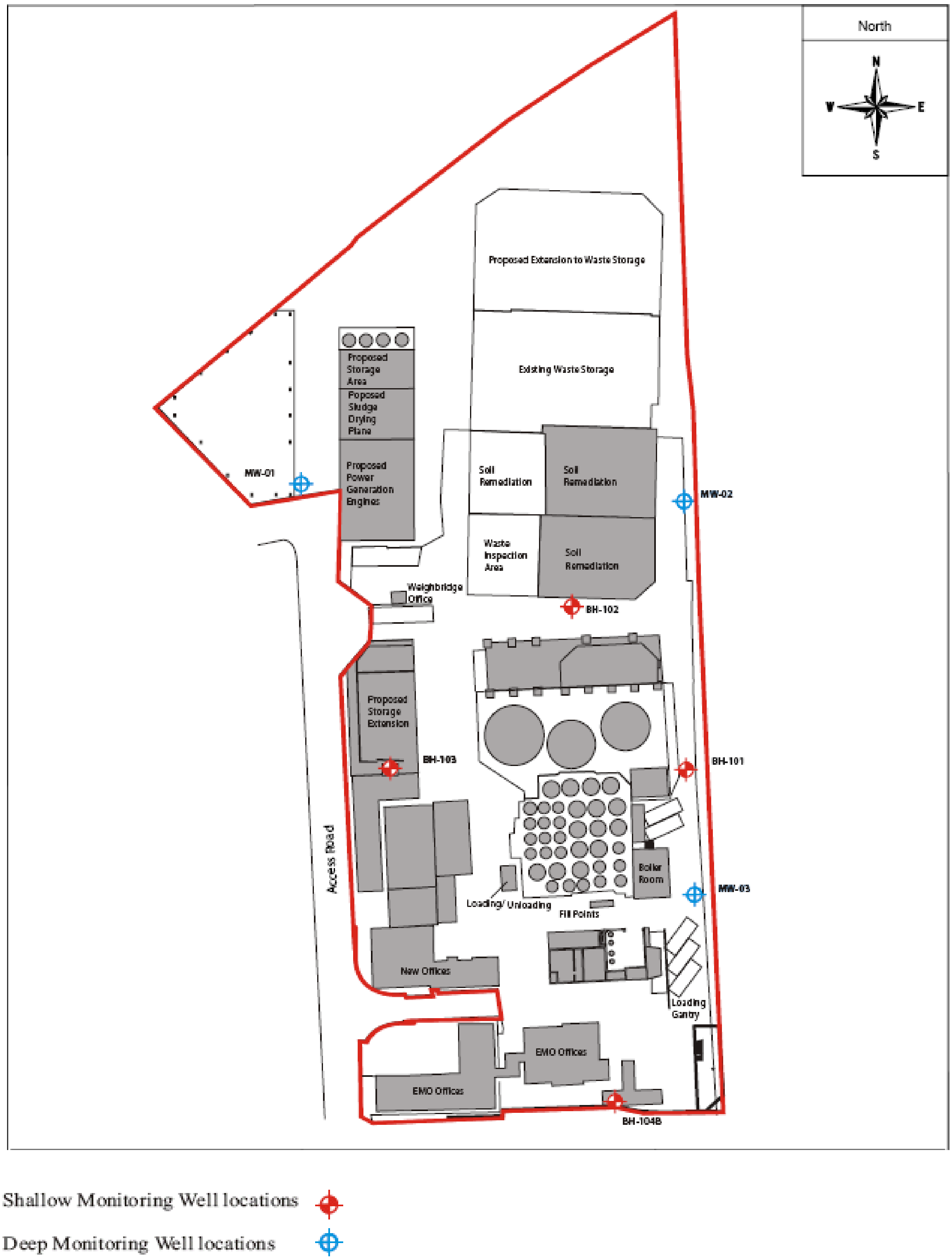
3.1 LABORATORY ANALYSIS

All groundwater samples were analysed at a UKAS accredited laboratory, I2 Analytical Ltd for the suite of analyses listed in Table 3.1. Table 3.1 also indicates the analytical techniques used by the laboratory.

Table 3.1: Analytical Methodologies – I2 Analytical Ltd

Parameter	Analytical Methodology
Phenols	GC-MS
Speciated PAHs	GC-MS
BTEX & MTBE	Headspace GC-MS
Petroleum Hydrocarbons	Headspace GC-MS
Volatile Organic compounds & Tentatively Identified Organic Compounds (VOCs & TICs)	Headspace GC-MS
Semi-Volatile Organic compounds & Tentatively Identified Organic Compounds (SVOCs & TICs)	GC-MS

Figure 2 Site Layout Plan with groundwater monitoring well locations



Source: *URS Environmental Consultants (Ref: 45078497 Issue No. 1)*

3.2 PRESENTATION & INTERPRETATION OF RESULTS

The Quarter 3 2011 results are tabulated in Section 4 and discussed with respect to previous results. The results have been compared to the EPA Interim Guideline Values (IGV) as set out in the Report 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004. It is important to note that the IGVs are based on the lowest acceptable value for either drinking water or environmental quality in surface water and is therefore conservative in nature.

Previous monitoring reports (as listed in Section 2.1) provide details of contaminant concentrations since 2004. The data available within these reports has been reviewed and time series plots of key parameters have been compiled. Trends for chlorinated solvents, petroleum hydrocarbons and phenol parameters have been plotted.

Time series plots are presented in Section 6 and include the results of this Quarter 3 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds used to illustrate the results.

Time series plots are also provided for manual water levels where available from previous reports.

4 QUARTER 3 RESULTS MAY 2011

The results of all field measurements and laboratory analysis are presented in this section.

The results are discussed in relation to appropriate guideline values in Section 5. Results that are shown to be above the relevant guideline values are highlighted in bold and shaded. Results that are shown to be above the relevant laboratory detection limits are highlighted in italics.

Site-specific field parameter measurements were collected during the site visit as per RPS Water sampling protocol.

Table 4.1: Groundwater Levels (Quarter 3, 2011)

Monitoring Well	BH101	BH102	BH103	BH104B	MW01	MW02	MW03
Depth (mbgl)	6.84	6.63	4.53	4.83	23.0	30.0	15.10
Static Water Level (mbgl)	4.48	3.54	1.80	0.79	3.30	4.42	4.44
Ground Level (mAOD)	103.06	102.55	101.16	101.52	102.1	103.12	102.77
Water Level (mAOD)	98.58	99.01	99.36	100.73	98.80	98.70	98.33
Free Phase Oil (mm)	No detection	No detection	No detection	No detection	No detection	No detection	No detection

mbgl = metres below ground level

Table 4.2: Results of Field Parameters Measured at each Groundwater Monitoring Well (Quarter 3, 2011)

Monitoring Well	pH (pH Units)	Temperature (°C)	Conductivity (µS/cm)	Dissolved O_2 (ppm)	Observations
BH101	7.06	14.2	**1887**	-	Purged water dirty in colour, clearer after 20L but cloudy, turned dirty again towards 30L. Fine sediment noted, H_2S odour on purging.
BH102	**6.40**	12.1	**1121**	-	Purged water yellowish in colour, strong H_2S odour detected, some fine floating sediment noted at 10L.
BH103	7.28	13.2	907	-	Purged water dirty in colour turning greyish after 30L. Sandy sediment noted, H_2S odour detected.
BH104B	6.81	13.2	511	-	Purged water dirty in colour turning clearer with greenish tint on further purging. H_2S odour detected with sandy sediment noted. Oily sheen noted on surface of samples.
MW01	7.39	18.6	781	-	Purged water dirty in colour, no odour detected.
MW02	7.54	12.9	648	-	Purged water clear in colour, no odour or sediment noted.
MW03	6.76	13.2	961	-	H_2S odour detected with oily slick noted at the surface and black suspended solids.
Interim EPA Guideline Values (Units as indicated)	**>6.5 & <9.5**	**25°C**	**1000**	**No abnormal change**	**-**

Note: Results above the relevant IGV are highlighted in bold and shaded.

Table 4.3: Results of Inorganic Analysis (as per Annual Licence Requirements)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Total Alkalinity	mg/l	10	250	470	270	230	330	320	350	No abnormal change
Calcium	mg/l	0.2	160	150	120	62	59	59	110	200
Manganese	mg/l	0.3	0.00056	**4.4**	**1.1**	**0.054**	0.0017	0.013	**0.27**	0.05
Sulphate	mg/l	0.1	44	43	44	13	20	21	32	200
Cyanide (Total)	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Chloride	mg/l	4	**360**	**68**	**42**	**28**	18	16	**120**	30
Sodium	mg/l	0.1	140	44	27	32	22	23	53	150

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.4: Results of BTEX & MTBE

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 [Note 1]
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 [Note 1]
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30

Note 1: No specific IGV for parameter. IGV for Total Xylenes is used as guideline.

Table 4.5: Results of Speciated PAH's

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	< 0.01	1.0
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Total EPA-16 PAH's	µg/l	0.2	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	0.1

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.6: Results of Total Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Total Phenols (monohydric)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	0.5
Total Phenols (GC-MS)	µg/l	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.5

Table 4.7: Results of Speciated Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.8: Results of Semi-Volatile Organic Compounds (sVOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
Bis(2-chloroethyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
1,4-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachloroethane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Nitrobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Isophorone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroethoxy)methane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
4-Chloroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachlorobutadiene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylnaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chloronaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dimethylphthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,6-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
2,4-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibenzofuran	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chlorophenyl phenyl ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Diethyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Nitroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Azobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bromophenyl phenyl ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachlorobenzene	µg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Carbazole	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibutyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.0
Anthraquinone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Butyl benzyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05

Note: Results above the relevant laboratory limit of detection in italics.

Table 4.9: Results of Volatile Organic Compounds (VOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Chloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Vinyl Chloride	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichlorofluoromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2,2-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12
1,1,1-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	500
1,2-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-Dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Tetrachloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0
1,2-dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Trichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70
Dibromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromodichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,1,2-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Dibromochloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tetrachloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40
1,2-Dibromoethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
1,1,1,2-Tetrachloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Styrene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tribromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Isopropylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
N-Propylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
4-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3,5-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tert-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Sec-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
P-Isopropyltoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,4-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-Dibromo-3-chloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40
Hexachlorobutadiene	µg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10
1,2,3-Trichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Note: Results above the relevant laboratory limit of detection are in italics.

Table 4.10: Results of Total Petroleum Hydrocarbons (Aliphatic/Aromatic)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	Interim EPA Guideline Values (Units as indicated)
Aliphatic > C5-C6	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C6-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	***18***	-
Aliphatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	***57***	-
Aliphatic > C16-C21	µg/l	10	<10	<10	<10	<10	<10	<10	***35***	-
Aliphatic >C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	***210***	-
Aliphatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	**370**	10
Aromatic > C5-C7	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C7-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	***42***	-
Aromatic > C16-C21	µg/l	10	<10	<10	78	<10	<10	<10	***66***	-
Aromatic > C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	***45***	-
Aromatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	**150**	10

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are highlighted in bold italics.

5 DISCUSSION OF QUARTER 3 RESULTS

The results of the Quarter 3 monitoring event for 2011 are presented in Table 4.1 to 4.9 of this report. For the purpose of this report, the results are compared to the EPA Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.* A discussion of the results and their significance is included below.

5.1 FIELD PARAMETERS

The results of the field parameters measured at each groundwater monitoring well are presented in Table 4.2. Groundwater samples recorded pH levels ranging between 6.37 and 7.51. All pH measurements, with the exception of BH102 (4.40) and BH103 (4.37), were within the EPA Interim guideline range of ≥6.5 to ≤9.5. Temperature measurements ranged from 12.1°C to 18.6°C and were within the EPA IGV of 25°C.

Field measurements of Electrical conductivity levels ranged between 511 µS/cm and 1887 µS/cm and were below the Interim Guideline Value of 1000 µS/cm at all locations with the exception of BH101 (1887 µS/cm) and BH102 (1121 µS/cm).

The dissolved oxygen probe was unable to be calibrated which resulted in a lack of field measurements for dissolved oxygen.

Observations relating to colour and odour varied from well to well as detailed in Table 4.2.

5.2 RESULTS OF INORGANIC ANALYSIS

The results of the inorganic analysis are presented in Table 4.3. The following inorganic parameters are required to be analysed on an annual basis in accordance with Schedule D of the Waste Licence Register Number W0184-01; Total Alkalinity, Calcium, Manganese, Sulphate, Cyanide (Total), Chloride and Sodium.

The results of the inorganic analysis for this monitoring event indicate that Manganese and Chloride were recorded above their respective recommended IGV's. The remaining parameters were below their IGV's at all locations.

Concentrations of Manganese exceeded the IGV of 0.05 mg/l at 4 no. locations (BH102, BH103, BH104B and MW03) ranging between 0.0054 mg/l and 4.4 mg/l.

Concentrations of Chloride were recorded above the IGV of 30 mg/l at 5 no. locations (BH101, BH102, BH103, BH104B and MW03) ranging between 28 mg/l and 360 mg/l.

5.3 RESULTS OF BTEX & MTBE

The results of the BTEX and MTBE analysis are presented in Table 4.4 and demonstrate concentrations below the laboratory limit of detections and associated IGV's at all locations.

Previous monitoring events detected MTBE above the laboratory limit of detection at a concentration of 16 µg/l during Quarter 1 and Quarter 2 of 2010 at BH103. During Quarter 3 and Quarter 4 of 2010 concentrations were below the laboratory limit of detection. Prior to these 2010 monitoring events, concentrations of MTBE at BH103 were recorded at 63 µg/l in December 2009. However, no exceedances of the IGV were recorded at any stage.

All concentrations of BTEX and MTBE were recorded below the laboratory limit of detection during the current Quarter 3 monitoring event.

5.4 RESULTS OF SPECIATED PAH'S

The results of the Speciated PAH analysis during this monitoring period are presented in Table 4.5.

The laboratory limit of detection for Total EPA-16 PAH's is 0.2 µg/l. This laboratory limit of detection is above the EPA IGV of 0.1 µg/l. To identify the compounds, which attributed to these concentrations, speciated PAH analysis was carried out, which reduces the limit of detection for individual parameters to 0.01 µg/l.

The results of the speciated polycyclic aromatic hydrocarbon analysis detected no parameters above the laboratory limits of detection and all other parameters were below the EPA IGV's. The laboratory is accredited to achieve a detection limit of 0.2 µg/l for EPA-16 PAH's. The laboratory has confirmed that the detection limit for total EPA-16 PAH's can be lowered to 0.1 µg/l for comparison with the EPA IGV of 0.1 µg/l, however this will not be accredited.

5.5 RESULTS OF SPECIATED PHENOLS

The results of Total Phenol analysis are presented in Table 4.6. All samples detected concentrations of monohydric phenol below the laboratory limit of detection of 10 µg/l. It should be noted that the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols.

For this reason, samples were analysed for phenols to include chlorophenols. The results of the speciated phenols analysis are presented in Table 4.7. The speciated phenol analysis reduces the laboratory limit of detection to 0.05 µg/l for individual parameters.

The results of the current Quarter 3 2011 speciated phenol analysis confirm concentrations of phenols were below the laboratory limit of detection of 0.05 µg/l at all locations. This is consistent with the results from the previous Quarter 1, Quarter 2 and 2010 monitoring events.

5.6 RESULTS OF SEMI-VOLATILE ORGANIC COMPOUNDS

The results of the Semi-Volatile Organic Compound analysis are presented in Table 4.8.

No SVOC's were detected during this monitoring period above the relevant IGV's.

5.7 RESULTS OF VOLATILE ORGANIC COMPOUNDS

The results of the Volatile Organic Compound analysis are presented in Table 4.9. The results of the current Quarter 3 2011 monitoring event indicate that there were no exceedances of VOC parameters detected above the relevant IGV's.

In November 2009, corresponding to Quarter 4 of 2009, no VOC's were detected above the relevant IGV's. However some parameters were detected above the laboratory limits of detection (1,1-Dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, MTBE, n-butylbenzene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene and tert-butylbenzene).

The Quarter 1 and Quarter 2 monitoring results of 2010 detected MTBE in BH103 raised above the laboratory limit of detection of 1.0 µg/l at a concentration of 16 µg/l.

The results of the Quarter 3 and Quarter 4 monitoring events of 2010 indicate that there were no exceedances of the IGV for specific parameters.

5.8 RESULTS OF TOTAL PETROLEUM HYDROCARBONS

In order to provide a more accurate profile of TPH within the groundwater, speciated hydrocarbon analysis using the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) method was carried out on samples taken at all boreholes. The results of the TPH analysis are presented in Table 4.10.

No detections were observed in the monitoring well locations during the current monitoring event with the exception of MW03. The EPA IGV of 10 µg/l for Total hydrocarbons is deemed comparable with the results for total petroleum hydrocarbons (TPH). The TPH concentration has increased since the previous Quarter 2 monitoring event.

Hydrocarbons have been detected in borehole MW03 during Quarter 1 2010, in borehole BH104B during the Quarter 2 2010 monitoring event and in borehole BH104B and MW03 during the Quarter 3 2010 monitoring events. These detections are discussed in Section 6.2.3.

6 HISTORICAL RESULTS & TRENDS

Time series plots are presented in this section and include the results of the Quarter 3 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds and used to illustrate the results.

6.1 GROUNDWATER LEVELS OVER TIME

Figure 3 to Figure 5 below illustrates the manually recorded water levels using an electronic probe. The graphs show that groundwater levels can vary considerably between monitoring rounds.

Figure 4 illustrates groundwater elevations (mAOD) in shallow groundwater wells (BH101 to BH104B) ranging between approximately 99 mAOD and 100 mAOD.

Figure 5 illustrates groundwater elevation (mAOD) in the deeper groundwater wells (MW01 to MW03). The groundwater elevation (mAOD) for these deeper groundwater wells ranges from approximately 98 mAOD to approximately 99 mAOD.

Figure 3 Groundwater Elevation (mAOD) in all Monitoring Wells

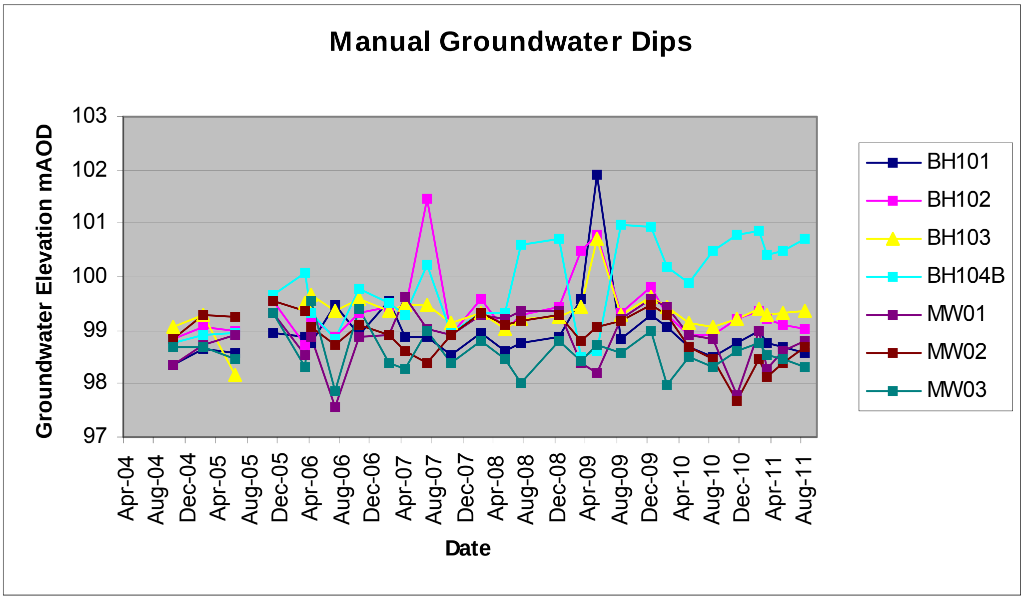


Figure 4 Groundwater Elevation (mAOD) in Shallow Monitoring Wells

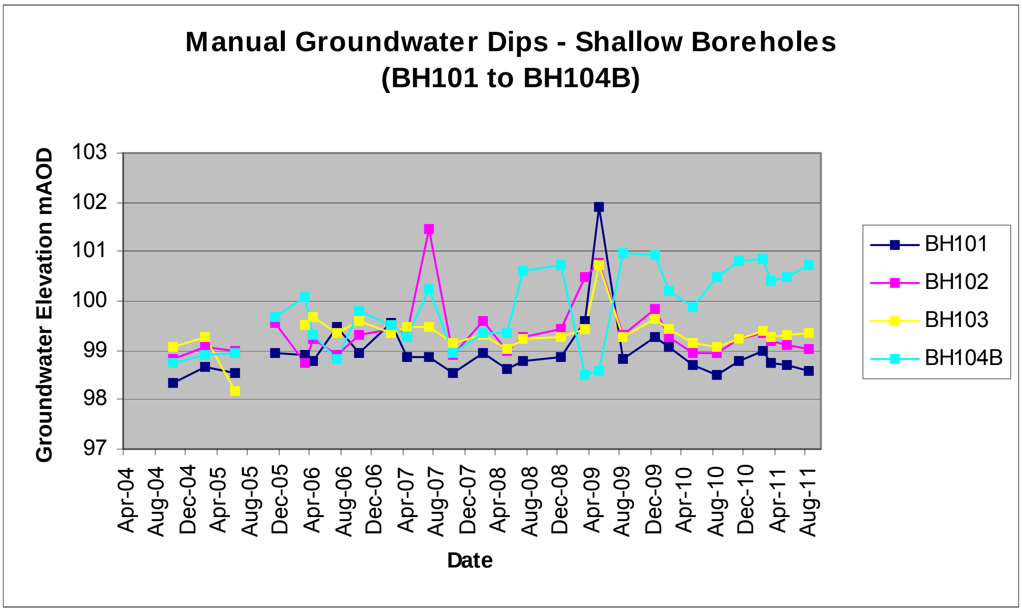
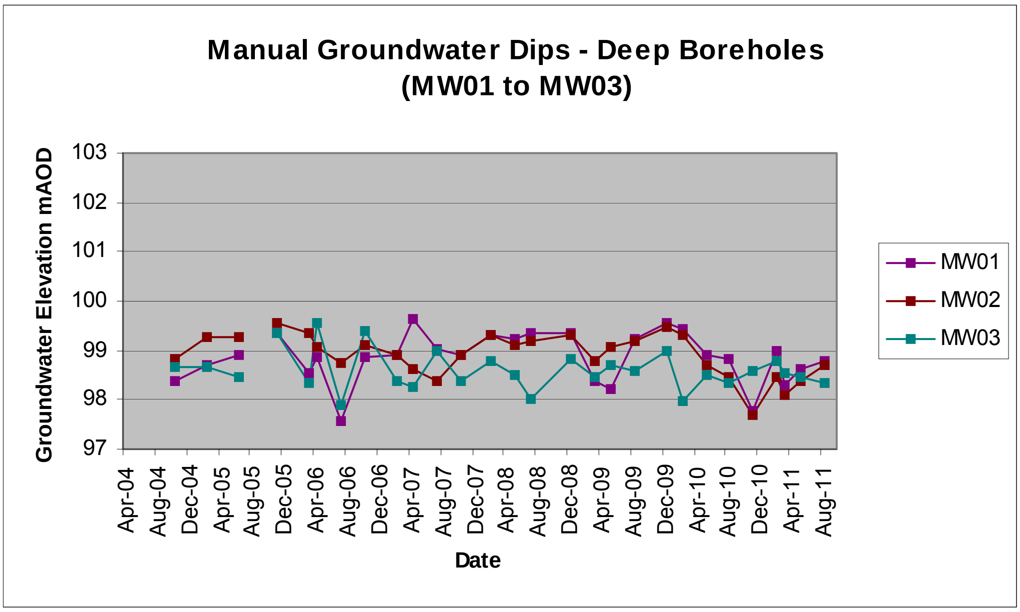


Figure 5 Groundwater Elevation (mAOD) in Deep Monitoring Wells



The groundwater levels generally show a similar pattern of fluctuation over time indicating a degree of connection between boreholes. The graphs demonstrate that groundwater levels can vary considerably between monitoring rounds; however, the general direction of flow in the shallow and deeper groundwater bearing unit is predominantly in a south easterly direction and occasionally in a southerly direction.

In addition, monthly rainfall data for Oak Park, Carlow have been tabulated from Met Eireann to examine the relationship between compounds and rainfall events. The data from Oak Park was chosen as the weather station at Birr, Co. Offaly closed in October 2009. A summary of the rainfall data is in Tables 5.1, 5.2 and 5.3.

Table 5.1: Monthly Rainfall data for Year 2009 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	113.4	29.2	32.6	102.4	69.0	65.4	152.4	100.9	41.8	127.8	215.5	73.7

Table 5.2: Monthly Rainfall data for Year 2010 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec
Rainfall (mm)	71.5	48.0	80.7	49.0	51.4	37.7	93.6	25.5	108.7	68.9	87.7	52.2

Table 5.3: Monthly Rainfall data for 2011 to date for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Rainfall (mm)	50.6	121.9	16.0	19.5	51.2	72.7	46.4	25.5	19.8 *

Note: Data for the most recent months are provisional.
* Monthly values for Oak Park up to 7th September 2011

6.2 GROUNDWATER CONCENTRATIONS OVER TIME

Groundwater quality trends have previously been examined in two reports (URS 2005 and RPS 2007). In addition, RPS carried out a groundwater risk assessment (Ref: MDE0788RP0001, dated November 2008) in which the general trend of contaminant concentrations over time was observed to be erratic with compounds rarely being detected in the same borehole on two consecutive monitoring rounds.

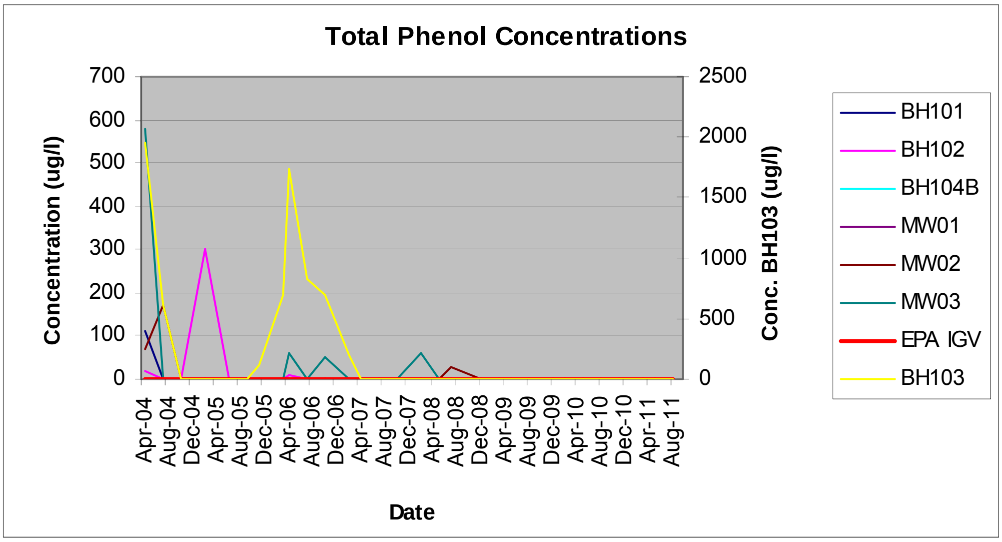
The data available within these reports has been reviewed and time series plots of key parameters have been compiled based on notable trends. Trends for phenols, petroleum hydrocarbons and chlorinated solvents have been plotted as outlined in the following sections.

6.2.1 Phenols

Phenols have been detected historically in all boreholes with the highest concentrations recorded in BH103. However concentrations in BH103 have declined since April 2007. Phenol concentrations have since been recorded below the IGV of 0.5 µg/l in all monitoring wells since December 2008 indicating natural attenuating conditions within the groundwater.

2,4-Dimethylphenol was detected at a concentration of 0.12 µg/l during the Quarter 1, 2010 monitoring event. There is no recommended IGV for this parameter. No detections of this parameter were noted in the subsequent Quarter 2, Quarter 3, Quarter 4 monitoring events of 2010, the Quarter 1, Quarter 2 monitoring event of 2011 and the current Quarter 3 monitoring event.

Figure 6 Phenol Concentrations in all Monitoring Wells



6.2.2 Polycyclic Aromatic Hydrocarbons (PAH's)

Figure 7 below illustrates that PAH's (Polycyclic Aromatic Hydrocarbons) have previously been detected within all monitoring wells above the recommended EPA IGV of 0.1 µg/l. Historically the highest concentrations have been detected within MW03 and BH104B. In addition, a range of PAH's including Benzo(a)pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3)cd pyrene, Fluoranthene and Napthalene have previously been detected in MW03 with Figures 8 to 11 illustrating some of the PAH compounds which were detected above their respective IGV's.

Figure 7 illustrates that **Total PAH** has been detected in all groundwater monitoring wells at the site above the IGV of 0.1 µg/l since 2005. Elevated concentrations have been detected in MW03 and BH104B, with the highest concentration detected in March 2006 (107 µg/l) and in October 2007 (19.72 µg/l) respectively. Since then, the concentrations have shown a marked decrease with no elevated Total PAH concentrations in this current Quarter 3 monitoring period of 2011.

The results from the Quarter 4, 2009 monitoring round in December 2009 recorded total EPA-16 PAH concentrations above the IGV at all locations with the exception of MW02. These concentrations may be linked to the heavy rainfall event, which occurred in November of 2009, which may have mobilized traces of these compounds from soil.

The results from the Quarter 1 monitoring round, 2010 recorded Total PAH concentrations below the IGV of 0.2 µg/l at all locations with the exception of MW03, which detected a concentration of 0.3 µg/l. There has been a decrease in Total PAH concentrations at all locations since the Quarter 4 event in December 2009 with the most notable decrease at MW03 reducing from 4.58 µg/l to <0.1 µg/l.

The only concentrations of Total PAH above the IGV in 2010 were detected during the Quarter 1 monitoring event in MW03 (0.3 µg/l), Quarter 2 monitoring event in BH104B (1.2 µg/l) and Quarter 3 monitoring event in MW02 (2.0 µgl) and BH104B (0.2 µgl). There were no elevated concentrations of Total PAH during the Quarter 4 2010, the previous Q1 and Q2 2011 monitoring event and the current Q3 monitoring event.

Figure 7 PAH (Total) Concentrations in all Monitoring Wells

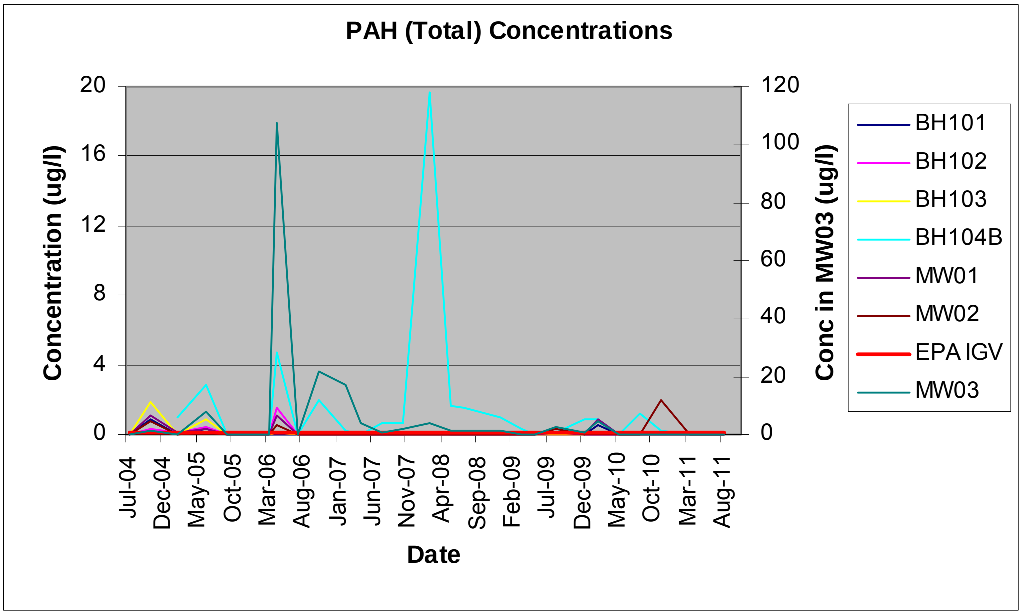


Figure 8 Fluoroanthene Concentrations in all Monitoring Wells

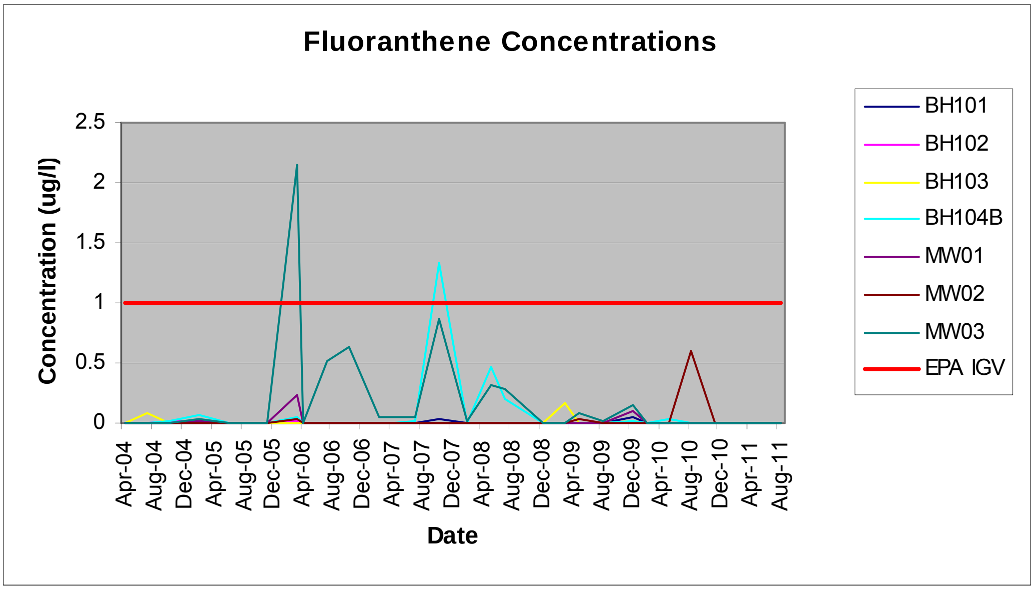
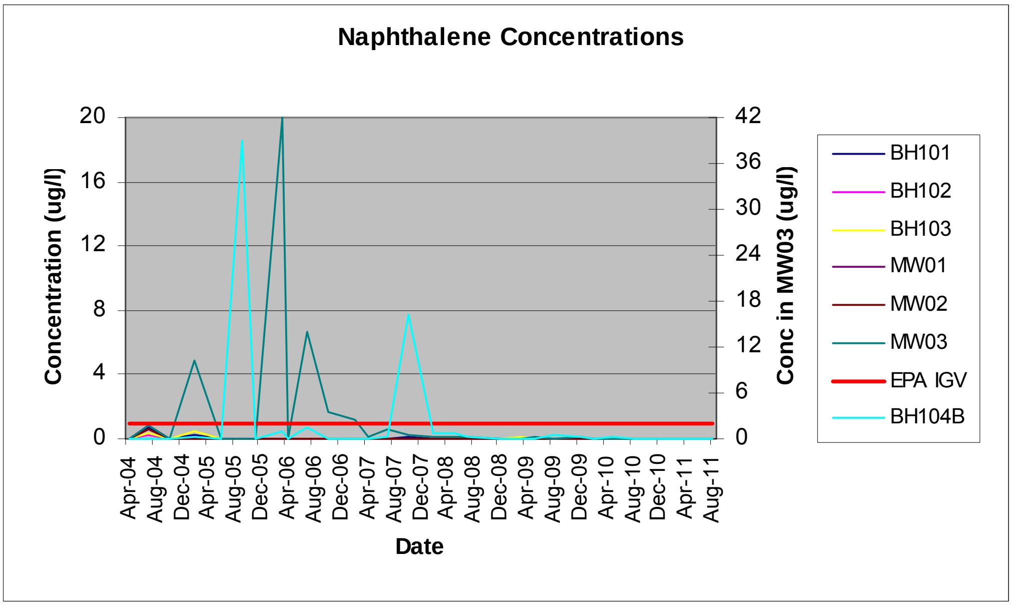


Figure 8 illustrates that **Fluoroanthene** was previously detected above the IGV of 1.0 µg/l in groundwater monitoring wells BH104B (October 2007, 1.33 µg/l) and MW03 (March 2006, 2.158 µg/l) only. The remaining monitoring wells recorded concentrations below the IGV of 1.0 µg/l.

Figure 9 Naphthalene Concentrations in all Monitoring Wells



A similar trend to Fluoroanthene has been noted in Figure 9, with concentrations of **Naphthalene** recorded above the IGV of 1.0 µg/l in BH104B and MW03 only. 4 no. exceedances of the IGV were noted in BH104B in September 2005 (39 µg/l), March 2006 (1.069 µg/l), July 2006 (1.594 µg/l) and October 2007 (16.31 µg/l). Since October 2007, the concentrations in BH104B have decreased below the IGV. There have been 5 exceedances of the IGV of 1.0 µg/l in MW03, with the highest concentration detected in March 2006 (19.986 µg/l). Naphthalene concentrations have been recorded below the IGV of 1.0 µg/l since April 2007. The concentrations detected in August 2010 were slightly above the laboratory limit of detection of 0.01 µg/l at BH104B (0.08 µg/l) and MW03 (0.05 µg/l); however these levels are deemed low. Concentrations of Naphthalene were below the EPA IGV limit of detection of 1.0 µg/l at all locations during the Quarter 4 2010, the Quarter 1 2011, the previous Quarter 2 2011 monitoring periods and the current Quarter 3 monitoring period.

Figure 10 Benzo (g,h,i) perylene in all Monitoring Wells

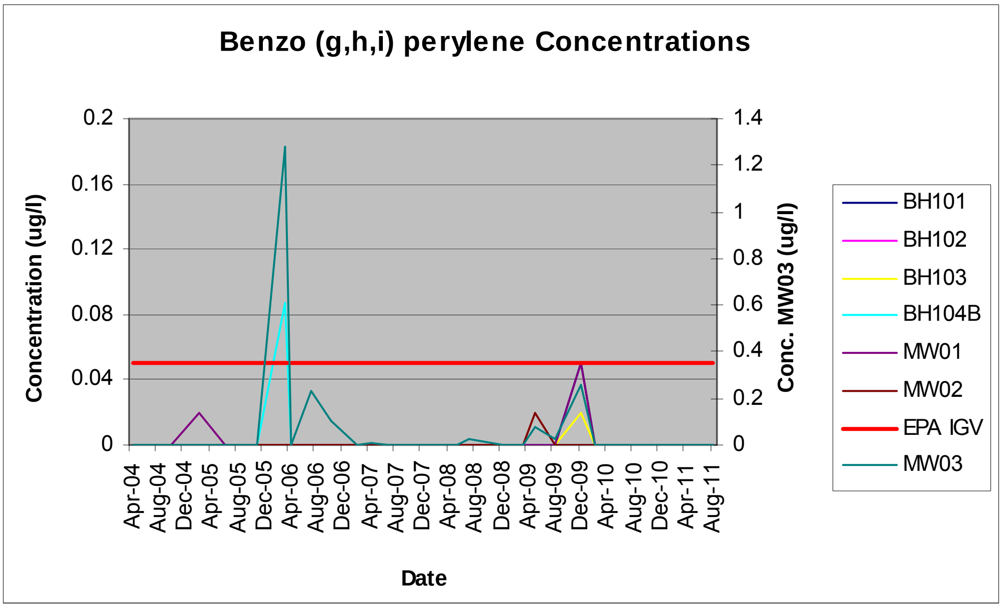


Figure 10 illustrates the concentrations of **Benzo(g,h,i)perylene** in BH104B and MW03 over time. Elevated concentrations above the IGV were recorded at BH104B (0.087 µg/l) on one occasion only in March 2006.

Figure 10a illustrates elevated concentrations above the IGV recorded at MW03 on 5 no. occasions with the most recent elevated concentration detected in December 2009 (0.26 µg/l). The results of monitoring events in May, August, November 2010, March and May 2011 and the current Quarter 3 2011 monitoring event recorded concentrations below the laboratory limit of detection of 0.01 µg/l at all locations.

Figure 10a Benzo (g,h,i) perylene in Monitoring Wells BH104B & MW03

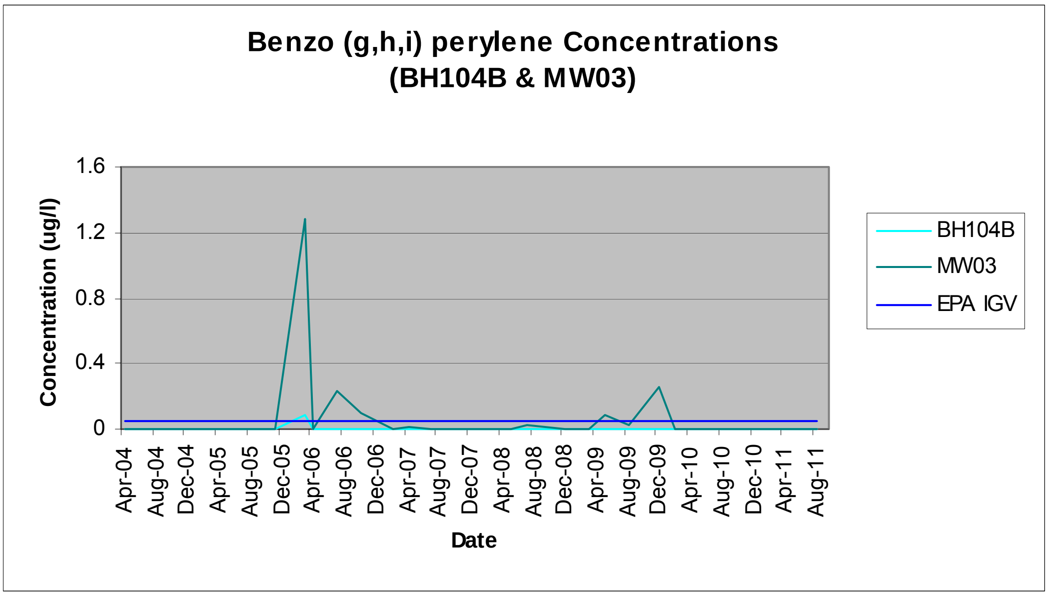
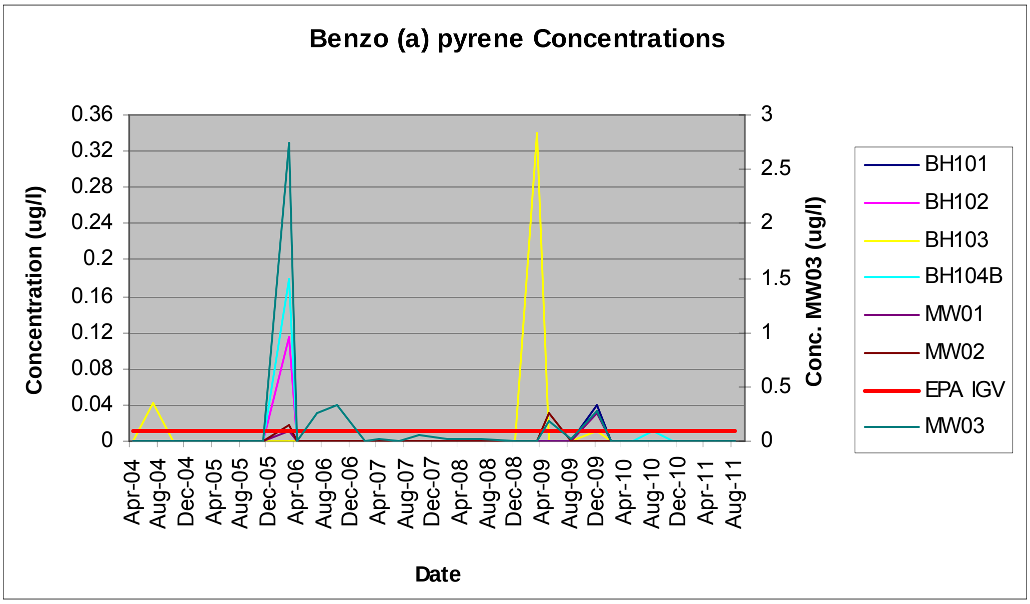


Figure 11 illustrates the concentrations of **Benzo(a)pyrene** in all groundwater monitoring wells and indicates that Benzo(a)pyrene has been detected historically in all boreholes above the IGV of 0.01 µg/l. Similarly with the above mentioned trends, the highest concentrations have been detected in MW03 and BH104B. Concentrations have markedly decreased since March 2006 when an elevated concentration of 2.751 µg/l was detected in MW03, however there have been a number of detections above the IGV, with the most recent elevated level detected in December 2009. Elevated concentrations above the IGV were recorded in BH101, BH103 and MW01 during this same period. The results of all monitoring events in 2010 (February, May, August and November) indicate concentrations below the IGV. The results of the previous Quarter 1 and Quarter 2 2011 monitoring event and the current Quarter 3 event also recorded concentrations below the IGV.

The slightly higher concentrations of Benzo(g,h,i)perylene and Benzo(a)pyrene detected in Quarter 4, 2009 may be attributed to heavy rainfall, which occurred in November of 2009 and as a result possibly mobilized traces of these compounds from the soil. The static water levels for December 2009 ranged between 0.58 and 3.78 mbgl. Since December 2009, concentrations of compounds have notably decreased to below the IGV's.

Figure 11 Benzo(a)pyrene in all Monitoring Wells

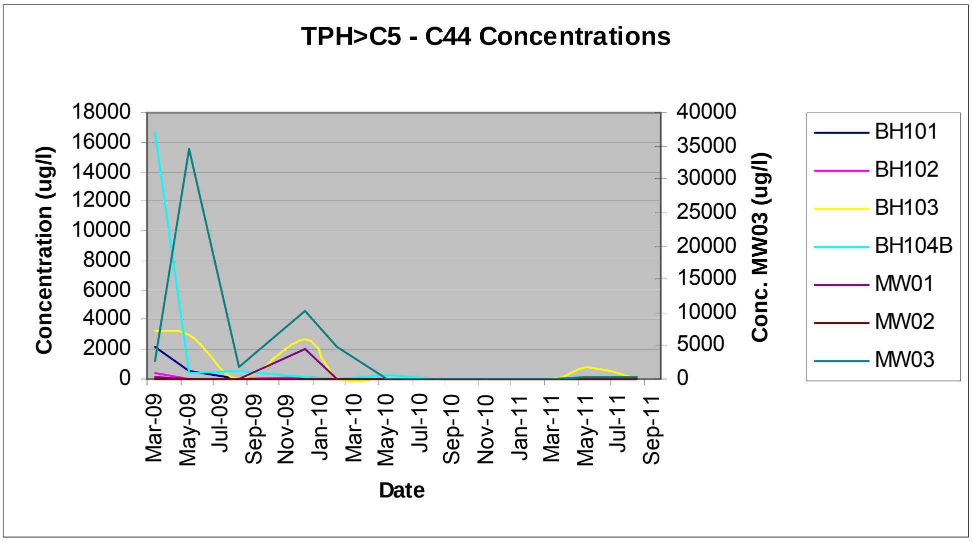


6.2.3 Petroleum Hydrocarbons (TPH)

Historically **Total Petroleum Hydrocarbons (TPH)** including mineral oil, petrol range organics (PRO) and diesel range organics (DRO) have been detected within BH103, BH104B and MW03. Since 2009, speciated hydrocarbon analysis using the Total Hydrocarbon Criteria Working Group (TPHCWG) method has been carried out on all samples to obtain a more accurate profile of TPH within groundwater.

The results of the TPHCWG analysis has indicated that the predominant hydrocarbons detected are in the heavier chain carbon fractions, most notably in the carbon range C16 - C21, C21 - C35 and C35 - C44. Figure 12 illustrates the TPH analysis for the total TPH analysis from C5 - C44 in all monitoring wells since 2009. The highest concentrations detected historically are at monitoring wells MW03, BH104 and BH103 respectively.

Figure 12 TPH (Carbon Range C5-C44) in all Monitoring Wells



During the Quarter 1, 2010 monitoring event, hydrocarbons were detected in borehole MW03. The predominant aliphatic carbon range in MW03 comprised of C16-C21 (1000 µg/l), C21-C35 (2300 µg/l) and C25-C44 (990 µg/l). The predominant aromatic carbon range in MW03 comprised of C16-C21 (220 µg/l) and C21-C35 (620 µg/l). No detections were observed at other locations.

During the Quarter 2, 2010 monitoring event, hydrocarbons were detected in borehole BH104B, with the predominant aliphatic carbon range comprising C12-C16 (130 µg/l) and C16-C21 (130 µg/l), while the predominant aromatic carbon range comprising C12-C16 (21 µg/l) and C16-C21 (47 µg/l). There were no detections of hydrocarbons in MW03 during the Quarter 2 monitoring event.

During the Quarter 3, 2010 monitoring event, hydrocarbons were detected in borehole BH104B and MW03. The predominant aliphatic carbon range in BH104B comprised of C12-C16 (12 µg/l) and C16-C21 (19 µg/l). The predominant aliphatic carbon range in MW03 comprised of C16-C21 (35 µg/l) and C21-C34 (46 µg/l). No aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the Quarter 4, 2010 and Quarter 1, 2011 monitoring event, there were no detections of TPH concentrations above the laboratory limit of detection of 10 µg/l at any location. No aliphatic or aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the previous Quarter 2, 2011 monitoring event, hydrocarbons were detected in borehole BH103, BH104B and MW03. The predominant aliphatic carbon range comprised of C16-C21 (340 µg/l, 20 µg/l and 46 µg/l) and C21-C35 (420 µg/l, 96 µg/l and 150 µg/l in BH103, BH104B and MW03 respectively). The predominant aromatic carbon range also comprised of C16-C21 (78 µg/l, 52 µg/l and 50 µg/l) and C21-C35 (110 µg/l, 49 µg/l and 93 µg/l in BH103, BH104B and MW03 respectively).

During the current Quarter 3, 2011 monitoring event, hydrocarbons were detected in borehole MW03 only. The predominant aliphatic carbon range comprised of C10-C12 (18 µg/l), C12-C16 (57 µg/l), C16-C21 (35 µg/l) and C21-C35 (210 µg/l). The predominant aromatic carbon range comprised of C12-C16 (42 µg/l), C16-C21 (66 µg/l) and C21-C35 (45 µg/l).

7 CONCLUSIONS

- In accordance with the criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01, groundwater monitoring was carried out at the ENVA Ireland site on the 3rd August 2011 corresponding to Quarter 3 of 2011. A suitably qualified consultant from RPS collected groundwater samples from 7 on-site monitoring wells and submitted these samples to an accredited laboratory for analysis.

- The results presented have been referenced against the Environmental Protection Agency's (EPA) Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.*

- Results of the BTEX and MTBE demonstrate that the levels of Benzene, Toluene, Ethylbenzene, Xylene and MTBE were below the recommended EPA IGV's. The Quarter 1 and Quarter 2, 2010 monitoring events detected a MTBE concentration of 16 µg/l at BH103. However it was below the recommended IGV of 30 µg/l. No detections of MTBE have been recorded since the Quarter 2, 2010 monitoring event.

- The Quarter 3, 2011 results of the speciated polycyclic aromatic hydrocarbons indicate that the laboratory limit of detection of 0.2 µg/l for Total PAH's was above the EPA IGV of 0.1 µg/l. There were no detections of speciated PAHs at any location. The general trend of PAH concentrations appear to be reducing over time. Further monitoring at these locations is recommended to determine the persistency of these detections.

- There have been no exceedances of the IGV for SVOC's and VOC's since Quarter 1 2010.

- The results of the phenol analysis by GC-MS detected concentrations below the laboratory limit of detection of 1.0 µg/l at all locations. However, the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols. Samples were subsequently also analysed for phenols to include chlorophenols and the results indicate that there were no detections above the laboratory limit of detection of 0.05 µg/l. A low level of 2,4-Dimethylphenol (0.12 µg/l) was detected in MW03 during the Quarter 1, 2010 monitoring event. There have been no detections of this compound since February 2010.

- Hydrocarbons were detected in boreholes BH104B and MW03 in the aliphatic carbon ranges during the Quarter 3, 2010 monitoring event. There were no detections of aromatic carbon above the laboratory limit of detection of 10 µg/l in BH104B and MW03. During the current Quarter 3, 2011 monitoring event, there were detections of hydrocarbons in the heavier chain carbon ranges of C16-C21 and C21-C35 above the IGV of 10 µg/l at MW03. Further monitoring at these locations is recommended to determine the persistency of these detections.

- The general trend of contaminant concentrations over time continues to be somewhat variable with compounds not being continually detected in the same borehole on two consecutive monitoring rounds. In general, the contaminant levels detected at the Enva facility appear to indicate reducing contaminant concentrations over time and further monitoring is recommended to confirm these reductions.

Enva Portlaoise

2011 Groundwater Compliance Monitoring Quarter 4 (Oct – Dec 2011)

DOCUMENT CONTROL SHEET

Client	Enva Ireland Ltd.					
Project Title	Enva Portlaoise 2011 Groundwater Compliance Monitoring					
Document Title	Quarter 4 (Oct – Dec 2011) Interpretative Report					
Document No.	MDE0973Rp0008A01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	36	1	1	-

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D01	Draft	C. Reilly	S. Herlihy	S. Herlihy	West Pier	13/12/12
A01	Client Approval	C. Reilly	S. Herlihy	S. Herlihy	West Pier	05/01/12

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1 INTRODUCTION

1.1 BACKGROUND

RPS has been commissioned by Enva Ireland Ltd to carry out groundwater quality monitoring for environmental compliance, at their facility in the Clonminam Industrial Estate, Portlaoise, Co Laois. Groundwater monitoring has being carried out in strict accordance with criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01.

Enva Ireland has been operating under Waste Licence Register No. W0184-01 since January 2004, and is required to submit a report to the Environmental Protection Agency (EPA) on a quarterly basis, outlining the existing groundwater quality underlying the site.

Suitably qualified environmental consultants from RPS, collected groundwater samples from a series of 8 monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03, MW04) within the site boundaries on the 16th of November 2011. The samples underwent laboratory analysis for the suite of parameters specified in Schedule 4(ii) of Waste Licence W0184-01. This report outlines the results of the Quarter 4 monitoring for 2011 and reviews historical data recorded at the site.

1.2 OBJECTIVES & SCOPE OF WORK

The specific objectives and scope of work are as follows:

- Review of previous data as provided by Enva Portlaoise;
- Graphical presentation of key compounds and trends; and
- Discussion of results for Quarter 4 2011 within the context of previous results and available guideline concentrations.

2 REVIEW OF PREVIOUS DATA

2.1 INFORMATION SOURCES

The following documents were reviewed as part of this project:

- Waste Licence W0184-01 and any available EPA documents from the EPA website
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2004)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), URS (2005)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2006)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2007)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2008)
- Quarterly Groundwater Monitoring Reports (Quarter 1 to Quarter 4), RPS (2009)
- Summary Report on Trend of Contaminant Levels at Enva Ireland Ltd since 2005, Ref: MDE0647RP0001, RPS (2007)
- Groundwater Risk Assessment, Ref: MDE0788Rp0001, RPS (2008)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0001F02, RPS (2010)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0002F01, RPS (2010)
- Quarter 3 Groundwater Monitoring Report, Ref: MDE0973Rp0003F01, RPS (2010)
- Quarter 4 Groundwater Monitoring Report, Ref: MDE0973Rp0004F01, RPS (2010)
- Quarter 1 Groundwater Monitoring Report, Ref: MDE0973Rp0005F01, RPS (2011)
- Quarter 2 Groundwater Monitoring Report, Ref: MDE0973Rp0006F01, RPS (2011)
- Quarter 3 Groundwater Monitoring Report, Ref: MDE0973Rp0007F01, RPS (2011)

2.2 SITE SETTING

The site is located to the southwest of the town of Portlaoise immediately to the south of the Dublin to Cork railway line. The general area is gently undulating. The site slopes gently to the southwest but to the east of the site the ground slopes gently towards the River Triogue, which is located approximately 1 km to the east. The site occupies an area of approximately 1.5 hectares and comprises of an operational waste oil and contaminated soil treatment plant.

The site is located on the outskirts of Portlaoise in an area of agricultural and light industrial development. The site is bounded to the north and east by land belonging to Irish rail, comprising sidings and general storage areas. To the south is a vehicle repair garage, which is elevated above the level of the site by approximately 1.5 m. To the west the site is adjoined by further industrial land, as well as residential land. The site location is presented on **Figure 1**.

The site has been in operation since 1978, and the layout has remained relatively consistent. The site layout is presented on **Figure 2**. The site is largely covered in hardstanding with some open areas in the far north and northwest of the site. All oil and soil storage areas are suitably bunded and the general standard of housekeeping is good.

2.3 REGIONAL SETTING

2.3.1 Geology

The Geological Survey of Ireland indicates that the regional geology of Portlaoise is typified by Carboniferous Limestone. In the vicinity of the site itself the solid geology comprises the Ballysteen Formation, a micaceous-bioclastic limestone. This well-bedded limestone, with interbeds of shale, is extensively folded, with axes trending north-east to south-west, and becomes increasingly muddy towards the top of the formation. North-east to south-west trending faults are found in the region, with one located approximately 500m to the east of the site. The subsoil's in the region comprise mainly Made Ground, around the industrial area, and Limestone Till in the surrounding regions.

2.3.2 Hydrogeology

The limestone is classified by the Geological survey of Ireland (GSI) as a locally important karstified aquifer. Porosity is predominantly in the form of fractures, in this aquifer, however the muddy nature of this formation greatly reduces permeability. Vulnerability of this aquifer beneath the site is classified as high, with moderate vulnerability to the east of the site.

The public water supply for Portlaoise is derived from groundwater, utilising five extraction wells in total. This supply currently comes from the Straboe area, approximately 5.5 km to the north-east of the site. The source protection zone for this water supply extends north-west south-east with the boundary of the outer protection zone at least 4 km to the north-east of the site. A further public abstraction well-field is currently being developed to the north-west of the current area in the townland of Eyne, approximately 6 km to the north of the site, and will comprise a further five abstraction wells. The Source Protection Zone for these wells has not yet been defined but it is not anticipated to affect the Enva site.

The GSI record a number of other dug wells and boreholes within the Portlaoise area, including the boreholes installed on the site. The accuracy of the locations of these wells varies. One well, which was drilled in 1899 is recorded as being located immediately to the south of the Enva site. The use of this well is not known and its location is only accurate to 1 km. A second borehole, drilled in 1973 is recorded 1.5 km to the north of the site at Clonroosk, the accuracy of this location is also 1 km so that it could be closer or further from the site. The use of this well is not known but its yield is recorded as being poor. There are no other wells recorded within 1 km of the site.

Enva is not aware of any abstraction boreholes within the immediate vicinity of their site.

2.4 SITE GROUND CONDITIONS

A total of eight boreholes have been drilled at the site and the general sequence of ground conditions is presented in **Table 2**.

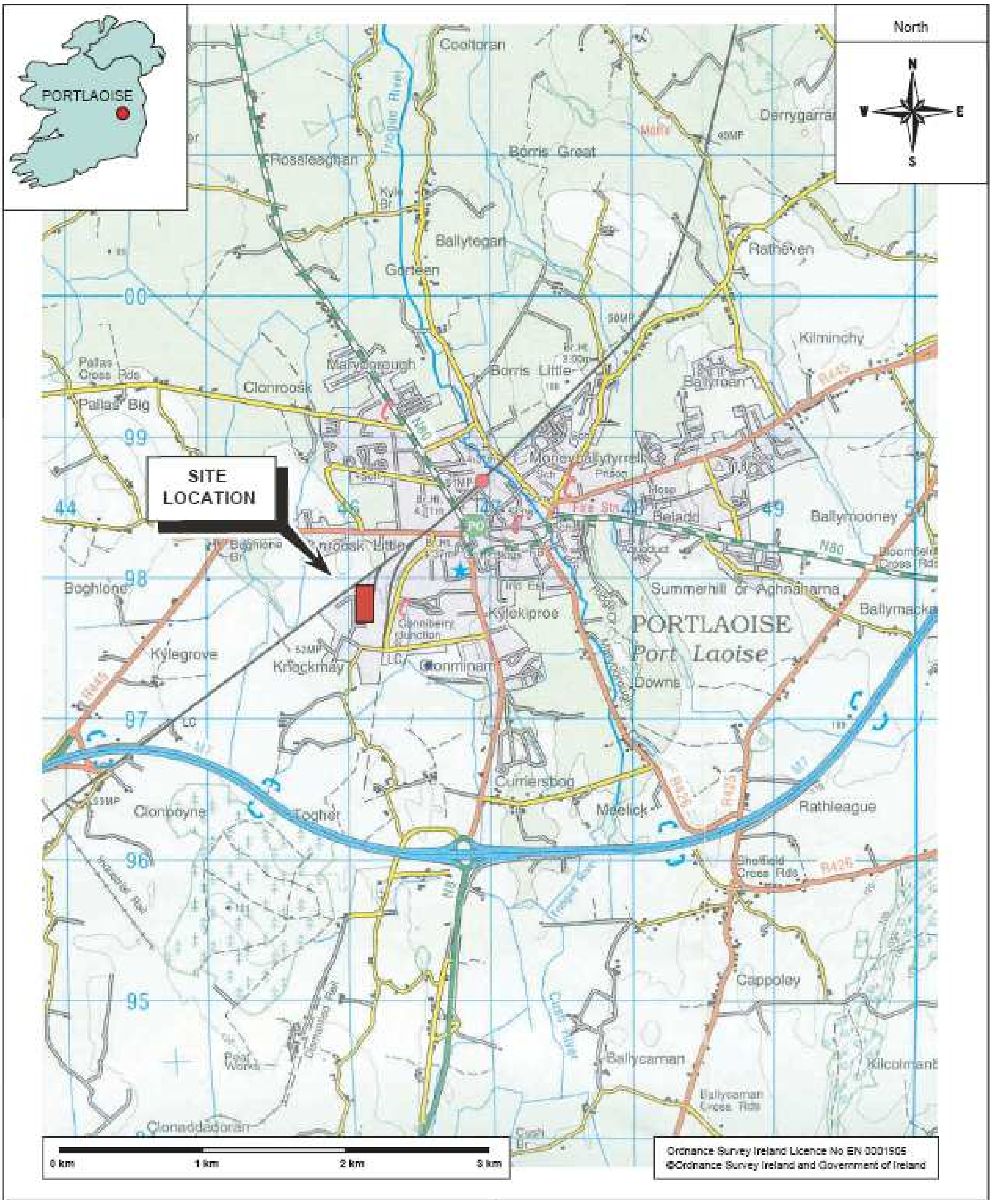
Table 2.1: Ground Conditions

Strata	Extent	Thickness	Description
Made Ground	BH104	0-3.5 m	Predominantly concrete, with hardcore fill, and clay.
Boulder Clay	All boreholes	<8.5 m	Includes fine to medium, well rounded gravels.
Sand and Gravel	Confined to	0-2 m	In general the transition from boulder clay to

Strata	Extent	Thickness	Description
	south east corner of site (BH101, BH104 and MW03)		sand is gradual with changes from gravel, to sandy gravel, to sand.
Limestone Bedrock	Encountered in MW01, MW02 and MW03	Top of limestone ranges from 7.7m to 9m below ground level.	Pale grey, fine-grained bedrock, differentiated from boulders by its un-weathered nature.

The logs for each of the boreholes were previously presented as Appendix B in the RPS Groundwater Risk Assessment Report (Ref: MDE0788Rp0001).

Figure 1 Site Location



2.4.1 Licence Conditions

The waste management licence requires the regular monitoring and sampling of boreholes BH101, BH102, BH103, BH104B, MW01, MW02 and MW03. The parameters requiring measurement or analysis are presented in Table 2.2.

An additional groundwater monitoring well was installed at the site on the 4th of November as requested by the EPA (Ref: W0184-01/GC21JF, dated 29th July 2010). This additional groundwater monitoring well is subject to the monitoring requirements of W0184-01 as outlined in Table 2.2 below.

Table 2.2: Licence Parameters

Group	Parameters requiring Quarterly Measurement	Parameters requiring Annual Measurement
Field Parameters	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection	Groundwater Level pH Temperature Dissolved Oxygen Electrical Conductivity Visual Inspection
Organics	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's	Mineral Oil BTEX & MTBE PAH's Phenols VOC's SVOC's
Inorganics	-	Total Alkalinity, Calcium, Manganese, Sulphate, Cyanide (Total), Chloride, Sodium,

3 METHODOLOGY

Groundwater samples were collected from 8 no. on-site groundwater-monitoring wells (BH101, BH102, BH103, BH104B, MW01, MW02, MW03, MW04), (See Figure 2) using dedicated Waterra tubing, in accordance with RPS's standard sampling protocol. A non-return foot valve was fixed to the bottom of the tubing and inserted into the well, close to the base of the borehole. Separate tubing and foot valves were used at each monitoring well to eliminate the possibility of cross contamination.

Groundwater in the well casing is not considered representative of the groundwater quality at a given location. For this reason, three well volumes were purged from each well prior to collection of the groundwater sample. By the time purging was complete all field test water parameters (namely pH, Temperature, Electrical Conductivity and Dissolved Oxygen) were within 10% variance in three consecutive measurements. This ensured that the groundwater sample extracted from the monitoring borehole was representative of the water held in the subsurface strata and not water held stagnant in the borehole casing. The purged volumes were calculated on-site from the measured static water levels and total well depths using an electronic dip meter.

Groundwater samples were collected in laboratory supplied containers and stored in chilled cool boxes following sampling and during transit to the laboratory. A rigorous chain of custody procedure was used during the sample round.

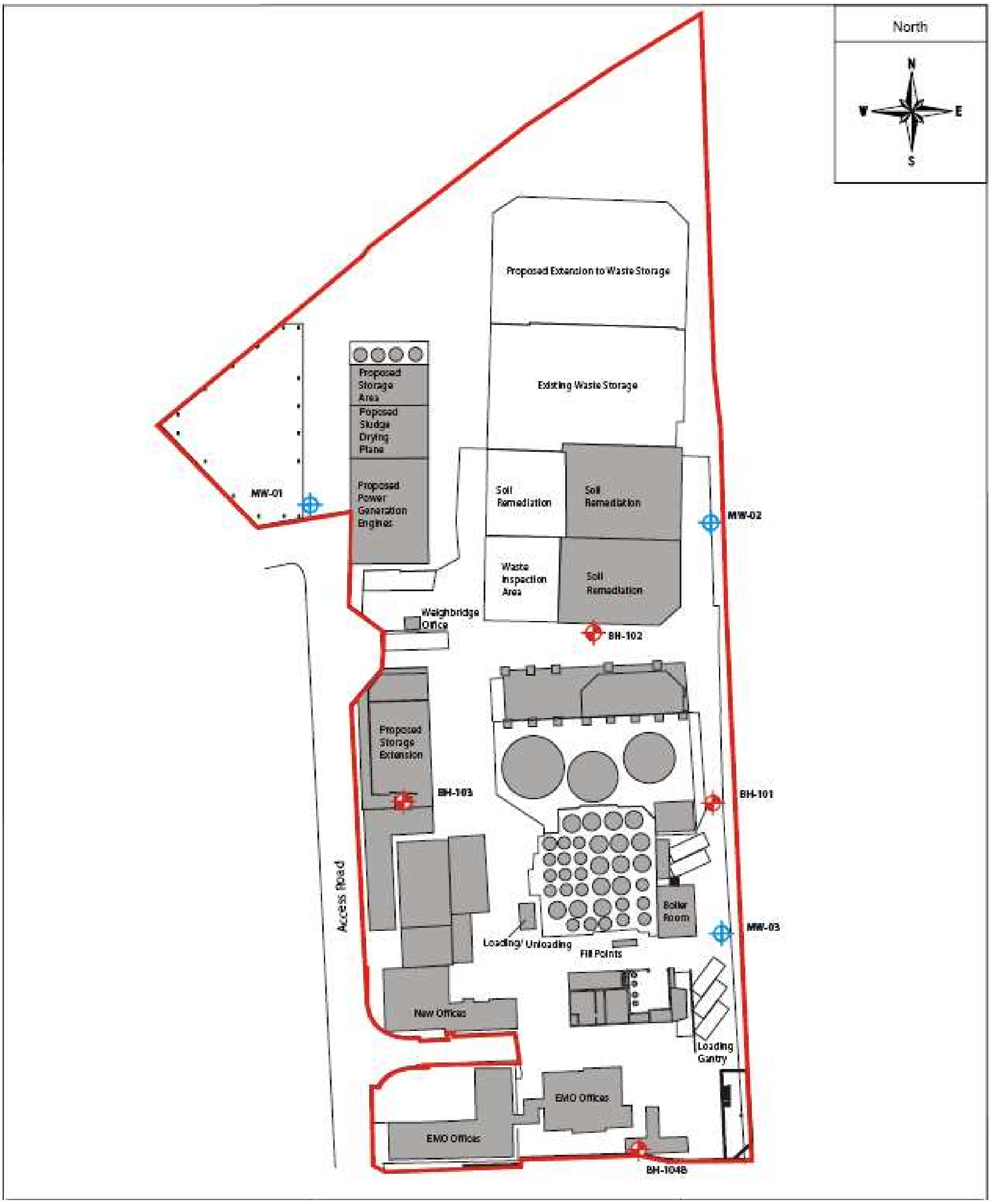
3.1 LABORATORY ANALYSIS

All groundwater samples were analysed at a UKAS accredited laboratory, I2 Analytical Ltd for the suite of analyses listed in Table 3.1. Table 3.1 also indicates the analytical techniques used by the laboratory.

Table 3.1: Analytical Methodologies – I2 Analytical Ltd

Parameter	Analytical Methodology
Phenols	GC-MS
Speciated PAHs	GC-MS
BTEX & MTBE	Headspace GC-MS
Petroleum Hydrocarbons	Headspace GC-MS
Volatile Organic compounds & Tentatively Identified Organic Compounds (VOCs & TICs)	Headspace GC-MS
Semi-Volatile Organic compounds & Tentatively Identified Organic Compounds (SVOCs & TICs)	GC-MS

Figure 2 Site Layout Plan with groundwater monitoring well locations



Shallow Monitoring Well locations

Deep Monitoring Well locations

Source: *URS Environmental Consultants (Ref: 45078497 Issue No. 1)*

3.2 PRESENTATION & INTERPRETATION OF RESULTS

The Quarter 4 2011 results are tabulated in Section 4 and discussed with respect to previous results. The results have been compared to the EPA Interim Guideline Values (IGV) as set out in the Report 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004. It is important to note that the IGVs are based on the lowest acceptable value for either drinking water or environmental quality in surface water and is therefore conservative in nature.

Previous monitoring reports (as listed in Section 2.1) provide details of contaminant concentrations since 2004. The data available within these reports has been reviewed and time series plots of key parameters have been compiled. Trends for chlorinated solvents, petroleum hydrocarbons and phenol parameters have been plotted.

Time series plots are presented in Section 6 and include the results of this Quarter 4 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds used to illustrate the results.

Time series plots are also provided for manual water levels where available from previous reports.

4 QUARTER 4 RESULTS NOVEMBER 2011

The results of all field measurements and laboratory analysis are presented in this section.

The results are discussed in relation to appropriate guideline values in Section 5. Results that are shown to be above the relevant guideline values are highlighted in bold and shaded. Results that are shown to be above the relevant laboratory detection limits are highlighted in italics.

Site-specific field parameter measurements were collected during the site visit as per RPS Water sampling protocol.

Table 4.1: Groundwater Levels (Quarter 4, 2011)

Monitoring Well	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1
Depth (mbgl)	6.82	6.64	4.56	4.84	22.94	30.0	15.05	7.20
Static Water Level (mbgl)	4.25	3.34	1.68	0.77	3.44	4.84	4.06	3.88
Ground Level (mAOD)	103.06	102.55	101.16	101.52	102.1	103.12	102.77	TBC Note 2
Water Level (mAOD)	98.81	99.21	99.48	100.75	98.66	98.28	98.71	TBC Note 2
Free Phase Oil (mm)	No detection	No detection	No detection	No detection	No detection	No detection	No detection	No detection

mbgl = metres below ground level
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)
Note 2: Groundwater and Water Level (mAOD) to be confirmed by topographic level survey

Table 4.2: Results of Field Parameters Measured at each Groundwater Monitoring Well (Quarter 4, 2011)

Monitoring Well	pH (pH Units)	Temperature (℃)	Conductivity (µS/cm)	Dissolved O_2 (ppm)	Observations
BH101	**6.49**	12.7	**1874**	3.56	Some surface water ingress noted at this location. Purged water grey in colour with oily residue noted at surface. H_2S odour detected on purging, no odour detected at 20L, sandy sediment noted.
BH102	**4.95**	12.8	**1184**	2.03	Purged water yellowish in colour, H_2S odour detected on purging.
BH103	**5.89**	12.1	833	6.74	Purged water brown in colour, sandy sediment noted. Slight H_2S odour detected before purging, no odour detected from purged water.
BH104B	**5.78**	10.9	424	3.87	Thin film of oily residue noted on surface before purging. Purged water dark colour at 10L becoming clearer at 20L. H_2S odour detected.
MW01	**5.78**	11.9	684	6.54	Purged water grey in colour, no odour detected, fine sediment noted. Oily slick noted at 65L
MW02	**5.03**	11.6	653	4.71	Purged water clear in colour, no odour, some sediment noted.
MW03	**6.12**	11.2	935	7.24	H_2S odour detected with oily slick noted at the surface and black suspended solids.
MW04 Note 1	6.78	13.2	**1383**	8.62	Purged water brown in colour, no odour detected, suspended solids noted. Mud/Sand noted at bottom of bucket.
Interim EPA Guideline Values (Units as indicated)	**>6.5 & <9.5**	**25℃**	**1000**	**No abnormal change**	**-**

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.3: Results of BTEX & MTBE

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 Note 1
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10 Note 1
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30

Note 1: No specific IGV for parameter. IGV for Total Xylenes is used as guideline.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.4: Results of Speciated PAH's

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	< 0.01	<0.01	<0.01	<0.01	< 0.01	1.0
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Total EPA-16 PAH's	µg/l	0.2	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	0.1

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are in italics.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.5: Results of Total Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Total Phenols (monohydric)	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	0.5
Total Phenols (GC-MS)	µg/l	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.5

Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.6: Results of Speciated Phenols

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Note: Results above the relevant laboratory limit of detection are in italics.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.7: Results of Semi-Volatile Organic Compounds (sVOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Aniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Phenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5
2-Chlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
Bis(2-chloroethyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
1,4-Dichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachloroethane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Nitrobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
4-Methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Isophorone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Nitrophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4-Dimethylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bis(2-chloroethoxy)methane	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40
Naphthalene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
2,4-Dichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chloroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Hexachlorobutadiene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10
4-Chloro-3-methylphenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	200
2,4,5-Trichlorophenol	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Methylnaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2-Chloronaphthalene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dimethylphthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
2,6-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Acenaphthylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Acenaphthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
2,4-Dinitrotoluene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibenzofuran	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Chlorophenyl phenyl ether	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Diethyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
4-Nitroaniline	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluorene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Azobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Bromophenyl phenyl	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
ether											
Hexachlorobenzene	µg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03
Phenanthrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Carbazole	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Dibutyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.0
Anthraquinone	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0
Pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Butyl benzyl phthalate	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Benzo(a)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Chrysene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(b)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Benzo(k)fluoranthene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Benzo(a)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Dibenz(a,h)anthracene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Benzo(g,h,i)perylene	µg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05

Note: Results above the relevant laboratory limit of detection in italics.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.8: Results of Volatile Organic Compounds (VOCs)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Chloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Vinyl Chloride	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichlorofluoromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2,2-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12
1,1,1-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	500
1,2-dichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,1-Dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,2-dichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Benzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
Tetrachloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
1,2-dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trichloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70
Dibromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromodichloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Cis-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Trans-1,3-dichloropropene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Toluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,1,2-Trichloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-Dichloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Dibromochloromethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tetrachloroethene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	40
1,2-Dibromoethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Chlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
1,1,1,2-Tetrachloroethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Ethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
p & m-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
Styrene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tribromomethane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
o-xylene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Isopropylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Bromobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
N-Propylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
2-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
4-Chlorotoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3,5-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Tert-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trimethylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Sec-Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,3-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
P-Isopropyltoluene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10
1,4-dichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
Butylbenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2-Dibromo-3-chloropropane	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
1,2,4-Trichlorobenzene	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1.0	<0.05	0.40
Hexachlorobutadiene	µg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10
1,2,3-Trichlorobenzene	µg/l	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-

Note: Results above the relevant laboratory limit of detection are in italics.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

Table 4.9: Results of Total Petroleum Hydrocarbons (Aliphatic/Aromatic)

Parameter	Units	Laboratory Limit of Detection	BH101	BH102	BH103	BH104B	MW01	MW02	MW03	MW04 Note 1	Interim EPA Guideline Values (Units as indicated)
Aliphatic > C5-C6	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C6-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aliphatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	***22***	<10	-
Aliphatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	***51***	<10	-
Aliphatic > C16-C21	µg/l	10	<10	<10	<10	<10	<10	<10	***85***	<10	-
Aliphatic >C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	***110***	<10	-
Aliphatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	**270**	<10	10
Aromatic > C5-C7	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C7-C8	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C8-C10	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C10-C12	µg/l	10	<10	<10	<10	<10	<10	<10	<10	<10	-
Aromatic > C12-C16	µg/l	10	<10	<10	<10	<10	<10	<10	***16***	<10	-
Aromatic > C16-C21	µg/l	10	<10	<10	78	<10	<10	<10	***14***	<10	-
Aromatic > C21-C35	µg/l	10	<10	<10	<10	<10	<10	<10	***91***	<10	-
Aromatic (C5-C35)	µg/l	10	<10	<10	<10	<10	<10	<10	**120**	<10	10

Note: Results above the relevant IGV are highlighted in bold and shaded.
Note: Results above the relevant laboratory limit of detection are highlighted in bold italics.
Note 1: Monitoring well, MW04 was installed on the 4th of November as requested by the Agency (Ref: W0184-01/GC21JF)

5 DISCUSSION OF QUARTER 4 RESULTS

The results of the Quarter 4 monitoring event for 2011 are presented in Table 4.1 to 4.9 of this report.

An additional groundwater monitoring well, MW04 was installed at the site on the 4th of November as requested by the EPA (Ref: W0184-01/GC21JF, dated 29th July 2010). This additional groundwater-monitoring well is subject to the monitoring requirements of W0184-01 and as such, samples were taken during the Quarter 4 monitoring event.

For the purpose of this report, the results are compared to the EPA Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.* A discussion of the results and their significance is included below.

5.1 FIELD PARAMETERS

The results of the field parameters measured at each groundwater monitoring well are presented in Table 4.2. Groundwater samples recorded pH levels ranging between 5.03 and 6.78. All pH measurements, with the exception of MW04 (6.78), were outside the EPA Interim guideline range of ≥6.5 to ≤9.5. pH measurements outside the guidelines were 0.05 – 1.55 pH units below the recommended 6.5 lower guideline. Temperature measurements ranged from 10.9℃ to 13.2℃ and were within the EPA IGV of 25℃.

Field measurements of Electrical Conductivity levels ranged between 424 µS/cm and 1874 µS/cm and were below the Interim Guideline Value of 1000 µS/cm at all locations with the exception of BH101 (1874 µS/cm), BH102 (1184 µS/cm) and MW04 (1383 µS/cm).

Dissolved oxygen levels ranged between 2.03 and 8.62 ppm. Factors such as climate, nutrients in the water, suspended solids; organic wastes and groundwater inflow can all influence the dissolved oxygen values.

Observations relating to colour and odour varied from well to well as detailed in Table 4.2.

5.2 RESULTS OF BTEX & MTBE

The results of the BTEX and MTBE analysis are presented in Table 4.3 and demonstrate concentrations below the laboratory limit of detections and associated IGV's at all locations.

Previous monitoring events detected MTBE above the laboratory limit of detection at a concentration of 16 µg/l during Quarter 1 and Quarter 2 of 2010 at BH103. During Quarter 3 and Quarter 4 of 2010 concentrations were below the laboratory limit of detection. Prior to these 2010 monitoring events, concentrations of MTBE at BH103 were recorded at 63 µg/l in December 2009. However, no exceedances of the IGV were recorded at any stage.

All concentrations of BTEX and MTBE were recorded below the laboratory limit of detection during the previous monitoring events in 2011 and during the current Quarter 4 monitoring event.

5.3 RESULTS OF SPECIATED PAH'S

The results of the Speciated PAH analysis during this monitoring period are presented in Table 4.4.

The laboratory limit of detection for Total EPA-16 PAH's is 0.2 µg/l. This laboratory limit of detection is above the EPA IGV of 0.1 µg/l. To identify the compounds, which attributed to these concentrations, speciated PAH analysis was carried out, which reduces the limit of detection for individual parameters to 0.01 µg/l.

The results of the speciated polycyclic aromatic hydrocarbon analysis detected no parameters above the laboratory limits of detection and all other parameters were below the EPA IGV's. The laboratory is accredited to achieve a detection limit of 0.2 µg/l for EPA-16 PAH's. The laboratory has confirmed that the detection limit for total EPA-16 PAH's can be lowered to 0.1 µg/l for comparison with the EPA IGV of 0.1 µg/l, however this will not be accredited.

5.4 RESULTS OF SPECIATED PHENOLS

The results of Total Phenol analysis are presented in Table 4.5. All samples detected concentrations of monohydric phenol below the laboratory limit of detection of 10 µg/l. It should be noted that the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols.

For this reason, samples were analysed for phenols to include chlorophenols. The results of the speciated phenols analysis are presented in Table 4.6. The speciated phenol analysis reduces the laboratory limit of detection to 0.05 µg/l for individual parameters.

The results of the current Quarter 4 monitoring for speciated phenol analysis confirm concentrations of phenols were below the laboratory limit of detection of 0.05 µg/l at all locations. This is consistent with the results from the previous Quarter 1, Quarter 2, Quarter 3 and 2011 monitoring events.

5.5 RESULTS OF SEMI-VOLATILE ORGANIC COMPOUNDS

The results of the Semi-Volatile Organic Compound analysis are presented in Table 4.7.

No SVOC's were detected during this monitoring period above the relevant IGV's.

5.6 RESULTS OF VOLATILE ORGANIC COMPOUNDS

The results of the Volatile Organic Compound analysis are presented in Table 4.8. The results of the current Quarter 4 2011 monitoring event indicate that there were no exceedances of VOC parameters detected above the relevant IGV's.

In November 2009, corresponding to Quarter 4 of 2009, no VOC's were detected above the relevant IGV's. However some parameters were detected above the laboratory limits of detection (1,1-Dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, MTBE, n-butylbenzene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene and tert-butylbenzene).

The Quarter 1 and Quarter 2 monitoring results of 2010 detected MTBE in BH103 raised above the laboratory limit of detection of 1.0 µg/l at a concentration of 16 µg/l.

The results of the Quarter 3 and Quarter 4 monitoring events of 2010 indicate that there were no exceedances of the IGV for specific parameters.

5.7 RESULTS OF TOTAL PETROLEUM HYDROCARBONS

In order to provide a more accurate profile of TPH within the groundwater, speciated hydrocarbon analysis using the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) method was carried out on samples taken at all boreholes. The results of the TPH analysis are presented in Table 4.9.

No detections were observed in the monitoring well locations during the current monitoring event with the exception of MW03. The EPA IGV of 10 µg/l for Total Hydrocarbons is deemed comparable with the results for total petroleum hydrocarbons (TPH). The TPH concentration has decreased since the previous Quarter 3, 2011 monitoring event however some individual species ranges have increased in concentration (Aliphatic range C10–C12, C16-C21 and Aromatic range C21-C35).

Hydrocarbons have been detected in borehole MW03 during Quarter 1 2010, in borehole BH104B during the Quarter 2 2010 monitoring event and in borehole BH104B and MW03 during the Quarter 3 2010 monitoring events. These detections are discussed in Section 6.2.3.

6 HISTORICAL RESULTS & TRENDS

Time series plots are presented in this section and include the results of the Quarter 4, 2011 monitoring round. As the monitoring continues in accordance with the waste licence requirements, the plots will be updated with the results of subsequent rounds and used to illustrate the results.

6.1 GROUNDWATER LEVELS OVER TIME

Figure 3 to Figure 5 below illustrate the manually recorded water levels using an electronic probe. The graphs show that groundwater levels can vary considerably between monitoring rounds.

Figure 4 illustrates groundwater elevations (mAOD) in shallow groundwater wells (BH101 to BH104B) ranging between approximately 99 mAOD and 100 mAOD.

Figure 5 illustrates groundwater elevation (mAOD) in the deeper groundwater wells (MW01 to MW03). The groundwater elevation (mAOD) for these deeper groundwater wells ranges from approximately 98 mAOD to approximately 99 mAOD.

Figure 3 Groundwater Elevation (mAOD) in all Monitoring Wells

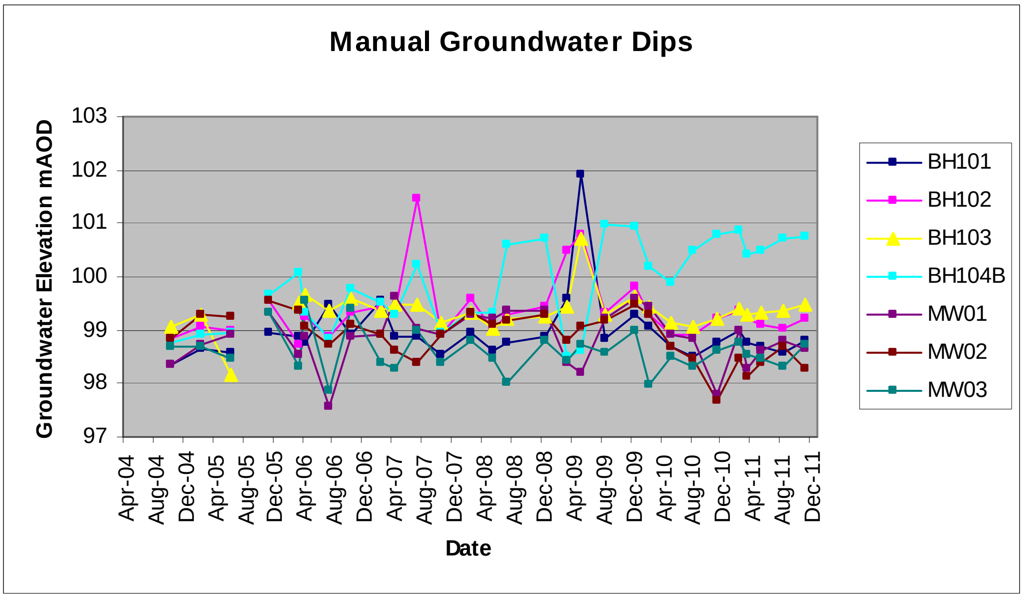


Figure 4 Groundwater Elevation (mAOD) in Shallow Monitoring Wells

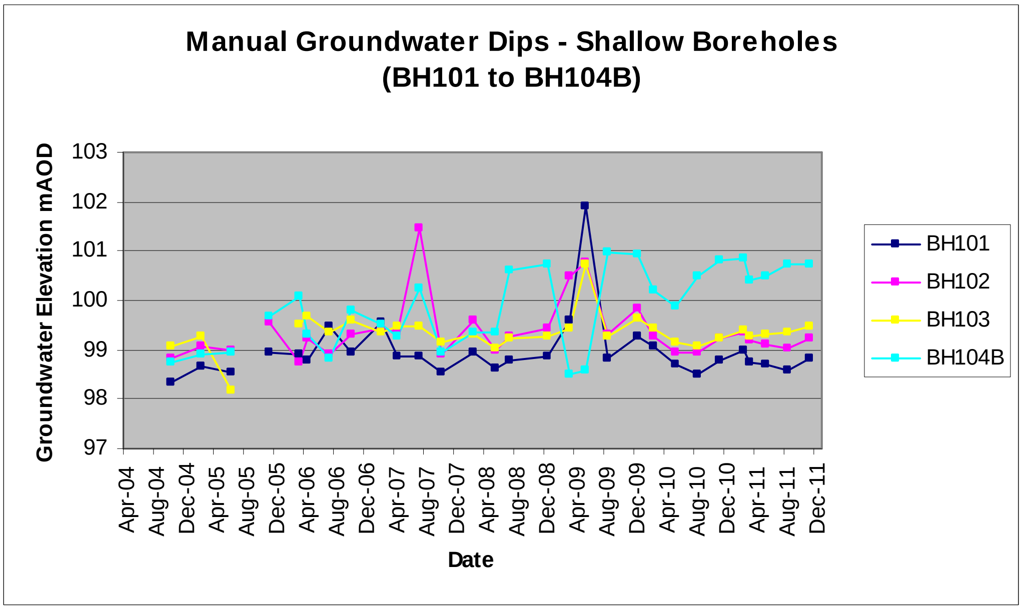
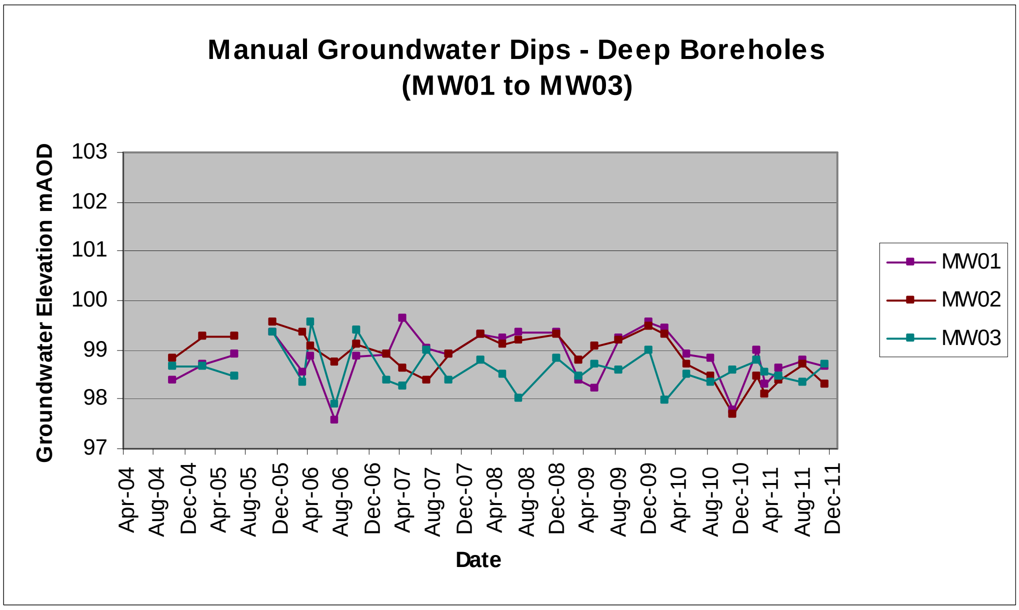


Figure 5 Groundwater Elevation (mAOD) in Deep Monitoring Wells



The groundwater levels generally show a similar pattern of fluctuation over time indicating a degree of connection between boreholes. The graphs demonstrate that groundwater levels can vary considerably between monitoring rounds; however, the general direction of flow in the shallow and deeper groundwater bearing unit is predominantly in a south easterly direction and occasionally in a southerly direction.

In addition, monthly rainfall data for Oak Park, Carlow have been tabulated from Met Eireann to examine the relationship between compounds and rainfall events. The data from Oak Park was chosen as the weather station at Birr, Co. Offaly closed in October 2009. A summary of the rainfall data is in Tables 5.1, 5.2 and 5.3.

Table 5.1: Monthly Rainfall data for Year 2009 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	113.4	29.2	32.6	102.4	69.0	65.4	152.4	100.9	41.8	127.8	215.5	73.7

Table 5.2: Monthly Rainfall data for Year 2010 for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec
Rainfall (mm)	71.5	48.0	80.7	49.0	51.4	37.7	93.6	25.5	108.7	68.9	87.7	52.2

Table 5.3: Monthly Rainfall data for 2011 to date for Oak Park, Carlow

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	50.6	121.9	16.0	19.5	51.2	72.7	46.4	25.5	93.9	93.9	89.2	55.5

Note: Data for the most recent months are provisional.
* Monthly values for Oak Park up to 4th January 2012

6.2 GROUNDWATER CONCENTRATIONS OVER TIME

Groundwater quality trends have previously been examined in two reports (URS 2005 and RPS 2007). In addition, RPS carried out a groundwater risk assessment (Ref: MDE0788RP0001, dated November 2008) in which the general trend of contaminant concentrations over time was observed to be erratic with compounds rarely being detected in the same borehole on two consecutive monitoring rounds.

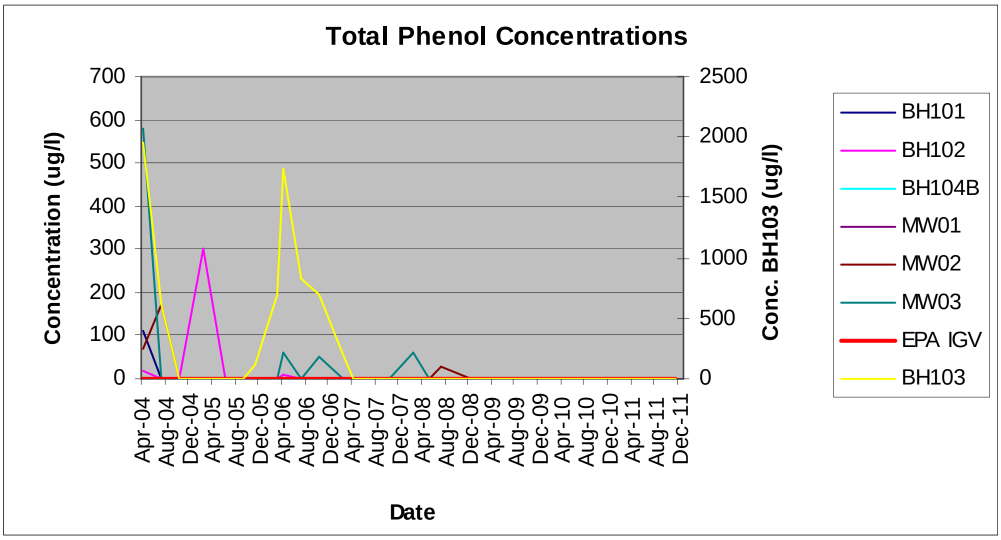
The data available within these reports has been reviewed and time series plots of key parameters have been compiled based on notable trends. Trends for phenols, petroleum hydrocarbons and chlorinated solvents have been plotted as outlined in the following sections.

6.2.1 Phenols

Phenols have been detected historically in all boreholes with the highest concentrations recorded in BH103. However concentrations in BH103 have declined since April 2007. Phenol concentrations have since been recorded below the IGV of 0.5 µg/l in all monitoring wells since December 2008 indicating natural attenuating conditions within the groundwater.

2,4-Dimethylphenol was detected at a concentration of 0.12 µg/l during the Quarter 1, 2010 monitoring event. There is no recommended IGV for this parameter. No detections of this parameter were noted in the subsequent Quarter 2, Quarter 3, Quarter 4 monitoring events of 2010, the Quarter 1, Quarter 2, Quarter 3 monitoring events of 2011 and the current Quarter 4, 2011 monitoring event.

Figure 6 Phenol Concentrations in all Monitoring Wells



6.2.2 Polycyclic Aromatic Hydrocarbons (PAH's)

Figure 7 below illustrates that PAH's (Polycyclic Aromatic Hydrocarbons) have previously been detected within all monitoring wells above the recommended EPA IGV of 0.1 µg/l. Historically the highest concentrations have been detected within MW03 and BH104B. In addition, a range of PAH's including Benzo(a)pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3)cd pyrene, Fluoranthene and Napthalene have previously been detected in MW03 with Figures 8 to 11 illustrating some of the PAH compounds which were detected above their respective IGV's.

Figure 7 illustrates that **Total PAH** has been detected in all groundwater monitoring wells at the site above the IGV of 0.1 µg/l since 2005. Elevated concentrations have been detected in MW03 and BH104B, with the highest concentration detected in March 2006 (107 µg/l) and in October 2007 (19.72 µg/l) respectively. Since then, the concentrations have shown a marked decrease with no elevated Total PAH concentrations in this current Quarter 4 monitoring event of 2011.

The results from the Quarter 4, 2009 monitoring round in December 2009 recorded total EPA-16 PAH concentrations above the IGV at all locations with the exception of MW02. These concentrations may be linked to the heavy rainfall event, which occurred in November of 2009, which may have mobilized traces of these compounds from soil.

The results from the Quarter 1 monitoring round, 2010 recorded Total PAH concentrations below the IGV of 0.2 µg/l at all locations with the exception of MW03, which detected a concentration of 0.3 µg/l. There has been a decrease in Total PAH concentrations at all locations since the Quarter 4 event in December 2009 with the most notable decrease at MW03 reducing from 4.58 µg/l to <0.1 µg/l.

The only concentrations of Total PAH above the IGV in 2010 were detected during the Quarter 1 monitoring event in MW03 (0.3 µg/l), Quarter 2 monitoring event in BH104B (1.2 µg/l) and Quarter 3 monitoring event in MW02 (2.0 µgl) and BH104B (0.2 µgl). There were no elevated concentrations of Total PAH during the Quarter 4 2010, the previous Q1, Q2 and Q3 2011 monitoring events and the current Q4 monitoring event.

Figure 7 PAH (Total) Concentrations in all Monitoring Wells

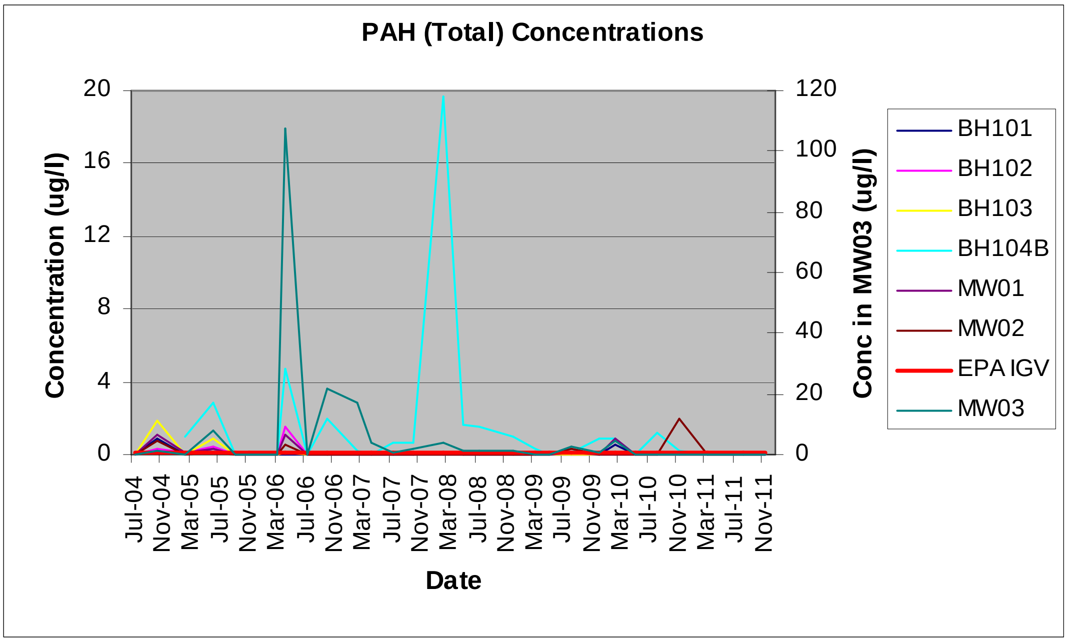


Figure 8 Fluoroanthene Concentrations in all Monitoring Wells

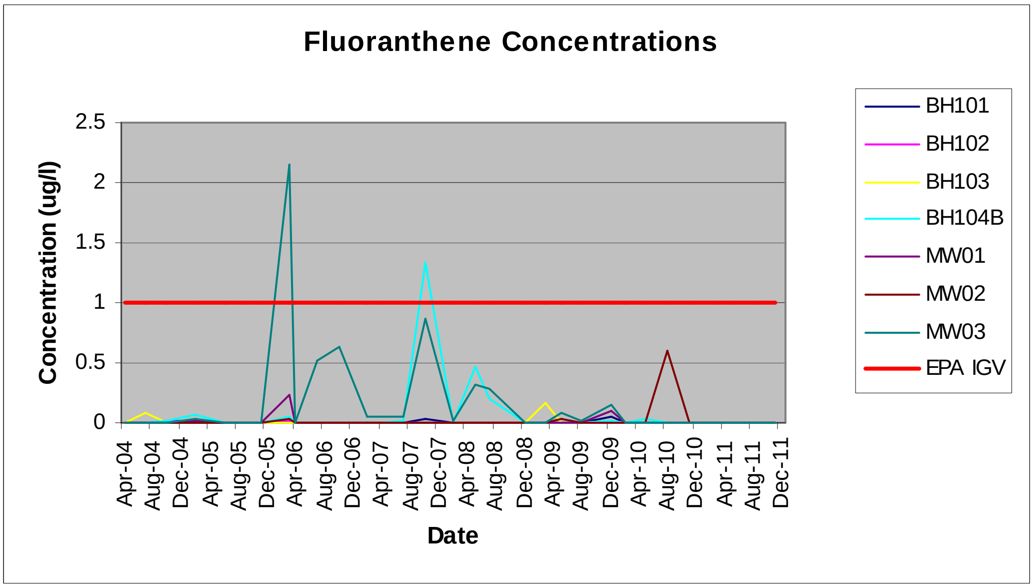
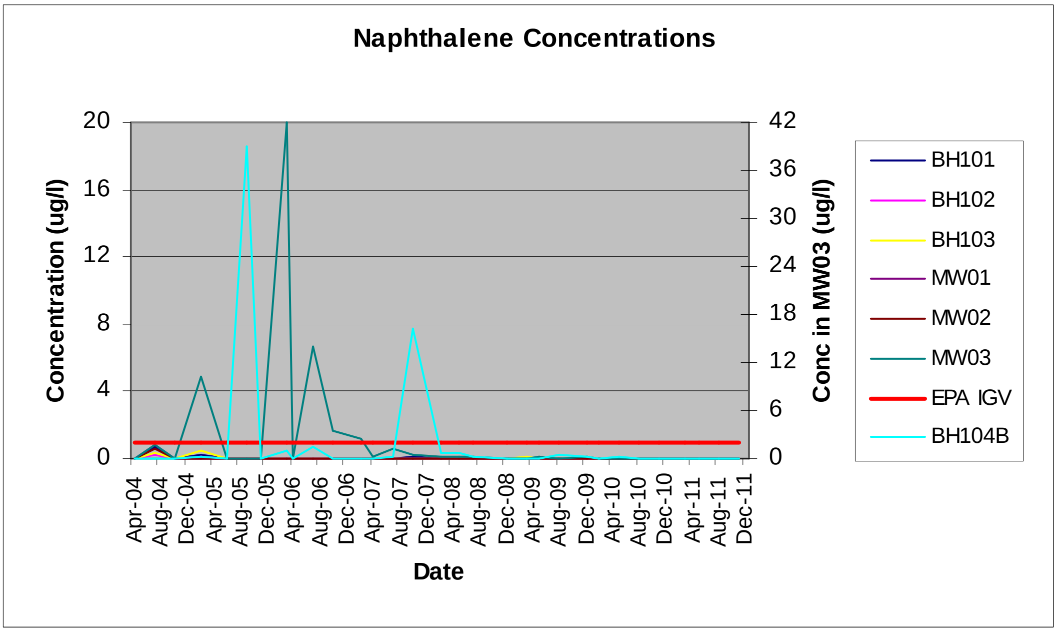


Figure 8 illustrates that **Fluoroanthene** was previously detected above the IGV of 1.0 µg/l in groundwater monitoring wells BH104B (October 2007, 1.33 µg/l) and MW03 (March 2006, 2.158 µg/l) only. The remaining monitoring wells recorded concentrations below the IGV of 1.0 µg/l.

Figure 9 Naphthalene Concentrations in all Monitoring Wells



A similar trend to Fluoroanthene has been noted in Figure 9, with concentrations of **Naphthalene** recorded above the IGV of 1.0 µg/l in BH104B and MW03 only. 4 no. exceedances of the IGV were noted in BH104B in September 2005 (39 µg/l), March 2006 (1.069 µg/l), July 2006 (1.594 µg/l) and October 2007 (16.31 µg/l). Since October 2007, the concentrations in BH104B have decreased below the IGV. There have been 5 exceedances of the IGV of 1.0 µg/l in MW03, with the highest concentration detected in March 2006 (19.986 µg/l). Naphthalene concentrations have been recorded below the IGV of 1.0 µg/l since April 2007. The concentrations detected in August 2010 were slightly above the laboratory limit of detection of 0.01 µg/l at BH104B (0.08 µg/l) and MW03 (0.05 µg/l);

however these levels are deemed low. Concentrations of Naphthalene were below the EPA IGV limit of detection of 1.0 µg/l at all locations during the Quarter 4 2010, the Quarter 1, Quarter 2, the previous Quarter 3, 2011 monitoring events and the current Quarter 4 monitoring event.

Figure 10 Benzo (g,h,i) perylene in all Monitoring Wells

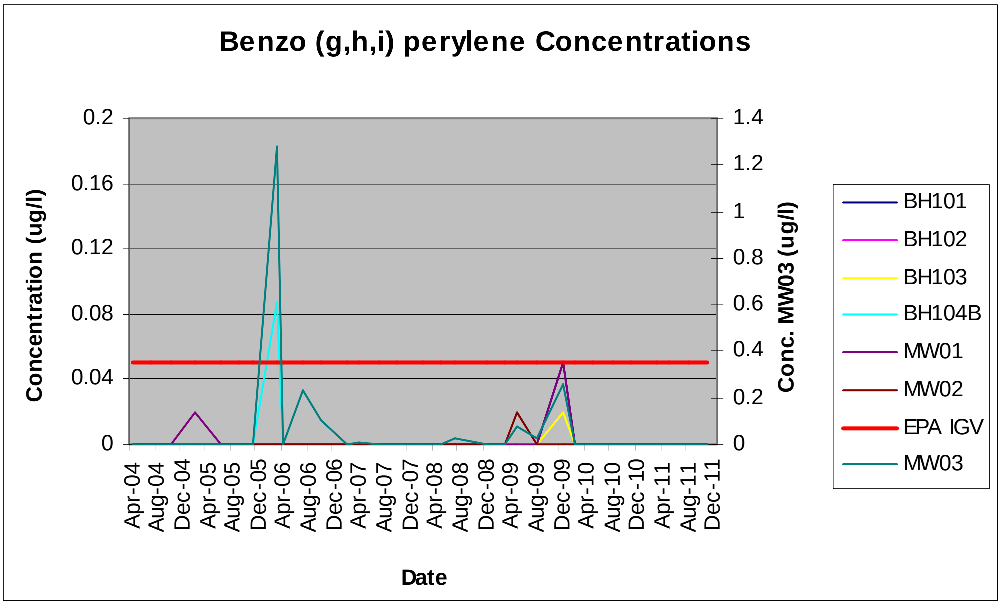


Figure 10 illustrates the concentrations of **Benzo(g,h,i)perylene** in BH104B and MW03 over time. Elevated concentrations above the IGV were recorded at BH104B (0.087 µg/l) on one occasion only in March 2006.

Figure 10a illustrates elevated concentrations above the IGV recorded at MW03 on 5 no. occasions with the most recent elevated concentration detected in December 2009 (0.26 µg/l). The results of monitoring events in May, August, November 2010, March, May and September 2011 and the current Quarter 4 2011 monitoring event recorded concentrations below the laboratory limit of detection of 0.01 µg/l at all locations.

Figure 10a Benzo (g,h,i) perylene in Monitoring Wells BH104B & MW03

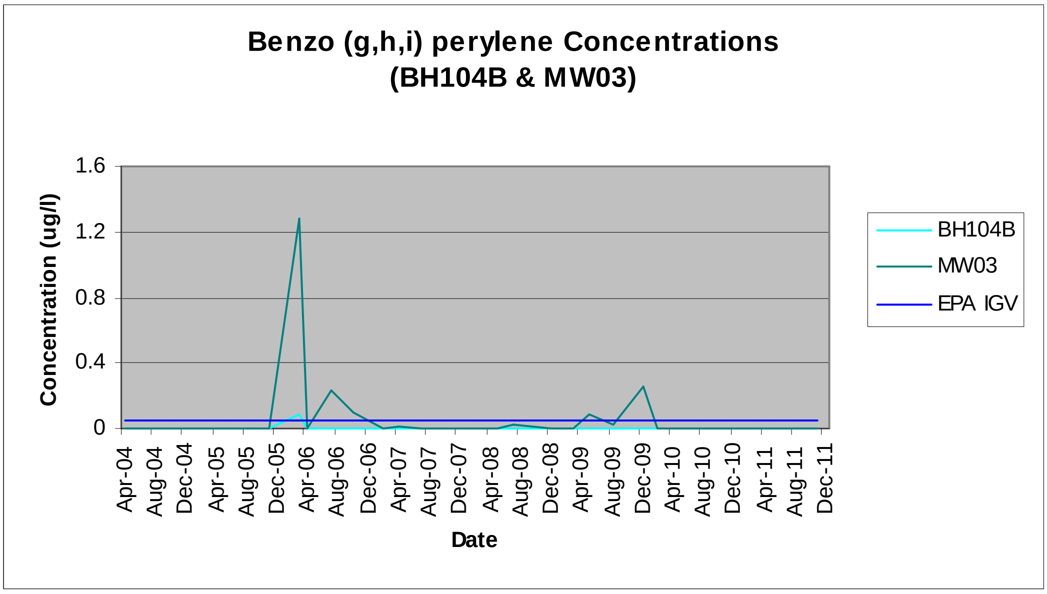
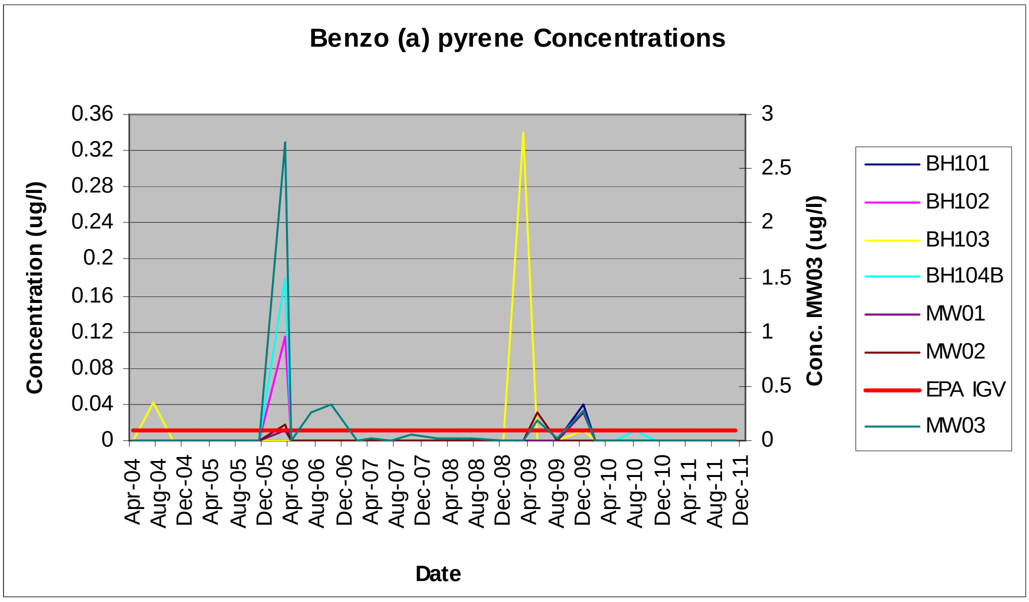


Figure 11 illustrates the concentrations of **Benzo(a)pyrene** in all groundwater monitoring wells and indicates that Benzo(a)pyrene has been detected historically in all boreholes above the IGV of 0.01 µg/l. Similarly with the above mentioned trends, the highest concentrations have been detected in MW03 and BH104B. Concentrations have markedly decreased since March 2006 when an elevated concentration of 2.751 µg/l was detected in MW03, however there have been a number of detections above the IGV, with the most recent elevated level detected in December 2009. Elevated concentrations above the IGV were recorded in BH101, BH103 and MW01 during this same period. The results of all monitoring events in 2010 (February, May, August and November) indicate concentrations below the IGV. The results of the previous Quarter 1, Quarter 2 and Quarter 3 2011 monitoring events and the current Quarter 4 event also recorded concentrations below the IGV.

The slightly higher concentrations of Benzo(g,h,i)perylene and Benzo(a)pyrene detected in Quarter 4, 2009 may be attributed to heavy rainfall, which occurred in November of 2009 and as a result possibly mobilized traces of these compounds from the soil. The static water levels for December 2009 ranged between 0.58 and 3.78 mbgl. Since December 2009, concentrations of compounds have notably decreased to below the IGV's.

Figure 11 Benzo(a)pyrene in all Monitoring Wells

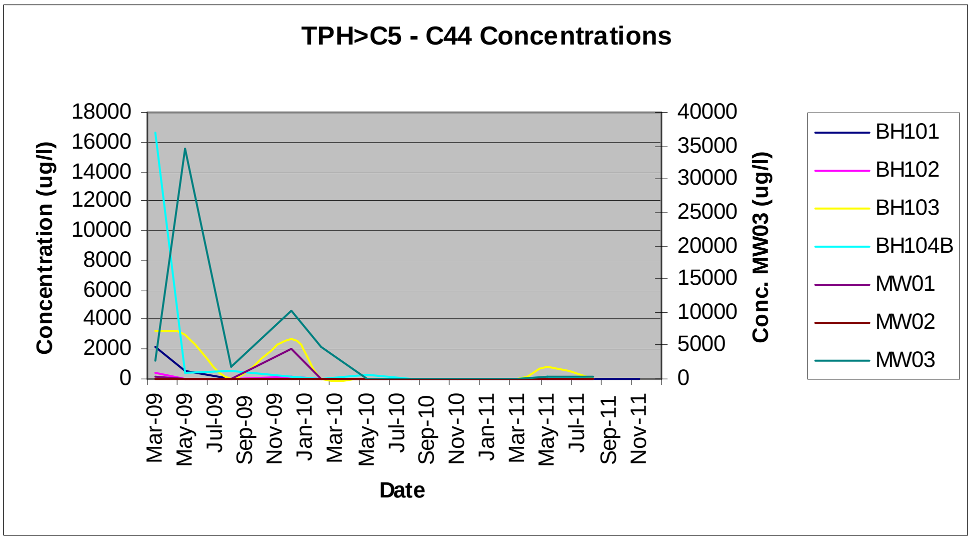


6.2.3 Petroleum Hydrocarbons (TPH)

Historically Total Petroleum Hydrocarbons (TPH) including mineral oil, petrol range organics (PRO) and diesel range organics (DRO) have been detected within BH103, BH104B and MW03. Since 2009, speciated hydrocarbon analysis using the Total Hydrocarbon Criteria Working Group (TPHCWG) method has been carried out on all samples to obtain a more accurate profile of TPH within groundwater.

The results of the TPHCWG analysis has indicated that the predominant hydrocarbons detected are in the heavier chain carbon fractions, most notably in the carbon range C16 - C21, C21 - C35 and C35 - C44. Figure 12 illustrates the TPH analysis for the total TPH analysis from C5 - C44 in all monitoring wells since 2009. The highest concentrations detected historically are at monitoring wells MW03, BH104 and BH103 respectively.

Figure 12 TPH (Carbon Range C5-C44) in all Monitoring Wells



During the Quarter 1, 2010 monitoring event, hydrocarbons were detected in borehole MW03. The predominant aliphatic carbon range in MW03 comprised of C16-C21 (1000 µg/l), C21-C35 (2300 µg/l) and C25-C44 (990 µg/l). The predominant aromatic carbon range in MW03 comprised of C16-C21 (220 µg/l) and C21-C35 (620 µg/l). No detections were observed at other locations.

During the Quarter 2, 2010 monitoring event, hydrocarbons were detected in borehole BH104B, with the predominant aliphatic carbon range comprising C12-C16 (130 µg/l) and C16-C21 (130 µg/l), while the predominant aromatic carbon range comprising C12-C16 (21 µg/l) and C16-C21 (47 µg/l). There were no detections of hydrocarbons in MW03 during the Quarter 2 monitoring event.

During the Quarter 3, 2010 monitoring event, hydrocarbons were detected in borehole BH104B and MW03. The predominant aliphatic carbon range in BH104B comprised of C12-C16 (12 µg/l) and C16-C21 (19 µg/l). The predominant aliphatic carbon range in MW03 comprised of C16-C21 (35 µg/l) and C21-C34 (46 µg/l). No aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the Quarter 4, 2010 and Quarter 1, 2011 monitoring event, there were no detections of TPH concentrations above the laboratory limit of detection of 10 µg/l at any location. No aliphatic or aromatic carbons were detected above the laboratory limit of detection of 10 µg/l in all monitoring wells.

During the Quarter 2, 2011 monitoring event, hydrocarbons were detected in borehole BH103, BH104B and MW03. The predominant aliphatic carbon range comprised of C16-C21 (340 µg/l, 20 µg/l and 46 µg/l) and C21-C35 (420 µg/l, 96 µg/l and 150 µg/l in BH103, BH104B and MW03 respectively). The predominant aromatic carbon range also comprised of C16-C21 (78 µg/l, 52 µg/l and 50 µg/l) and C21-C35 (110 µg/l, 49 µg/l and 93 µg/l in BH103, BH104B and MW03 respectively).

During the previous Quarter 3, 2011 monitoring event, hydrocarbons were detected in borehole MW03 only. The predominant aliphatic carbon range comprised of C10-C12 (18 µg/l), C12-C16 (57 µg/l), C16-C21 (35 µg/l) and C21-C35 (210 µg/l). The predominant aromatic carbon range comprised of C12-C16 (42 µg/l), C16-C21 (66 µg/l) and C21-C35 (45 µg/l).

During the current Quarter 4, 2011 monitoring event, hydrocarbons were detected in borehole MW03 only. The predominant aliphatic carbon range comprised C10-C12 (22 µg/l), C12-C16 (51 µg/l), C16-C21 (85 µg/l) and C21-C35 (110 µg/l). The predominant aromatic carbon range comprised of C12-C16 (16 µg/l), C16-C21 (14 µg/l) and C21-C35 (91 µg/l).

7 CONCLUSIONS

- In accordance with the criteria set out in Schedule 4(ii) of the site's Waste Licence Register No. W0184-01, groundwater monitoring was carried out at the ENVA Ireland site on the 16th November 2011 corresponding to Quarter 4 of 2011. A suitably qualified consultant from RPS collected groundwater samples from 8 on-site monitoring wells and submitted these samples to an accredited laboratory for analysis.

- The results presented have been referenced against the Environmental Protection Agency's (EPA) Interim Guideline Values (IGV) as set out in the Interim Report *'Towards Setting Guideline Values for the Protection of Groundwater in Ireland' 2004.*

- Results of the BTEX and MTBE demonstrate that the levels of Benzene, Toluene, Ethylbenzene, Xylene and MTBE were below the recommended EPA IGV's. The Quarter 1 and Quarter 2, 2010 monitoring events detected a MTBE concentration of 16 µg/l at BH103. However it was below the recommended IGV of 30 µg/l. No detections of MTBE have been recorded since the Quarter 2, 2010 monitoring event.

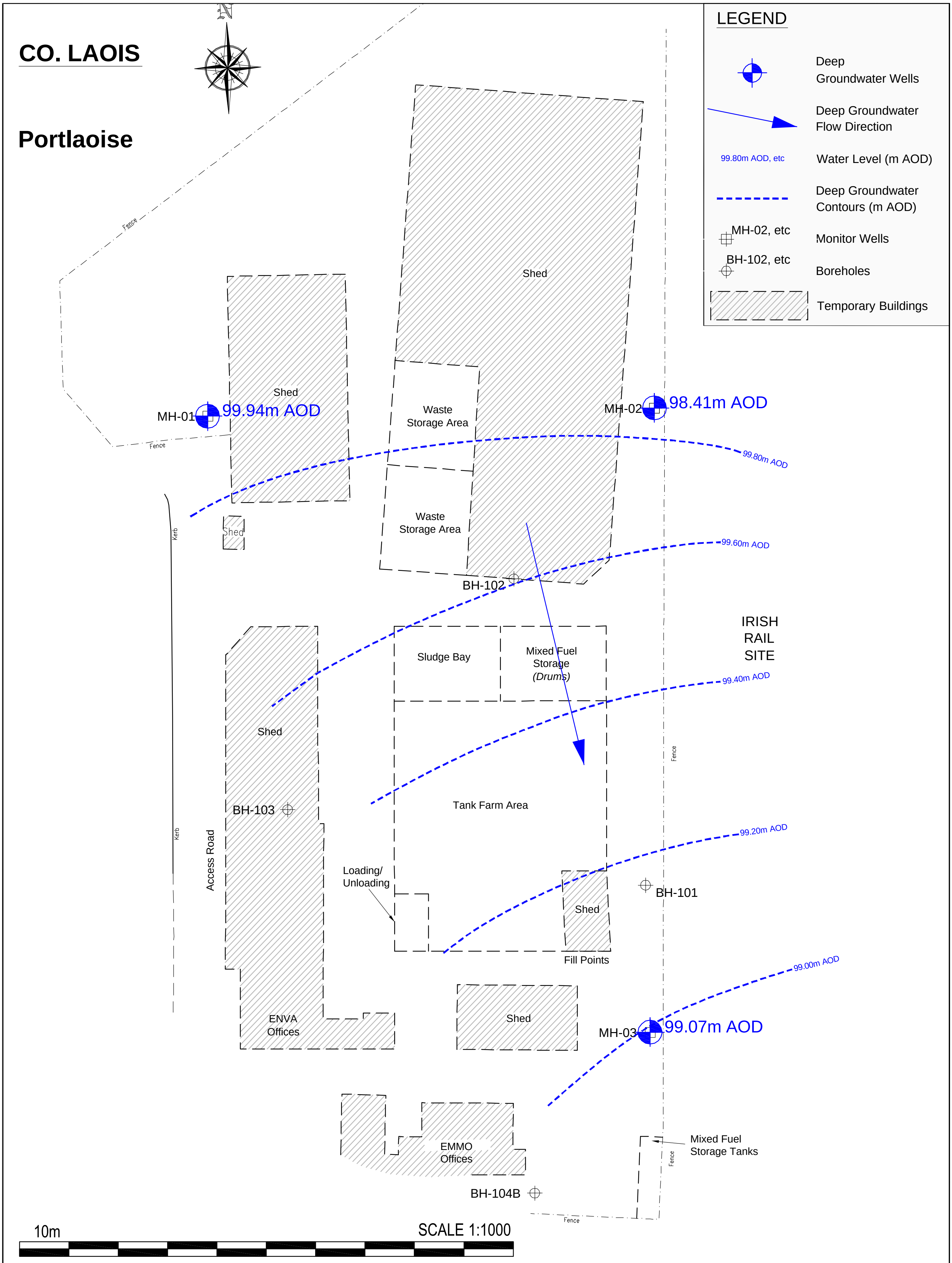
- The Quarter 4, 2011 results of the speciated polycyclic aromatic hydrocarbons indicate that the laboratory limit of detection of 0.2 µg/l for Total PAH's was above the EPA IGV of 0.1 µg/l. There were no detections of speciated PAHs at any location. The general trend of PAH concentrations appear to be reducing over time. Further monitoring at these locations is recommended to determine the persistency of these detections.

- There have been no exceedances of the IGV for SVOC's and VOC's since Quarter 1 2010.

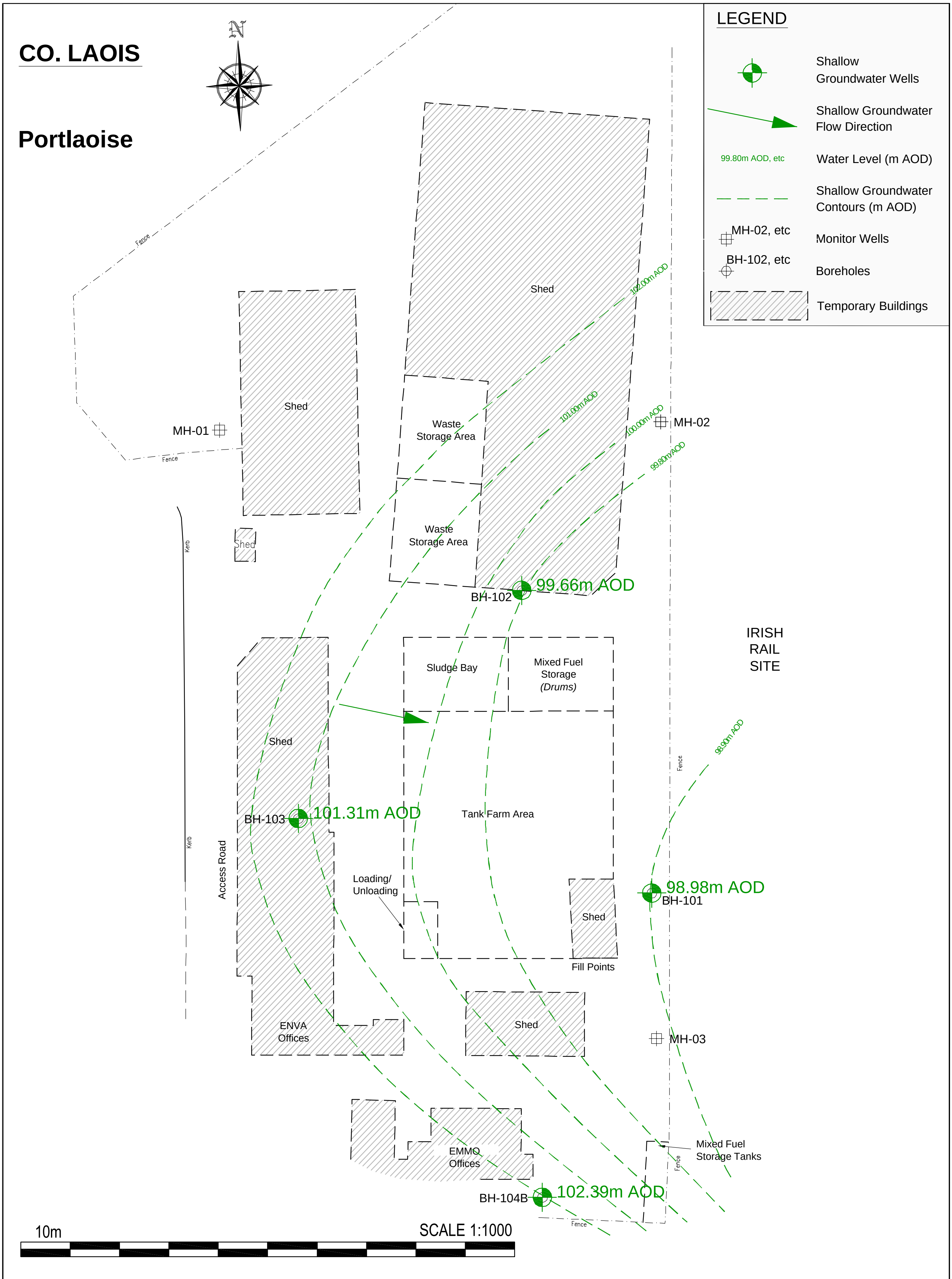
- The results of the phenol analysis by GC-MS detected concentrations below the laboratory limit of detection of 1.0 µg/l at all locations. However, the laboratory limit of detection is above the IGV of 0.5 µg/l for phenols. Samples were subsequently also analysed for phenols to include chlorophenols and the results indicate that there were no detections above the laboratory limit of detection of 0.05 µg/l. A low level of 2,4-Dimethylphenol (0.12 µg/l) was detected in MW03 during the Quarter 1, 2010 monitoring event. There have been no detections of this compound since February 2010.

- Hydrocarbons were detected in boreholes BH104B and MW03 in the aliphatic carbon ranges during the Quarter 3, 2010 monitoring event. There were no detections of aromatic carbon above the laboratory limit of detection of 10 µg/l in BH104B and MW03. During the current Quarter 4, 2011 monitoring event, there were detections of hydrocarbons in the heavier chain carbon ranges of C12-C16, C16-C21 and C21-C35 above the IGV of 10 µg/l at MW03. Further monitoring at these locations is recommended to determine the persistency of these detections.

- The general trend of contaminant concentrations over time continues to be somewhat variable with compounds not being continually detected in the same borehole on two consecutive monitoring rounds. In general, the contaminant levels detected at the Enva facility appear to indicate reducing contaminant concentrations over time and further monitoring is recommended to confirm these reductions.



Client: Enva Ireland Ltd	RPS, West Pier Business Campus, Dun Laoghaire, Co. Dublin, Ireland. T: +353 1 288 4499 - F: +353 1 283 5676 E: ireland@rpsgroup.com W: www.rpsgroup.com/ireland	Project: ENVA IPPC Monitoring	**Issue Details**	**Office Use Only**
			Drawn: D. Byrne	Job No. MDE0973
			Checked: C. O'Riordan	File Ref. MDE0973SK0002F01
		Title: Deep Groundwater Contours - February 2011	Approved: N. Mitchell	Fig No. Figure 2
			Scale: 1:1,000 (A4)	Rev. F01
			Date: April '11	



Client:		Project:	Issue Details		Office Use Only		
Enva Ireland Ltd	RPS RPS, West Pier Business Campus, Dun Laoghaire, Co. Dublin, Ireland. T: +353 1 288 4499 - F: +353 1 283 5676 E: ireland@rpsgroup.com W: www.rpsgroup.com/ireland	ENVA IPPC Monitoring	Drawn:	D. Byrne	Job No.	MDE0973	
			Checked:	C. O'Riordan	File Ref.	MDE0973SK0001F01	
		Title:	Approved:	N. Mitchell	Fig No.		Rev.
		Shallow Groundwater Contours - February 2011	Scale:	1:1,000 (A4)	Figure 1		F01
			Date:	April '11			

Appendix 2

SUMMARY OF METAL SCREEN RESULTS 2011

Quarter 1 Effluent Metal Screen

	Detection Method		ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	CV AA	ICP MS
	Method Detection Limit		<120ug/l	<100ug/l	<0.4ug/l	<1ug/l	<1ug/l	<2ug/l	<1ug/l	<1ug/l	<1ug/l	<0.05ug/l	<1ug/l
	UKAS Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓	·	·
Alcontrol Reference	Sample Identity	Other ID	Dissolved Calcium	Dissolved Magnesium	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Iron Low Level	Dissolved Manganese Low Level	Dissolved Nickel Low Level	Dissolved Zinc Low Level	Dissolved Mercury Low Level	Dissolved Lead Low Level
			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	Quarterly Effluent		354000	88600	0.382	13.7	2.94	1020	338	32.9	25.1	<0.01	0.761

Quarter 2 Effluent Metal Screen

	Detection Method		ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	CV AA	ICP MS
	Method Detection Limit		<120ug/l	<100ug/l	<0.4ug/l	<1ug/l	<1ug/l	<2ug/l	<1ug/l	<1ug/l	<1ug/l	<0.05ug/l	<1ug/l
	UKAS Accredited												
Alcontrol Reference	Sample Identity	Other ID	Dissolved Calcium	Dissolved Magnesium	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Iron Low Level	Dissolved Manganese Low Level	Dissolved Nickel Low Level	Dissolved Zinc Low Level	Dissolved Mercury Low Level	Dissolved Lead Low Level
			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Report No 130694	Quarterly Effluent	N/A	339	89.7	0.2	18	1.65	0.062	252	26.8	14.8	<0.01	0.062

Quarter 3 Effluent Metal Screen

	Detection Method		ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	CV AAS	ICP MS
	Method Detection Limit		<0.012mg/l	<0.036mg/l	<0.1ug/l	<0.22ug/l	<0.85ug/l	<0.019ug/l	<0.04ug/l	<0.15ug/l	<0.41ug/l	<0.01ug/l	<0.02ug/l
	ISO 17025 Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alcontrol Reference	Sample Identity	Other ID	Dissolved Calcium	Dissolved Magnesium	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Iron Low Level	Dissolved Manganese Low Level	Dissolved Nickel Low Level	Dissolved Zinc Low Level	Dissolved Mercury Low Level	Dissolved Lead Low Level
			mg/l	mg/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Report No 145834	Quarterly Effluent	PO 8251	651	112mg/l	2.39	24.8	2.79	6.28	2630	47.2	16.5	<0.01	0.91

Quarter 4 Effluent Metal Screen

	Detection Method		ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	CV AA	ICP MS
	Method Detection Limit		<120ug/l	<100ug/l	<0.4ug/l	<1ug/l	<1ug/l	<2ug/l	<1ug/l	<1ug/l	<1ug/l	<0.05ug/l	<1ug/l
	UKAS Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓	▪	▪
Alcontrol Reference	Sample Identity	Other ID	Dissolved Calcium	Dissolved Magnesium	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Iron Low Level	Dissolved Manganese Low Level	Dissolved Nickel Low Level	Dissolved Zinc Low Level	Dissolved Mercury Low Level	Dissolved Lead Low Level
			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Report No: 154623	Quarterly Effluent	PO: 8277	682000	47100	0.41	17	3.7	254	223	63.1	12.6	<0.01	0.04

Appendix 3

Summary of 2011 Surface water monitoring for SW01 and SW02

Surface water monitoring results for quarter 1, 2, 3 and 4 were all within licence requirements. There was a non conformance in February 2011 in relation to mineral oil analysis not being carried out, this was reported to the agency at the time.

Surface water monitoring for SW01 and SW02 from 1st January to the 31st of December 2011.

	Sample Identity	Oils, Fats & Greases	pH	COD Settled	Suspended Solids	Mineral Oil by GC
	Limit	ug/l	pH Units	mg/l	mg/l	ug/l
		15000	n/a	250	60	5000
SW01	Interceptor (Alcontrol) 06.01.2011	5070	7.99	175	N/A	2030
	Interceptor (Enva) 05.01.2011	N/A	7.31	157	N/A	N/A
	Interceptor (Enva) 10.01.2011	N/A	6.43	84	N/A	N/A
	Interceptor (Enva)17.01.2011	N/A	6.73	123	N/A	N/A
	Interceptor (Enva)24.01.2011	N/A	7.38	119	33	N/A
	Interceptor (Enva) 01.02.2011	N/A	6.70	34	N/A	N/A
	Interceptor (Alcontrol) 03.02.2011	<1000	8.44	50.9	N/A	416
	Interceptor (Enva) 07.02.2011	N/A	6.51	26	N/A	N/A
	Interceptor (Enva14.02.2011	N/A	6.51	8	N/A	N/A
	Interceptor (Enva) 21.02.2011	N/A	7.67	75	N/A	N/A
	Interceptor (Enva)28.02.2011	N/A	8.50	16	N/A	N/A
	Interceptor (Alcontrol) 03.03.2011	<1000	8.65	23.5	N/A	113
	Interceptor (Enva) 07.03.2011	N/A	7.14	54	N/A	N/A
	Interceptor (Enva) 14.03.2011	N/A	6.73	19	N/A	N/A
	Interceptor (Enva) 21.03.2011	N/A	7.64	158	N/A	N/A
	Interceptor (Enva) 28.03.2011	N/A	7.01	10	N/A	N/A
SW02	Interceptor (Alcontrol) 06.01.2011	N/A	7.51	22.4	N/A	92.8
	Interceptor (Enva) 05.01.2011	N/A	7.28	5	N/A	N/A
	Interceptor (Enva) 10.01.2011	N/A	6.83	7	N/A	N/A
	Interceptor (Enva)17.01.2011	N/A	6.83	13	N/A	N/A
	Interceptor (Enva)24.01.2011	N/A	7.59	1	11	N/A
	Interceptor (Enva) 01.02.2011	N/A	6.70	1	N/A	N/A
	Interceptor (Alcontrol) 03.02.2011	N/A	8.28	13	N/A	
	Interceptor (Enva) 07.02.2011	N/A	6.86	8	N/A	N/A
	Interceptor (Enva14.02.2011	N/A	6.88	1	N/A	N/A
	Interceptor (Enva) 21.02.2011	N/A	6.99	17	N/A	N/A
	Interceptor (Enva)28.02.2011	N/A	6.37	7	N/A	N/A
	Interceptor (Alcontrol) 03.03.2011	N/A	7.81	23.4	N/A	484
	Interceptor (Enva) 07.03.2011	N/A	7.24	14	N/A	N/A
	Interceptor (Enva) 14.03.2011	N/A	7.19	11	N/A	N/A
	Interceptor (Enva) 21.03.2011	N/A	6.54	23	N/A	N/A
	Interceptor (Enva) 28.03.2011	N/A	6.90	11	N/A	N/A

	Sample Identity	Oils, Fats & Greases	pH	COD Settled	Mineral Oil by GC
	Limit	ug/l	pH Units	mg/l	ug/l
		15000	n/a	250	5000
SW01	11.04.2011 (Alcontrol)	3320	7.98	24.6	236
	04.04.2011 (Enva)	N/A	8.11	52	N/A
	11.04.2011 (Enva)	4.1	7.90	49	N/A
	18.04.2011 (Enva)	N/A	7.21	21	N/A
	25.04.2011 (Enva)	N/A	6.71	30	N/A
	03.05.2011 (Alcontrol)	1250	8.28	22.5	235
	05.05.2011 (Enva)	N/A	7.54	15	N/A
	09.05.2011 (Enva)	N/A	5.97	23	N/A
	18.05.2011 (Enva)	N/A	6.11	34	N/A
	24.05.2011 (Enva)	N/A	7.71	58	N/A
	31.05.2011 (Enva)	N/A	6.98	50	N/A
	01.06.2011 (Alcontrol)	<1	7.79	12.8	<1
	09.06.2011 (Enva)	N/A	7.19	5	N/A
	13.06.2011 (Enva)	N/A	7.70	37	N/A
	21.06.2011 (Enva)	N/A	8.70	38	N/A
	28.06.2011 (Enva)	N/A	7.81	8	N/A
SW02	11.04.2011 (Alcontrol)	N/A	7.86	20.5	60.4
	04.04.2011 (Enva)	N/A	7.93	22	N/A
	11.04.2011 (Enva)	N/A	7.90	23	N/A
	18.04.2011 (Enva)	N/A	6.84	18	N/A
	25.04.2011 (Enva)	N/A	7.62	20	N/A
	03.05.2011 (Alcontrol)	N/A	7.85	32.3	141
	05.05.2011 (Enva)	N/A	7.00	11	N/A
	09.05.2011 (Enva)	N/A	8.23	29	N/A
	17.05.2011 (Enva)	N/A	7.80	63	N/A
	24.05.2011 (Enva)	N/A	7.62	123	N/A
	31.05.2011 (Enva)	N/A	7.11	45	N/A
	01.06.2011 (Alcontrol)	N/A	7.36	18.1	<1
	09.06.2011 (Enva)	N/A	7.17	6	N/A
	13.06.2011 (Enva)	N/A	7.44	8	N/A
	21.06.2011 (Enva)	N/A	8.69	56	N/A
	28.06.2011 (Enva)	N/A	7.76	30	N/A

	Sample Identity	Oils, Fats & Greases	pH	COD Settled	Suspended Solids	Mineral Oil by GC
	Limit	mg/l	pH Units	mg/l	mg/l	ug/l
		15mg/l	n/a	250	60	5000
SW01	07.07.2011 (Enva)	N/A	6.50	15	N/A	N/A
	13.07.2011 (Enva)	N/A	6.60	32	N/A	N/A
	19.07.2011 (Enva)	N/A	7.24	207	N/A	N/A
	27.07.2011 (Enva)	N/A	7.54	91	N/A	N/A
	07.07.2011 (Alcontrol)	3.65	8.4	17.4	N/A	83.2
	04.08.2011 (Enva)	N/A	7.36	37	N/A	N/A
	09.08.2011 (Enva)	N/A	8.09	18	N/A	N/A
	17.08.2011 (Enva)	N/A	7.77	41	27	N/A
	23.08.2011 (Enva)	N/A	7.12	15	N/A	N/A
	04.08.2011 (Alcontrol)	2.46	8.09	29	N/A	785
	02.09.2011 (Enva)	N/A	6.01	143	N/A	N/A
	08.09.2011 (Enva)	N/A	7.13	52	N/A	N/A
	12.09.2011 (Enva)	N/A	7.77	41.5	N/A	N/A
	21.09.2011 (Enva)	N/A	7.89	111.5	N/A	N/A
	14.09.2011 (Alcontrol)	1.08	7.84	17.2	N/A	<10
SW02	07.07.2011 (Enva)	N/A	7.29	20	N/A	N/A
	13.07.2011 (Enva)	N/A	7.59	6	N/A	N/A
	19.07.2011 (Enva)	N/A	7.14	75	N/A	N/A
	27.07.2011 (Enva)	N/A	7.72	2	N/A	N/A
	07.07.2011 (Alcontrol)	N/A	8.54	13.4	N/A	<10
	04.08.2011 (Enva)	N/A	7.69	18	N/A	N/A
	09.08.2011 (Enva)	N/A	7.79	33	N/A	N/A
	17.08.2011 (Enva)	N/A	7.12	14	12	N/A
	23.08.2011 (Enva)	N/A	6.01	20.5	N/A	N/A
	04.08.2011 (Alcontrol)	N/A	7.92	22.2	N/A	<10
	01.09.2011 (Enva)	N/A	6.06	16	N/A	N/A
	08.09.2011 (Enva)	N/A	7.38	75	N/A	N/A
	12.09.2011 (Enva)	N/A	7.74	91	N/A	N/A
	21.09.2011 (Enva)	N/A	7.53	33	N/A	N/A
	01.09.2011 (Alcontrol)	N/A	7.06	42.9	N/A	152

	Sample Identity	Oils, Fats & Greases	pH	COD Settled	Suspended Solids	Mineral Oil by GC
		ug/l	pH Units	mg/l	mg/l	ug/l
	Limit:	**15,000**	**n/a**	**250**	**60**	**5,000**
SW01	Enva (04.10.2011)	N/A	7.79	69.5	N/A	N/A
	Enva (11.10.2011)	N/A	7.42	83	49	N/A
	Enva (18.10.2011)	N/A	7.31	62	N/A	N/A
	Enva (27.10.2011)	N/A	7.44	40	N/A	N/A
	Alcontrol (04.10.2011)	3320	8.02	36.9	N/A	1450
	Enva (03.11.2011)	N/A	7.50	41	N/A	N/A
	Enva (09.11.2011)	N/A	7.54	72	N/A	N/A
	Enva (18.11.2011)	N/A	7.41	34	N/A	N/A
	Enva (23.11.2011)	N/A	7.77	85	N/A	N/A
	Alcontrol (03.11.2011)	<1	8.12	27.4	N/A	<10
	Enva (01.12.2011)	N/A	7.64	33	N/A	N/A
	Enva (06.12.2011)	N/A	7.77	84	N/A	N/A
	Enva (12.12.2011)	N/A	7.78	88.5	N/A	N/A
	Alcontrol (01.12.2011)	<1	7.29	16.7	N/A	<1
SW02	Enva (04.10.2011)	N/A	7.92	66	N/A	N/A
	Enva (11.10.2011)	N/A	7.85	116	32	N/A
	Enva (18.10.2011)	N/A	7.64	97	N/A	N/A
	Enva (27.10.2011)	N/A	7.88	87	N/A	N/A
	Alcontrol (04.10.2011)	N/A	7.69	47.3	N/A	<1000
	Enva (03.11.2011)	N/A	7.94	90	N/A	N/A
	Enva (09.11.2011)	N/A	7.22	10	N/A	N/A
	Enva (18.11.2011)	N/A	7.30	50	N/A	N/A
	Enva (23.11.2011)	N/A	7.68	63	N/A	N/A
	Alcontrol (03.11.2011)	N/A	7.73	45.6	N/A	<10
	Enva (01.12.2011)	N/A	7.17	55	N/A	N/A
	Enva (06.12.2011)	N/A	7.51	77	N/A	N/A
	Enva (12.12.2011)	N/A	8.00	89	N/A	N/A
	Alcontrol (01.12.2011)	N/A	7.49	<7	N/A	N/A

Appendix 4

WRIGHT ENVIRONMENTAL
SERVICES

CONFIDENTIAL REPORT

Client	**Title**
Enva Ireland Ltd	Measure Emissions to Atmosphere
Clonminam Industrial Estate	from Boiler – October 2011
Portlaoise	
Co. Laois	Enva Ireland Ltd. – Portlaoise
Attn. Ms. Anne Phelan	

EPA Waste Licence Reg. No. 184-1

Report Ref:	1217	Report by:	Frances Wright Frances Wright BSc, PgDip Env, Dip SHWW, CertOH
Date recd:		Approved by:	Paddy Wright Paddy Wright BSc, PgDip ChemEng, CertOH
Copies to:		Date:	10th November 2011

CONTENTS

1. INTRODUCTION

Enva Ireland Ltd. operate a waste recovery facility at Clonminam Industrial Estate, Portlaoise which is licensed under the EPA Waste Licence system (Reg. No. 184-1).

Enva Ireland Ltd are required to measure annually the following emissions to atmosphere from their boiler under Schedule D of their Waste Licence.

- Oxides of Sulphur
- Nitrogen Oxides
- Carbon Monoxide
- Combustion Efficiency

At the request of Ms. Anne Phelan of Enva Ireland Ltd., Wright Environmental Services carried out this monitoring on the 27th October 2011.

This report contains the results of these tests. There are no limits set for these parameters in the company's licence.

2. RESULTS

Emissions to atmosphere, as required by the company's Waste Licence, were measured from the boiler at Clonminam Industrial Estate, Portlaoise on the 27th October 2011. The boiler was running on gas and operating on medium fire during the monitoring periods.

A summary of the concentrations measured are given in Table 1. Detailed test results are presented in Appendix 1. Sampling and analytical methods are presented in Appendix 2.

Table 1

Summary of Emissions from Boiler

27th October 2011

Parameter	Measured mg/Nm^3	Measured mg/Nm^3
	Test 1	**Test 2**
Carbon Monoxide	3	3
Nitrogen Oxides (as NO_2)	135	152
Oxides of Sulphur	Less than 5	Less than 5
Combustion Efficiency (%)	80.9	80.4

Appendix 1

Detailed Test Results

Emissions from Oil Fired Boiler

27th October 2011 – Test 1

Time	Temperature	Oxygen	Carbon Monoxide	Nitrogen Oxides	Efficiency
	°C	%	mg/Nm³	mg/Nm³	%
13:04	167	7.3	5	92	81.9
13:05	169	5.9	4	115	82.5
13:06	172	8.8	6	130	80.8
13:07	175	6.8	5	114	81.8
13:08	174	5.1	4	107	82.6
13:09	174	4.8	4	105	82.7
13:10	174	8.6	5	137	80.9
13:11	174	8.6	7	140	80.8
13:12	175	8.6	5	140	80.8
13:13	175	8.6	5	140	80.8
13:14	176	8.6	7	140	80.8
13:15	176	8.6	5	140	80.8
13:16	176	8.6	7	143	80.8
13:17	176	8.6	2	140	80.8
13:18	176	8.6	0	140	80.8
13:19	176	8.6	2	143	80.8
13:20	178	8.6	2	140	80.6
13:21	178	8.6	2	140	80.6
13:22	178	8.5	2	142	80.6
13:23	179	8.5	2	142	80.6
13:24	180	8.5	2	142	80.6
13:25	180	8.5	4	145	80.6
13:26	180	8.5	2	142	80.6
13:27	181	8.5	2	142	80.5
13:28	181	8.5	2	142	80.6
13:29	181	8.5	4	142	80.5
13:30	182	8.5	4	142	80.5
13:31	182	8.5	2	145	80.5
13:32	183	8.5	2	142	80.5
13:33	183	8.5	2	145	80.5
13:34	183	8.5	2	145	80.5
Average	**177**	**8**	**3**	**135**	**80.9**

Emissions from Oil Fired Boiler

27th October 2011 – Test 2

Time	Temperature	Oxygen	Carbon Monoxide	Nitrogen Oxides	Efficiency
	^oC	%	mg/Nm^3	mg/Nm^3	%
13:35	184	8.5	2	152	80.4
13:36	184	8.5	4	152	80.4
13:37	184	8.5	2	152	80.4
13:38	185	8.5	4	152	80.4
13:39	186	8.4	4	151	80.4
13:40	186	8.4	2	151	80.4
13:41	186	8.5	4	152	80.4
13:42	186	8.5	4	152	80.3
13:43	187	8.5	4	152	80.3
13:44	187	8.4	4	151	80.3
13:45	188	8.5	2	152	80.3
13:46	188	8.5	4	155	80.3
13:47	188	8.5	4	155	80.3
13:48	186	8.4	2	151	80.4
13:49	186	8.5	4	152	80.4
13:50	186	8.5	4	152	80.3
Average	**186**	**8**	**3**	**152**	**80.4**

Appendix 2

Sampling and Analytical Methods

Sampling and Analytical Methods

Emissions to Atmosphere

Oxides of nitrogen, carbon monoxide, oxygen, temperature and combustion efficiency were measured in the flue gas from the boiler using a Kane-May, Quintox flue gas analyser. Readings were taken at intervals of one minute over a thirty minute period during normal boiler operating conditions and the average for the period calculated. The boiler was running on gas during the monitoring period.

Sulphur Dioxide

Sulphur dioxide was determined using BS EN 14791:2005 Stationary source emissions — Determination of mass concentration of sulphur dioxide — Reference method. This specifies drawing a measured volume of flue gas through dilute hydrogen peroxide and determining the collected sulphate by ion chromatography or by titration by the Thorin method.

Standard Reference Conditions

The concentration of the emissions were calculated and reported in mg/Nm^3 as follows :-

- temperature 273^{o}K
- pressure 101.3 kPa
- dry gas
- corrected to 3% oxygen

Appendix 5

CONFIDENTIAL REPORT

Client	**Title**
Enva Ireland Ltd	Annual Environmental
Clonminam Industrial Estate	Noise Survey 2011
Portlaoise	Enva Ireland Ltd. – Portlaoise
Co. Laois	EPA Waste Licence Reg. No. 184-1
Attn. Ms. Anne Phelan	

Report Ref:	1201	Report by:	Frances Wright BSc, PgDip Env, Dip SHWW, CertOH Frances Wright
Date recd:		Approved by:	Paddy Wright BSc, PgDip ChemEng, CertOH Paddy Wright
Copies to:		Date:	14th November 2011

CONTENTS PAGE

1. INTRODUCTION:

Enva Ireland Ltd. operate a waste recovery facility at Clonminam Industrial Estate,Portlaoise which is licensed under the EPA Waste Licence system (Reg. No. 184-1). Schedule D of the company's licence requires an annual Environmental Noise Survey to be undertaken.

At the request of Ms. Anne Phelan of Enva Ireland Ltd., Wright Environmental Services carried out this Noise Survey on the 27th October (day time survey) and 10th / 11th November (night time survey) 2011.

This report presents and interprets the results of the survey with reference to the company's Waste Licence noise criteria. The methodology used for the survey is described in Appendix I. Instrumentation and calibration is described in Appendix II. Monitoring locations are shown in the site map in Appendix III. Appendix IV presents the 1/3 octave band analysis of the noise at monitoring locations.

2. SUMMARY

Wright Environmental Services carried out the day (08:00 – 22:00) and night (22:00 – 08:00) Environmental Noise Survey on the 27^{th} October and the 10^{th} / 11^{th} November 2011. Noise monitoring was carried out at one noise sensitive location (N4) and four boundary locations (N1, N2, N3, N5).

Noise levels were below the criterion levels at the noise sensitive and boundary locations. Therefore the noise attributable to Enva at a noise sensitive locations beyond the boundary locations in each of these directions would be less than the criterion values set out in their licence.

A tone was detected at N4 (25Hz,63Hz,125Hz) during the daytime monitoring. This location is on the corner of Knockmay Road and Marian Avenue. There was no noise audible from Enva at this noise sensitive location. The noise at this location is mainly attributable to the activity in the railway yard and passing traffic noise. The tones are therefore attributable to extraneous noise. A tone was detected at 25Hz during the daytime monitoring at N2. This location is near the boiler house which was the likely source of the tone. This tone was not clearly audible and due to the other extraneous industrial noise, is not thought to affect any noise sensitive locations in this direction. A tone was also detected at N2 at 50 Hz during the night time monitoring. Fan noise from the neighbouring facility is the likely source of this tone and not Enva. No other tones were detected during the monitoring periods.

3. MONITORING RESULTS AND DISCUSSION:

Wright Environmental Services carried out the day (08:00 – 22:00) and night (22:00 – 08:00) Environmental Noise Survey on the 27th October and the 10th / 11th November 2011. The monitoring locations are described below and are shown in the site map in Appendix III.

Location **N1**:Along the mid western site boundary.
Location **N2**: In the corner of the site, along the south eastern boundary
Location **N3**:In the corner of the site, along the north eastern boundary.
Location **N4**:Nearby residential area, south east of Enva and railway yard, on the corner of Knockmay Road and Marian Avenue.
Location **N5**:North west of Enva site, on the corner with access road for Rowan park halting site (currently deserted).

The following "A-Weighted" data was determined for each discrete sampling period.

L_{eq} : The equivalent continuous noise level for the measurement period. (This is defined as the sound level of a steady sound having the same energy as a fluctuating sound over the specified measuring period).

$L_{(1)}$: The noise level exceeded for 1% of the measurement period. (This parameter gives a good indication of typical maximum levels.)

$L_{(10)}$: The noise level exceeded for 10% of the measurement period.

$L_{(90)}$: The noise level exceeded for 90% of the measurement period. (This is taken to represent the background noise level).

Detailed results are presented in Table 1, 2 and 3 below along with appropriate comments regarding noise in the monitoring environment.

Table 1

Daytime - Boundary Results - 27th October 2011

Monitoring Position	Time	L_{eq} (dBA)	L_1 (dBA)	L_{10} (dBA)	L_{90} (dBA)	Comments
N1	15:05 – 15:35	**54**	63	54	48	Distant traffic to the west audible/dominant in the absence of other activity. 2 cars and 1 HGV pass. Train passes. Machinery operating in warehouse in Enva.
N2	12:35 – 13:05	**52**	57	53	49	Noise from boiler room is the dominant noise source. Vehicle movement on Enva site. HGV movement in adjacent yard. Signal/Alarm and machinery movement audible from the railway yard.
N3	13:23 – 14:00	**51**	60	53	46	2 Shovels operating approximately 60m away on Enva site. Forklift operating in railway yard. Pause test during a passing rain shower.
N5	14:26 – 14:56	**54**	64	57	44	Distant traffic to the west audible/dominant in the absence of other activity. Vehicle (HGV and cherry picker) movement in/out of Enva site. 2 trains pass.

Table 2

Night time - Boundary Results – 10th / 11th November 2011

Monitoring Position	Time	L_{eq} (dBA)	L_1 (dBA)	L_{10} (dBA)	L_{90} (dBA)	Comments
N1	00:25 – 00:55	**44**	51	46	42	Distant traffic noise is dominant. Distant fan noise from industrial estate audible. No noise audible from Enva.
N2	22:00 – 22:30	**46**	49	47	44	Distant traffic noise and boiler is dominant noise source. Boiler cuts in and out. Hum from fan, reversing signal and occasional bang from neighbouring facility. Train passes.
N3	22:34 – 23:04	**41**	47	42	38	Distant traffic noise is dominant. No noise from Enva audible. Pause while train passes. Dog barking in the distance.
N5	23:14 – 23:44	**43**	49	45	40	Traffic noise in the Clonminan industrial estate and distant traffic noise are the dominant noise sources. Distant fan and machinery noise from industrial estate audible.

Table 3

Noise Sensitive Location Results – 27th October and 10th / 11th November 2011

Monitoring Position	Time	L_{eq} (dBA)	L_1 (dBA)	L_{10} (dBA)	L_{90} (dBA)	Comments
N4	10:21 – 11:00	**54**	64	58	46	Dominant noise source: Railway yard (bang, reversing signal, vehicle movement) and traffic passing (approximately 30 cars, 2 HGVs, 4 vans/4 by 4) adjacent to N4. No noise audible from Enva. Paused while car on idle beside monitoring location.
N4	23:49 – 00:19	**43**	51	46	39	Distant traffic noise is dominant. No noise audible from Enva. Machinery noise from railway yard. 1 car passes nearby. Leaves rustle in light breeze. Dog barks in distance.

In accordance with their waste licence, Enva Ireland Ltd are required to comply with maximum noise limit values. Criterion noise levels are set for day and night time, for noise measured at Noise Sensitive Locations (NSLs). The criterion noise levels are presented in Schedule C of the licence as follows:

Day	*55*	*dB(A) LAeq(30 minutes)*
Night	*45*	*dB(A) LAeq(30 minutes)*

Section 7.7.1 states that noise from the facility should not exceed this level by more than 2dB(A).

> *7.1.1 Noise from the activity shall not give rise to sound pressure levels (LAeq 30min) measured at noise sensitive locations which exceed the limit value(s) by more than 2dB(A).*

Noise levels were below the criterion levels at the boundary locations. Therefore the noise attributable to Enva at a noise sensitive locations beyond the boundary locations in each of these directions would be less than the criterion values set out in their licence.

There is no noise audible from Enva at the noise sensitive location, N4. This location is on the corner of Knockmay Road and Marian Avenue. The noise levels measured at this location were within the criterion levels for day and night.

Section 6.7 of the company's licence states that

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

The noise was perceived at each of the monitoring locations to investigate the presence of tones. Using the sound level meter, one third octave band analysis of the noise was also carried out at each location. A tone was detected at N4 (25Hz,63Hz,125Hz) during the daytime monitoring. This location is on the corner of Knockmay Road and Marian Avenue. There was no noise audible from Enva at this noise sensitive location. The noise at this location is mainly attributable to the activity in the railway yard and passing traffic noise. The tones are therefore attributable to extraneous noise. A tone was detected at 25Hz during the daytime monitoring at N2. This location is near the boiler house which was the likely source of the tone. This tone was not clearly audible and due to the other extraneous industrial noise, is not thought to affect any noise sensitive locations in this direction. A tone was also detected at N2 at 50 Hz (different from the daytime tonal feature detected) during the night time monitoring. Fan noise from the neighbouring facility is the likely source of this tone and not Enva. No other tones were detected during the monitoring periods.

The one third octave band analysis is presented in Appendix IV.

APPENDIX I

Methodology

METHODOLOGY

The methodology of the survey was based upon procedures set out in the International Standard, ISO 1996-2 (Acoustics – description and measurement of environmental noise). The following Environmental Protection Agency's guidance documents were also referenced; "Environmental Noise Survey Guidance Document, 2003" and "Guidance Note For Noise In Relation To Schedule Activities, 2^{nd} Edition , 2006".

Environmental noise levels were determined by using a Pulsar Model 33 , Type 1 Real Time Sound Level Meter, with half inch condenser microphone. The instrumentation was calibrated directly before and after the noise measurements. Details of the instrumentation and external calibration are presented in Appendix II of this report. A series of 1/3 Octave Band level measurements were simultaneously taken using the Sound Level Analyser and this data was used to evaluate the presence of tones. This analysis is presented in Appendix IV.

Results reported were determined using the fast response, A-Weighting (ref. 20 μPa) and are rounded off to the nearest whole decibel. Monitoring was conducted in relatively calm, dry weather conditions during the day (08:00 – 22:00) and night (22:00 – 08:00). Throughout the monitoring, the microphone was situated 1.5 m above ground level, away from any reflective surfaces. The monitoring equipment was manned throughout the sampling intervals and comments were recorded in order to aid the interpretation of the results.

During the survey air temperature and humidity measurements were undertaken using a Delta Ohm Hygrometer HD 8501 H. Wind speed measurements were taken using a TSI VelociCalc and the wind direction was noted using a compass. Details of the weather conditions are presented in Table below.

Summary of Weather Conditions

Date/Time	Air Temperature ºC	Relative Humidity %	Wind Direction	Wind Speed m/s	General Conditions
27/10/11 10:30	11	82	W	1.2	Dry – no precipitation.
10/11/11 22:10	12	91	SE	1.5	Dry – no precipitation.

APPENDIX II

Instrumentation and External Calibration Details

INSTRUMENTATION AND EXTERNAL CALIBRATION DETAILS

Instrumentation:

Pulsar Model 33 , Type 1 Real Time Sound Level Meter, with half inch condenser microphone, Serial Number T223417.

On-site calibrations were carried out before and after sampling with a Pulsar Calibrator – model 100B, Serial Number: 42171.

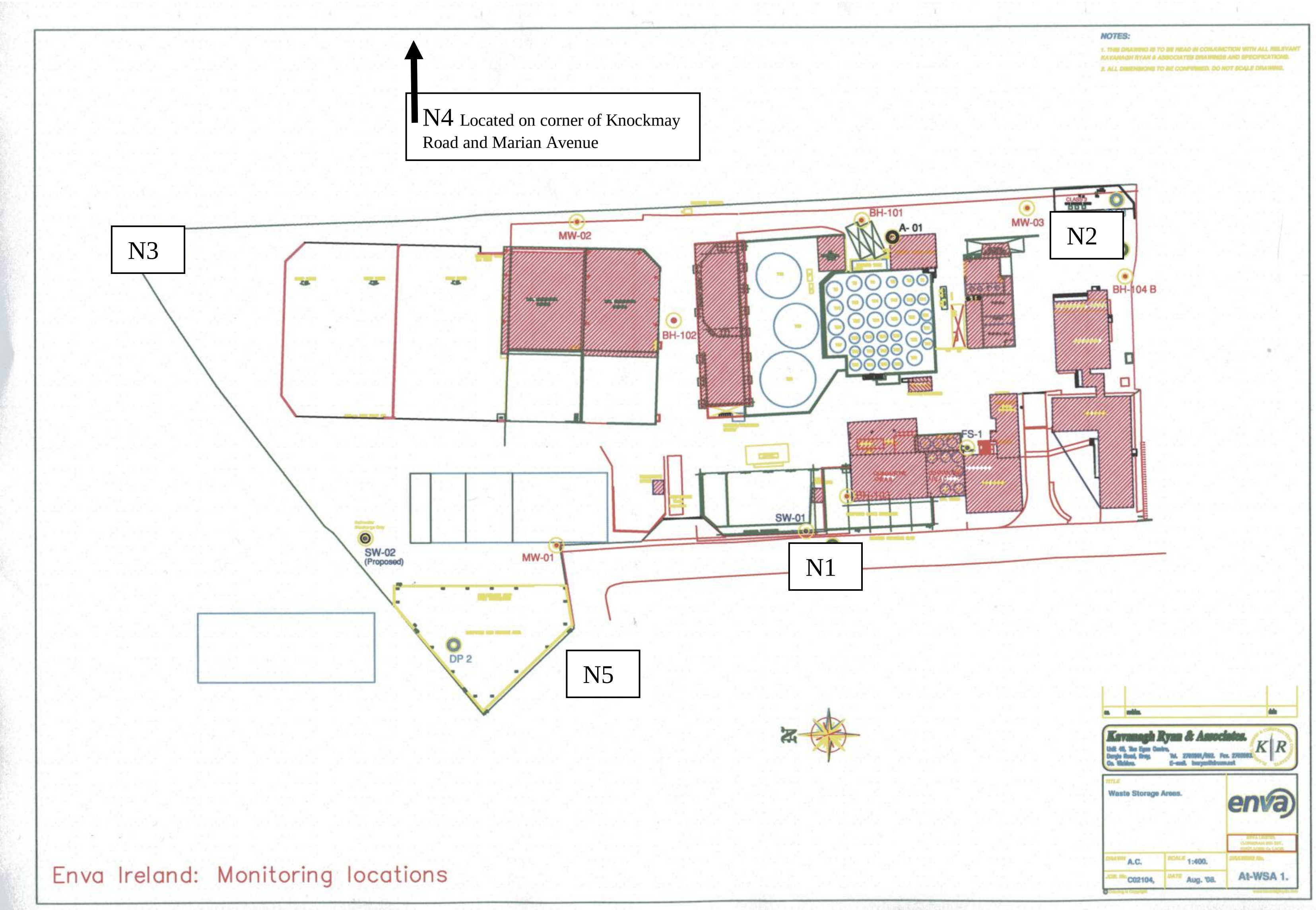
External Calibration:

External Calibration of instrumentation was undertaken by Pulsar Instruments Plc:

Unit	Calibration Date	Calibration Certificate Number
Sound Level Meter Serial No. T223417	19th November 2010	182109
Calibrator – Serial No. 42171	19th November 2010	182110

APPENDIX III

Site Plan showing Noise Monitoring Positions


N4 Located on corner of Knockmay Road and Marian Avenue
N3
N2
N1
N5
MW-02
MW-01
MW-03
BH-101
BH-102
BH-104 B
A- 01
FS-1
SW-01
SW-02
(Proposed)
DP 2
NOTES:
Kavanagh Ryan & Associates.
Waste Storage Areas.
enva
A.C.
1:400.
C02104.
Aug. '08.
At-WSA 1.
Enva Ireland: Monitoring locations

APPENDIX IV

1/3 Octave Band Analysis (OBA)

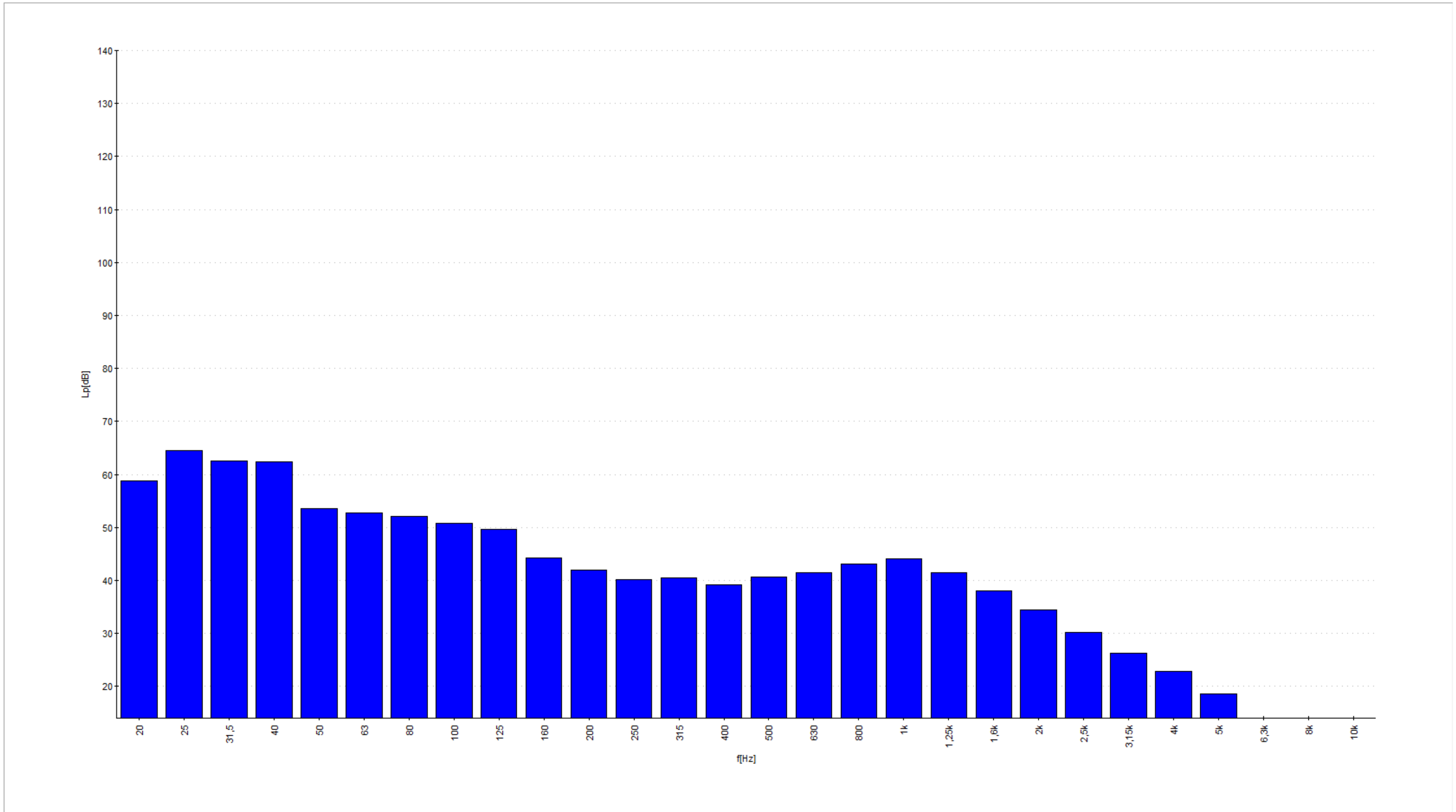


Figure 1: N 1 - Daytime

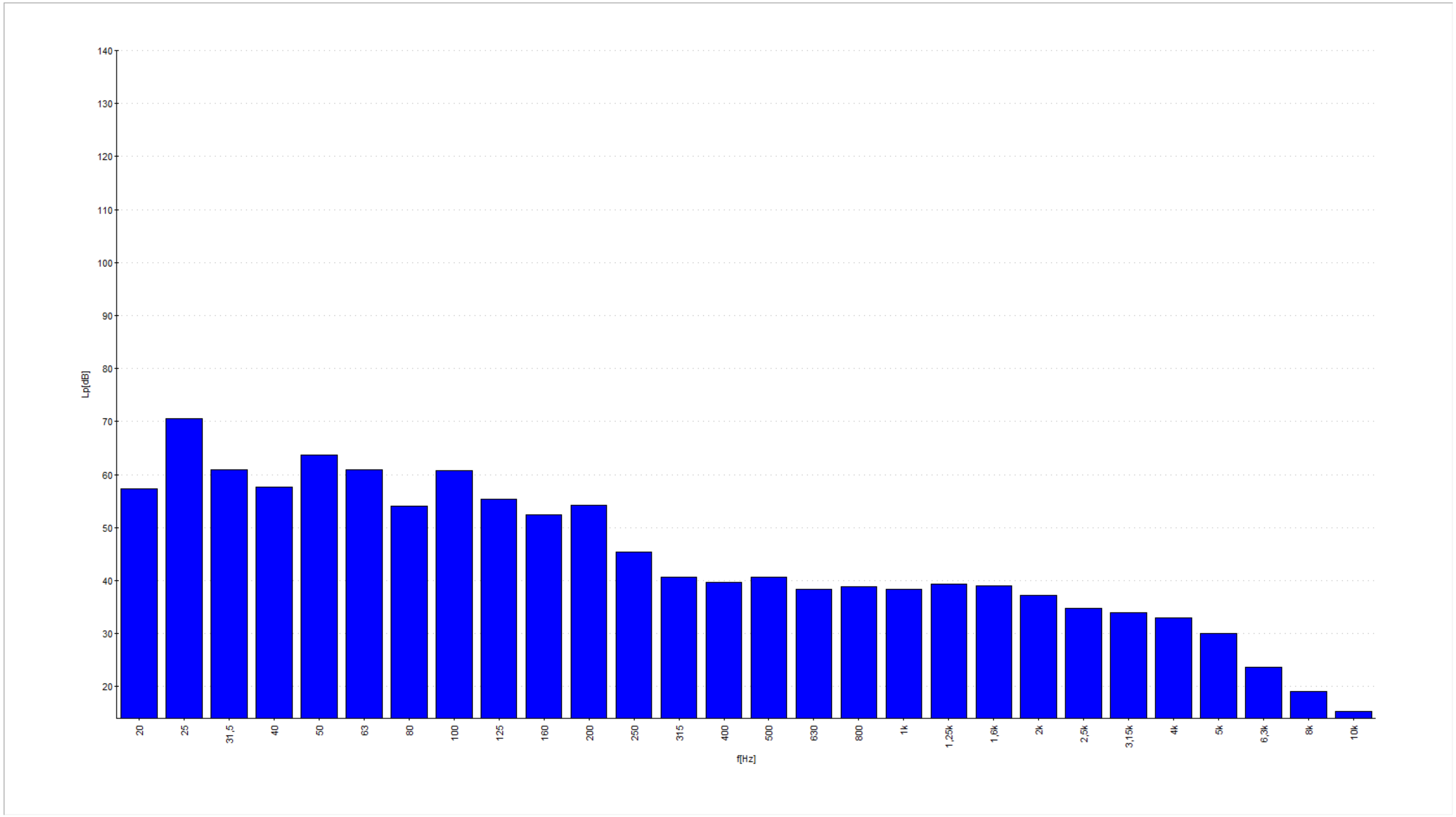


Figure 2: N 2 - Daytime

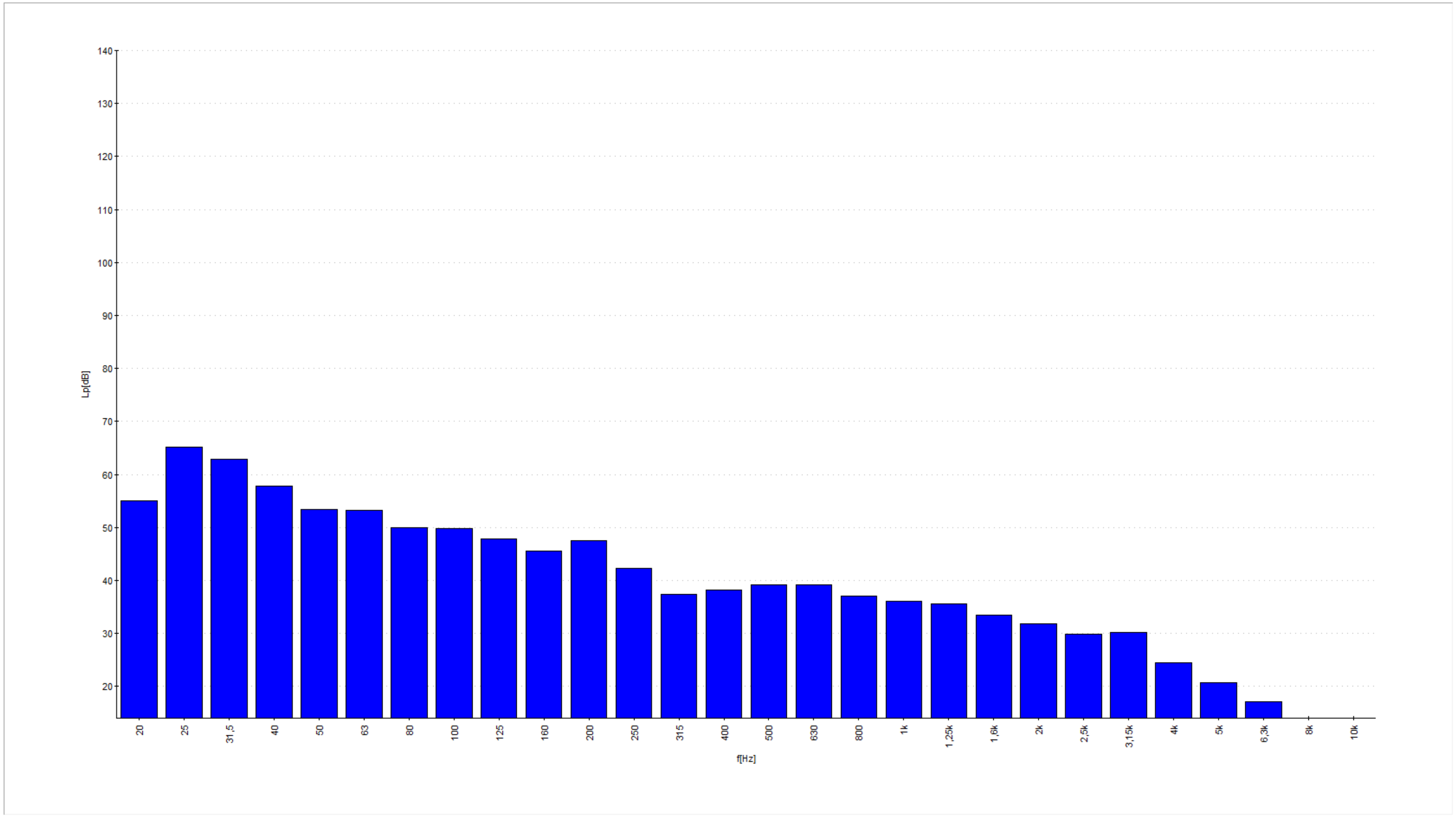


Figure 3: N 3 - Daytime

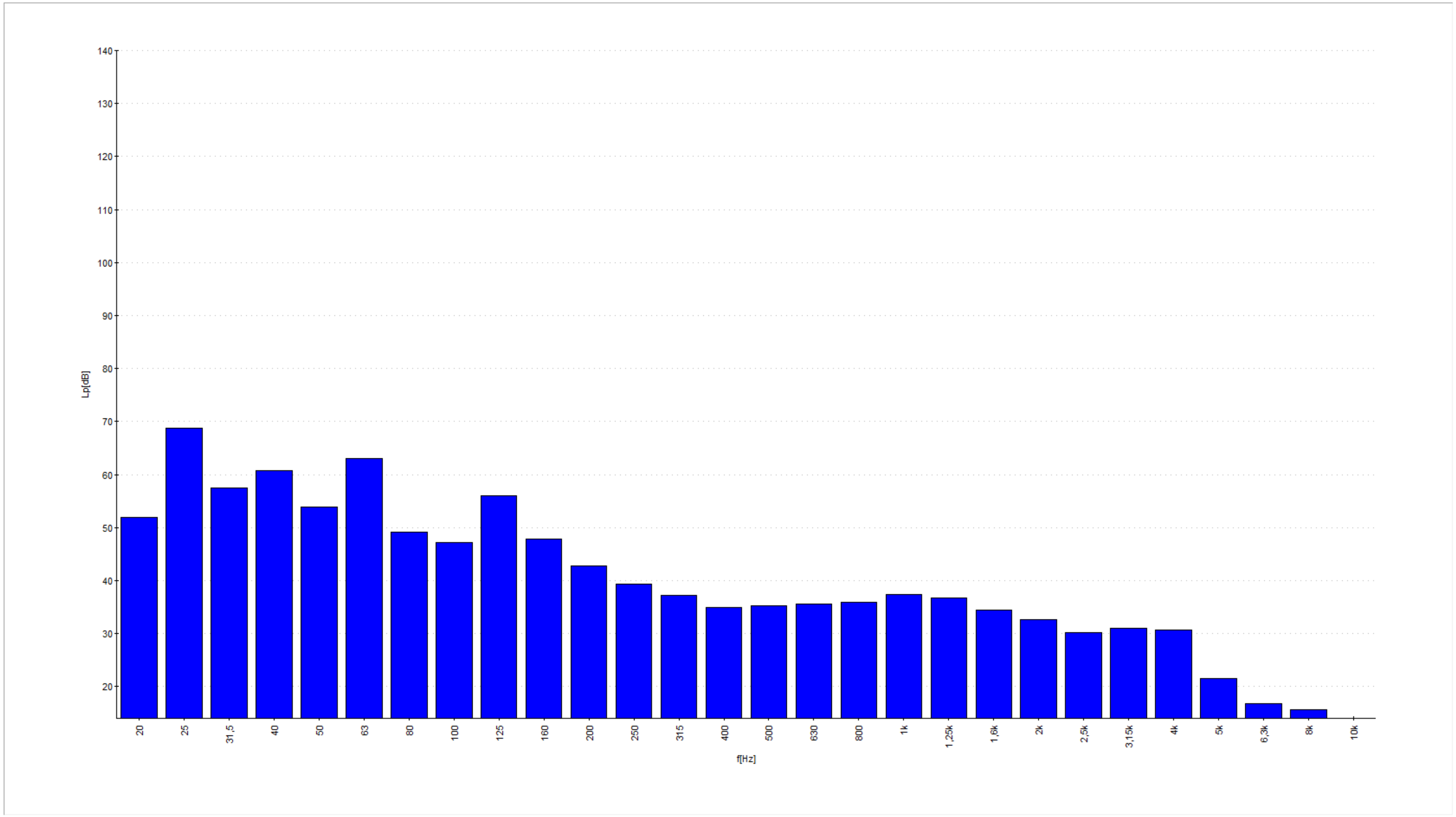


Figure 4: N 4 - Daytime

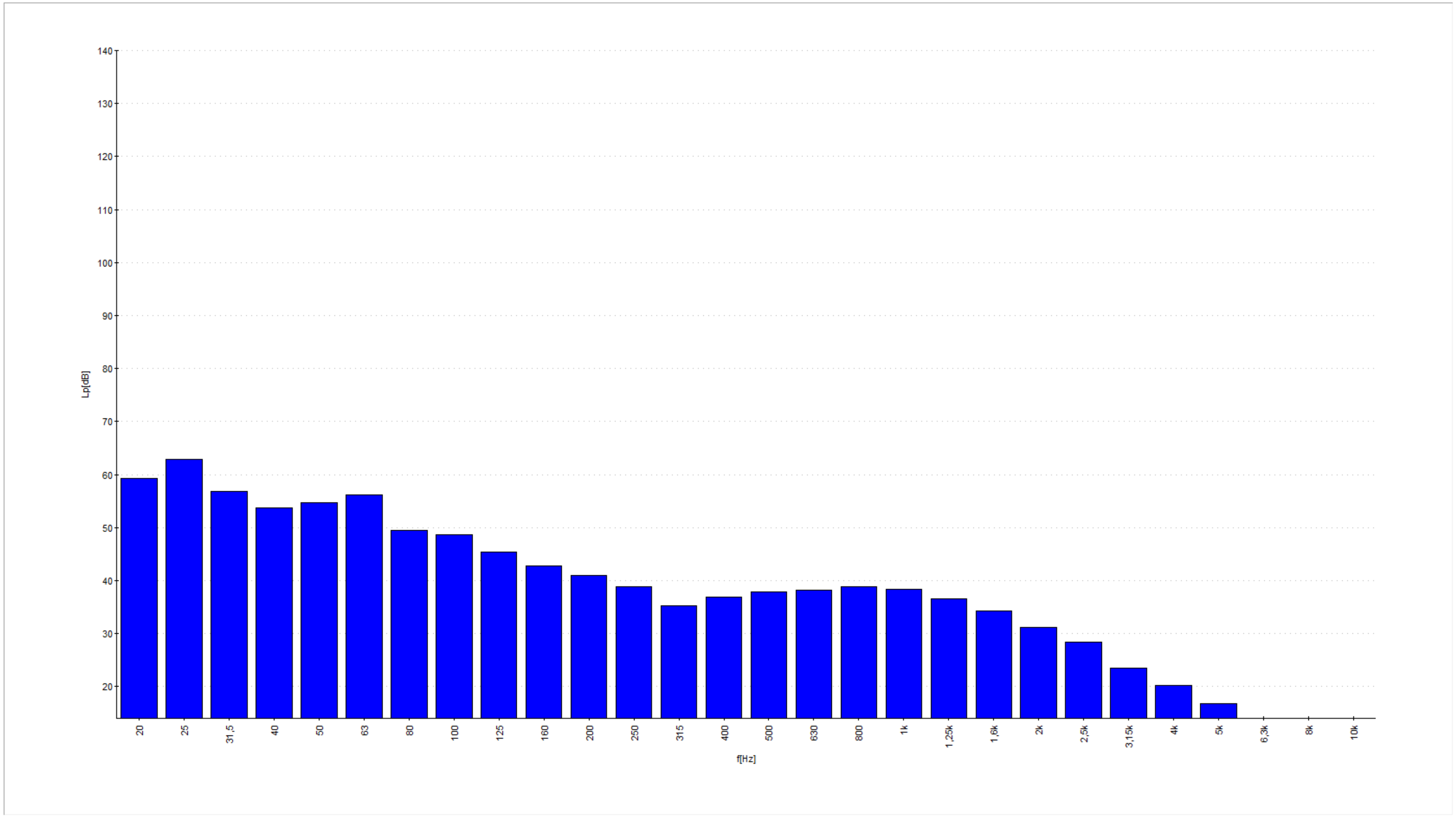


Figure 5: N 5 – Day time

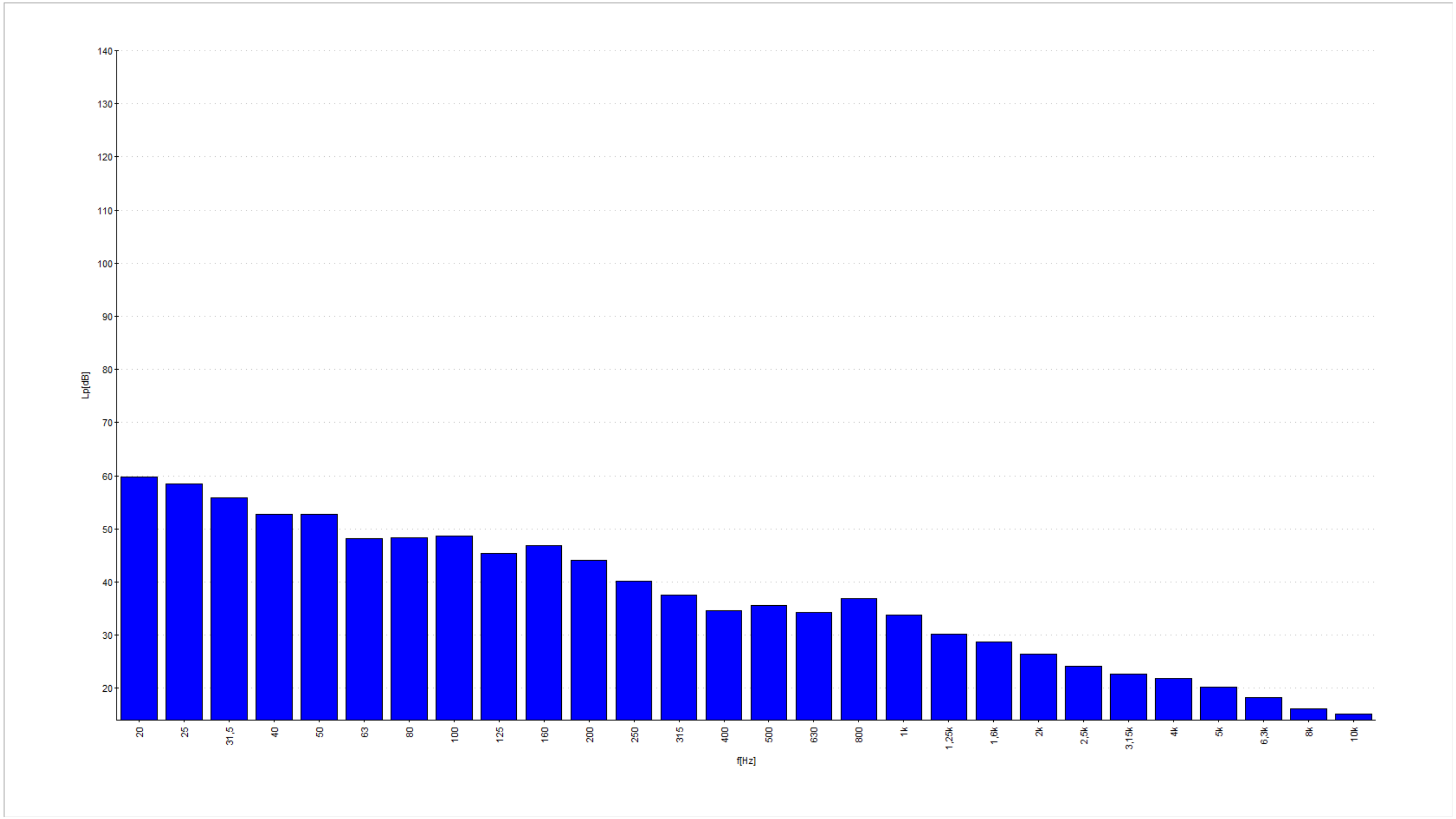


Figure 6: N 1 – Night time

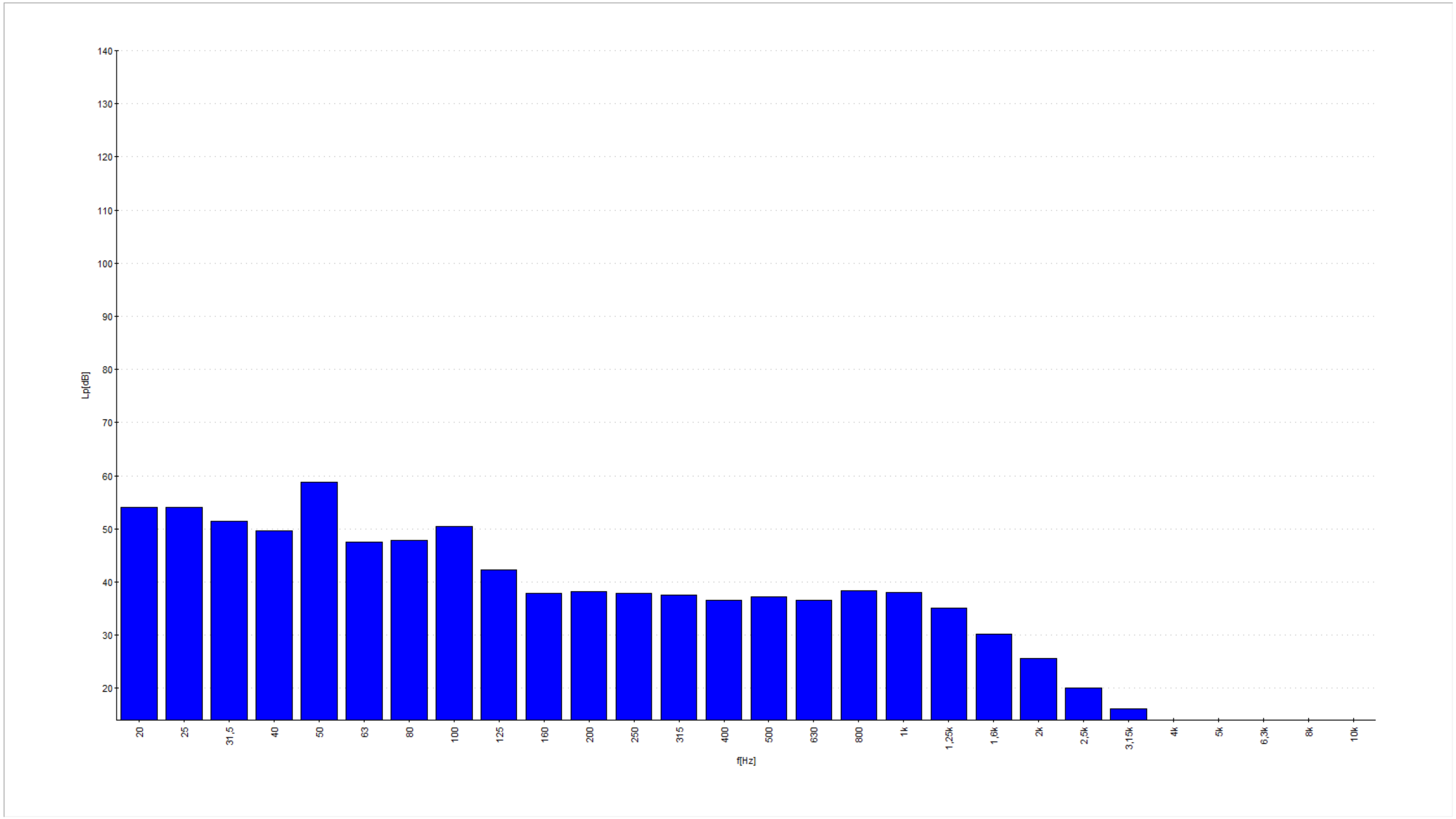


Figure 7: N 2 – Night time

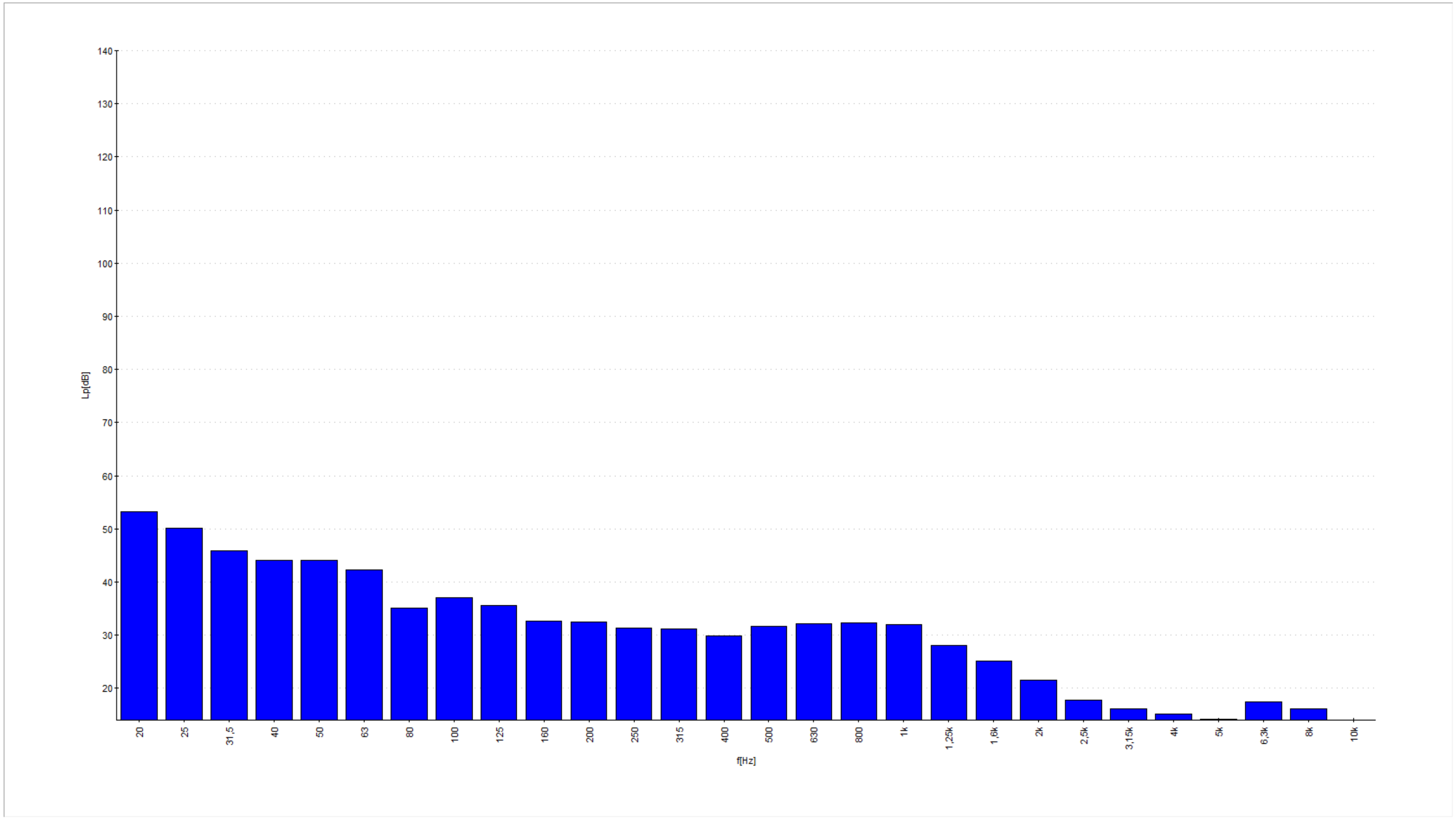


Figure 8: N 3 – Night time

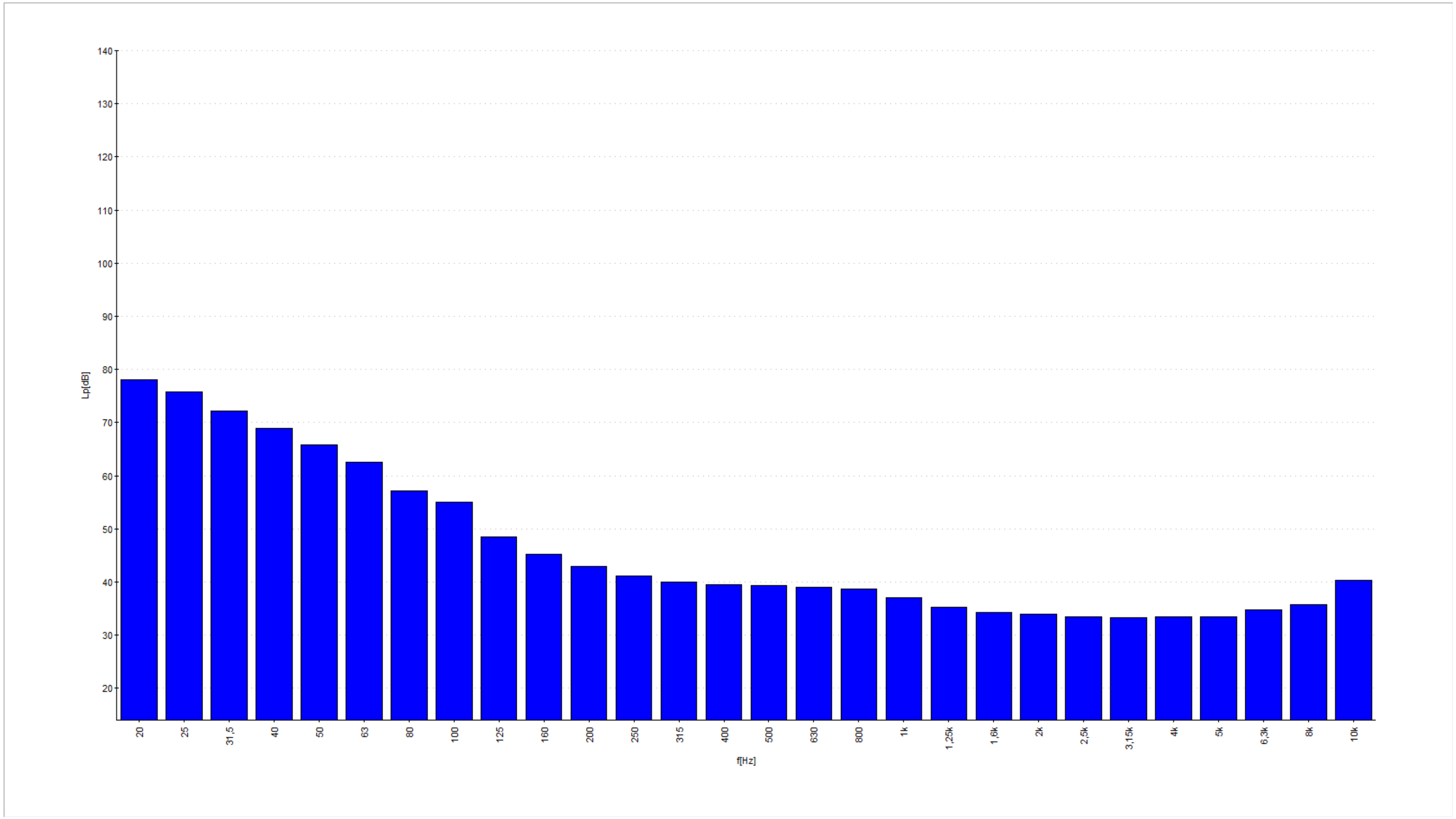


Figure 9: N 4 – Night time

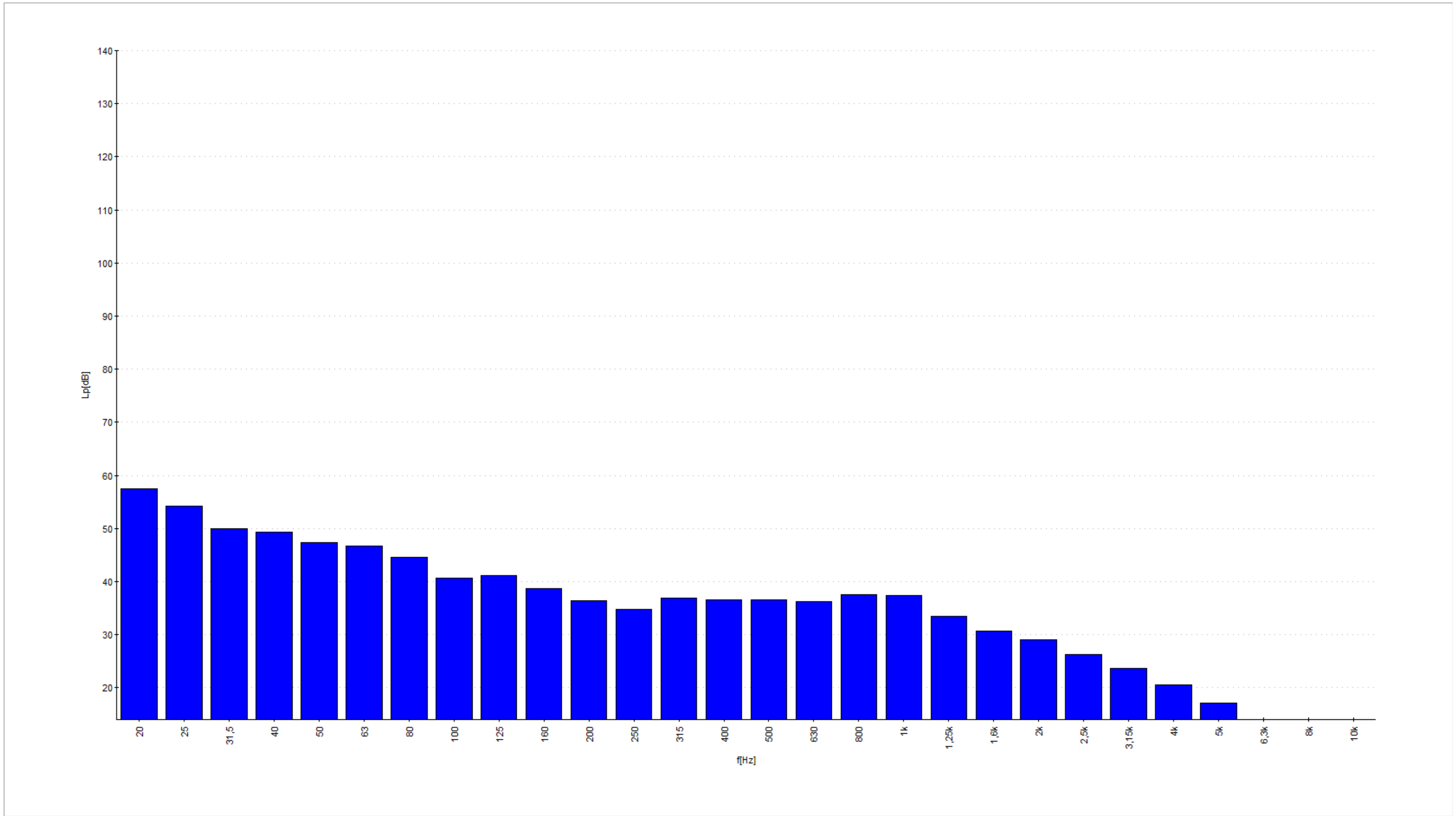
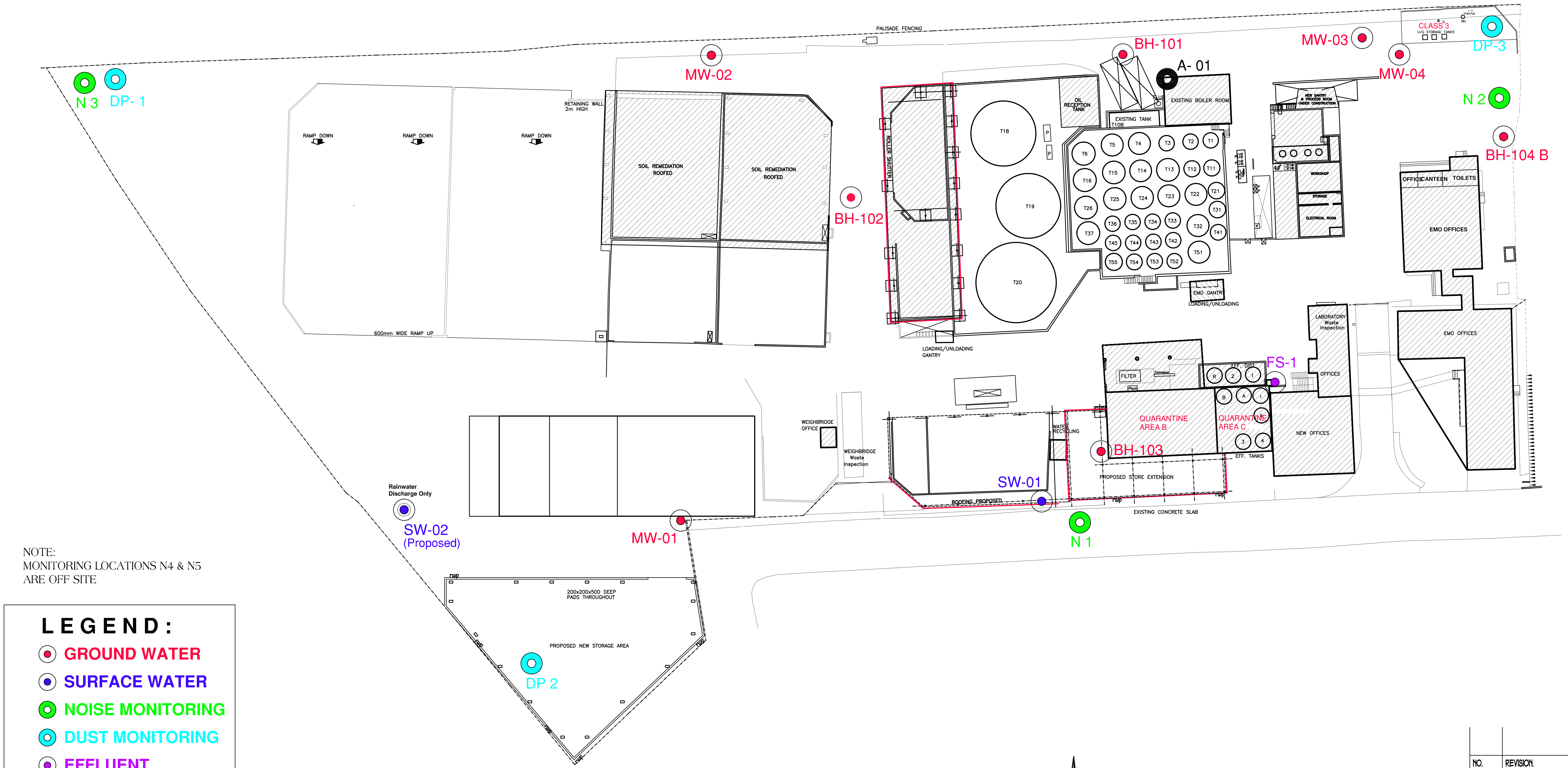


Figure 10: N 5 – Night time

Appendix 6

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT KAVANAGH RYAN & ASSOCIATES DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS TO BE CONFIRMED. DO NOT SCALE DRAWING.



NOTE:
MONITORING LOCATIONS N4 & N5
ARE OFF SITE

LEGEND:

- GROUND WATER
- SURFACE WATER
- NOISE MONITORING
- DUST MONITORING
- EFFLUENT
- AIR EMISSIONS

NO.	REVISION	DATE

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Tel. 2765661. Fax. 2765663.
E-mail. kmryan@eircom.net

CLIENT
Waste Storage Areas.

enva
ENVA LIMITED, CLONMINAM IND. EST., PORTLAOISE, Co. LAOIS.

TITLE

DRAWN A.C.	SCALE 1:400.	DRAWING No.	
JOB. No. C02104,	DATE Aug. '08.	At-WSA 1.	

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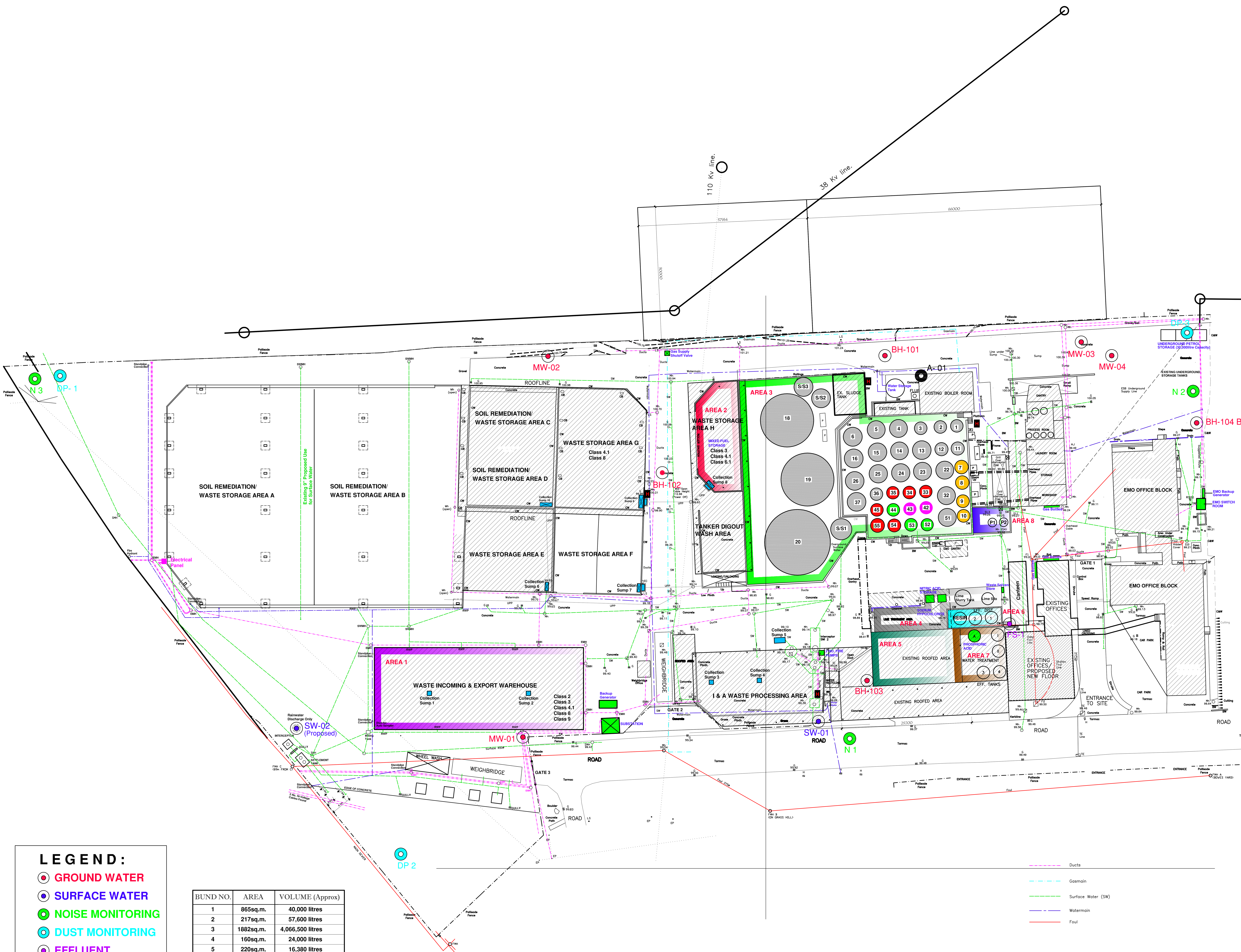
Enva Ireland: Monitoring locations

Appendix 7

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT KAVANAGH RYAN & ASSOCIATES DRAWINGS AND SPECIFICATIONS.

2. ALL DIMENSIONS TO BE CONFIRMED. DO NOT SCALE DRAWING.



LEGEND:

- GROUND WATER
- SURFACE WATER
- NOISE MONITORING
- DUST MONITORING
- EFFLUENT
- AIR EMISSIONS

BUND NO.	AREA	VOLUME (Approx)
1	865sq.m.	40,000 litres
2	217sq.m.	57,600 litres
3	1882sq.m.	4,066,500 litres
4	160sq.m.	24,000 litres
5	220sq.m.	16,380 litres
6	49sq.m.	21,400 litres
7	140sq.m.	11,400 litres
8	43sq.m.	43,263 litres

OIL TANK REGISTER

TANK NO.	GRADE	CAPACITY	FLASH POINT
1	11 LS	50,000 Ltr.	Above 38°
2	11 LS	50,000 Ltr.	Above 38°
3	11 LS	50,000 Ltr.	Above 38°
4	11 LS	100,000 Ltr.	Above 38°
5	11 LS	100,000 Ltr.	Above 38°
6	11 LS	140,000 Ltr.	Above 38°
7	Waste Oil	60,000 Ltr.	Above 36°
8	Waste Oil	60,000 Ltr.	Above 36°
9	Waste Oil	60,000 Ltr.	Above 36°
10	Waste Oil	60,000 Ltr.	Above 36°
11	Waste Oil	50,000 Ltr.	Above 36°
12	Waste Oil	50,000 Ltr.	Above 36°
13	Waste Oil	100,000 Ltr.	Above 36°
14	Waste Oil	100,000 Ltr.	Above 36°
15	Waste Oil	100,000 Ltr.	Above 36°
16	Waste Oil	140,000 Ltr.	Above 36°
18	Waste Oil	1,000,000 Ltr.	Above 36°
19	Waste Oil	1,000,000 Ltr.	Above 36°
20	11 LS	2,000,000 Ltr.	Above 38°
22	Waste Oil	100,000 Ltr.	Above 36°
23	Waste Oil	100,000 Ltr.	Above 36°
24	Waste Oil	100,000 Ltr.	Above 36°
25	Waste Oil	100,000 Ltr.	Above 36°
26	Waste Oil	140,000 Ltr.	Above 36°
32	Waste Oil	100,000 Ltr.	Above 36°
33	Kero	50,000 Ltr.	Above 36°
34	Kero	48,000 Ltr.	Above 36°
35	Kero	50,000 Ltr.	Above 36°
36	Waste Oil	50,000 Ltr.	Above 36°
37	Waste Oil	140,000 Ltr.	Above 36°
42	Derv	50,000 Ltr.	Above 56°
43	Derv	50,000 Ltr.	Above 56°
44	Gas Oil	50,000 Ltr.	Above 56°
45	Kero	50,000 Ltr.	Above 36°
51	14 LS	100,000 Ltr.	Above 56°
52	Gas Oil	50,000 Ltr.	Above 36°
53	Gas Oil	50,000 Ltr.	Above 56°
54	Kero	50,000 Ltr.	Above 36°
55	Kero	50,000 Ltr.	Above 36°
S/S1	Waste Oil	200,000 Ltr.	Above 36°
S/S2	Waste Oil	200,000 Ltr.	Above 36°
S/S3	Waste Oil	200,000 Ltr.	Above 36°
UGST	Petrol	30,000 Ltr.	Above -40°
P1	Waste Oil	10,000 Ltr.	Above 36°
P2	Waste Oil	10,000 Ltr.	Above 36°

NO.	REVISION.	DATE
I.	MW-04 ADDED.	16/03/'12.
H.	TANK LAYOUT & GENERAL ADDITIONS.	09/03/'11.
G.	DRAINAGE UPDATED.	19/06/'09.
F.	TK. 10 added, 21, 31 & 41 renamed	11/12/'07.
E.	DUCTING ADDED	23/10/'07.
D.	TANK TABLE AND NOTES ADDED	16/08/'06.
C.	DRAINAGE&ROOFED AREAS ADDED	23/05/'06.
B.	DRAINAGE ADDED	23/11/'05.
A.	DRAWING REVISED TO LATEST LAYOUT	15/08/'05.

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PLANNING, DESIGN & CONSTRUCTION CONSULTANTS.

CLIENT
Enva Ltd.,
Clonminam Ind. Est.,
Portlaoise,
Co. Laois.

TITLE

ENVA LIMITED,
CLONMINAM IND. EST.,
PORTLAOISE, Co. LAOIS.

DRAWN A.C.	SCALE 1:400.	DRAWING No. Site-NR01.
JOB. No. C05015.	DATE Sept. '03.	

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Appendix 8

1.0 PURPOSE

The purpose of this procedure is to ensure that environmental, health & safety information is communicated effectively to all external bodies and other parties and to ensure that environmental, health & safety concerns are effectively communicated and appropriately dealt with.

2.0 SCOPE

This procedure relates to any external environmental, health & safety communication with members of the public or with regulatory authorities or any requests for information regarding the environmental, health & safety performance of site operations within any of the Enva facilities in the Republic of Ireland.

It does not cover reporting of incidents/accidents/emergencies or training. These are dealt with under separate procedures. Customer complaints or dealing with customer requests is outside the scope of this procedure also.

3.0 RESPONSIBILITIES

It shall be the responsibility of the HSE Department to;

- Communicate environmental, health and safety information to all members of the public and regulatory authorities as necessary.
- Retain logs and records of external communications.
- Address requests for information from the public.
- Address and report complaints which relate to HSE performance.

4.0 PROCEDURE

4.1 The following documents are used to communicate environmental health and safety information to external parties

- HSE policy
- HSE manual
- EPA Annual Environmental Report
- Waste Collection Permit Reports
- DGSA report
- EPA waste licence
- Waste Collection Permits
- Contractor inductions
- External audits

4.2. Communications with Regulatory Authorities

All communications with regulatory authorities such as the HSA, EPA, etc shall be entered into a communications log. This shall record the dates of the communication, persons involved, topic covered and close out of the communication. Copies of communications sent or received shall also be filed by the HSE Department.

4.3 Communications with other Interested External Parties

4.3.1 All enquiries regarding the environmental, health & safety performance of the site operations are to be directed to the HSE department.

4.3.2 Requests for information from the general public shall be directed to the HSE Department who shall deal with each request or enquiry as appropriate. Evna sites are required under their Waste Management licenses to maintain a file for public inspection which should as a minimum include:

- Monitoring results,
- Complaints records,
- Environmental incidents records,
- EPA communication files including audits and inspections,
- Annual Environmental Reports.

Copies of information shall only be given to the public on the authority of the Chief Operations Officer (C.O.O.) or Managing Director of Enva.

4.3.3 Any complaints relating to HSE matters (e.g. related to public safety, nuisances, environmental emissions etc) received by Enva shall be directed to the HSE department. The HSE Department shall record details of the complaint and initiate corrective action. As appropriate the complaint shall be reported to the relevant regulatory authorities (e.g. EPA/|HSA). The HSE Department shall ensure an investigation takes place and shall respond (generally in writing) within one week of the complaint being received. A Corrective Action Requirement (CAR) shall be raised in relation to any complaint. . The person/ persons who have submitted the complaint shall be kept informed of any progress made in resolving the issue that gave rise to the complaint.

4.3.4 All enquiries regarding environmental, health & safety information shall be dealt with by the HSE department. Written requests shall be filed with the response attached.

4.3.5 If the request for information cannot be fulfilled over the telephone the HSE department may if appropriate invite the enquirer to the site to review any appropriate documentation or records available on the public file. In such cases the C.O.O. must be notified.

4.3.6 All site tours associated with an enquiry should be scheduled where possible within one working week of receipt of request. In exceptional circumstances it may be arranged at shorter notice.

5.0 RELATED DOCUMENTS

Correspondence Logs
Records of complaints

6.0 REFERENCE

ISO14001:2004 Clause 4.4.3
OHSAS 18001 Clause 4.4.3

Appendix 9

OBJECTIVE:				**ACHIEVE BY:**
PL 01-2012	**Improvement in enironmental performance and compliance.**			**31/12/2015**
RATIONALE:	To ensure that activities from the site do not impact on the environment.			
TARGET:				**ACHIEVE BY:**
PL 01T01	**Improvement of the quality of effluent release from the site**			**01/12/2012**
STEP	**IMPLEMENTATION PROGRAMME**	**RESP.**	**Target Date**	**STATUS**
1	Continue to monitor effluent and ensure parameters are met. Investigate treatment options for parameters not incompliance with the site licence.	HSE & Operations	Ongoing	There were no significant trends in non conformances during 2011. The monitoring of the quality of effluent will continue.
2	Consider installation of heat tracing on effluent discharge lines to prevent extreme cold temperatures affecting discharge	HSE & Operations	01/12/2012	Works have been carried out to insulate the discharge line by installing weather protection.
PL 1 T02	**Investigate groundwater contamination on site.**			
STEP	**IMPLEMENTATION PROGRAMME**	**RESP.**	**Target Date**	**STATUS**
1	Install new groundwater well	HSE	30.09.11	This has been installed
2	Upgrade well heads to provide additional protection to wells.	HSE	30.12.11	Contractor has been engaged for the replacement of well heads, this will be carried out in the next two months.
3	Update ground water risk assessment for site	HSE	30.12.12	
TARGET:				**ACHIEVE BY: 31/12/2011**
PL2 T03	**Review quality of self monitoring compliance data**		**31/03/2010**	
1	Carry out gap analysis to determine key laboratory management practises required to improve quality of data generated in the laboratory.	Laboratory &HSE	30/06/2011	laboratory equipment, purchase of laboratory reagents, control of standards, training, control of retains and storage, housekeeping and out of specification results and laboratory PPE. A sample handling SOP is also in place.Duplicate analysis has also been implemented on sample checks on all self monitoring on water parameters. Standard checks are ran frequently depending on the parameter.
2	Review outcome of data generated from EPA Intercalibration scheme.	Laboratory &HSE	31/03/2012	Current performace against EPA intercalibration samples are within specification
3	Determine key tests for validation	Laboratory &HSE	30/09/2012	Upon asssessment of key parameters for validation it was decided to begin implementing validation for COD. A trial validation has been performed to assess gaps in validation process. Target date is therefore being moved to 30/09/2012 for completion of validati for COD.
4	Carry out validation for significant self monitoring parameters	Laboratory &HSE	31/03/2013	A review of other critcial parameters for validation will be carried out upon completion of COD validation.
5	Assess requirement for AQC's and implement where deemed necessary.	Laboratory &HSE	31/06/2013	An AQC will be reviewed upon completion of COD validation.
TARGET:				**ACHIEVE BY: 31/12/2012**
PL3 T04	**Improve Tank & Pipeline, yard and bund integrity assessments**			
1	Replace damaged concrete to upgrade yard integrity and reseal expansio joints as required	HSE & Operations	31/12/2012	
2	Review the site with respect to tanks and pipelines and draft a register of current bunds, tanks and pipelines,their inclusion/exclusion (if required) in the 3 yearly bund integrity assessment	HSE & Operations	31/12/2012	A review of all pipelines, bunds and sumps was carried out, the attached drawing details the bunds, Surface water pipelines, and monitoring locations on site. All bunds are currently checked by means of a visual test on a three yearly basis All underground drainage lines are checked by CCTV on a three yearly basis. All sumps identified on site are in the process of being checked.This is due for completion in 2012. A review was carried out of above ground pipelines. The majority of overground pipelines are contained with in bunded areas. It is therefore deemed not necessary to pressure test each of these pipelines. Enva propose to pressure test all pipelines located out side of bunded areas on a phased basis over the next three years. A detailed drawing of process pipelines is available for review at the Enva facility. The lines for inspection can be divided up into the following: Transfers Process Unloading Each line outside of a bunded area will be uniquely numbered. A register of bunds and sumps is in place as part of the monitoring and measurement schedule. A register of pipelines which will be tested over the next three years will be included on this register.
3	Provide adequate bund retention capacity for areas 6 and 7.	HSE & Operations	31/12/2011	Overflow capacity has been upgraded to allow for removal of any spills from these to the main tank farm bund. Completed.
TARGET:				**ACHIEVE BY: 31/12/2012**
PL4 T05	**Reduce resource usage**			
1	Extension of existing rain water capture system from main offices to feed c	Operations	31/12/2012	
2	Install a system to reduce water usage in site toilets	Operations	31/12/2012	

Appendix 10

Enforcement Category Summary

Organisation Name	Enva Ireland Ltd
Case Number	W0184-1

Fixed Attributes	Enforcement Category
Complexity	High
Location	Low

Enforcement Category due to Fixed Attributes	C1

Sheet Reference	Enforcement Category
Complexity	High
Emissions	High
Location	Low
Operator Management	Mid
Enforcement Record	Mid

Enforcement Category Based Upon Above 7 Attributes	A3
FINAL ENFORCEMENT CATEGORY FOR YOUR FACILITY [1]	A1

Note[1]: If different from above, a default may have been applied.

Appendix 11

KAVANAGH RYAN & ASSOCIATES LIMITED.
PLANNING, DESIGN & CONSTRUCTION CONSULTANTS.
Unit 48, The Egan Centre, Dargle Road, Bray, Co. Wicklow.
Tel: 01-2765661/2 Fax: 01-2765663
E-mail: kmryan@eircom.net web site: www.kavanaghryan.com

BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 8	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *To be assessed..*
Bund Dimensions (internal): 43 sq. metres	*Primary Vessels – Materials of Construction:* Steel Tanks
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* 20 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 11 M^3
Bund Retention Volume (Local/Remote): 43,250 litres	*Vessels – 25% of Total Storage Volume:* 5 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: Yes	*Date of Hydrostatic test:* N/A

If No, give reasons:

Description and results of Hydrostatic Test:

- A hydrostatic test was carried out from the 18/10/2010 at 9.40 a.m. to the 19/10/2010 9.10 a.m.. No drop in level was noted.

Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K.M. Ry
for KAVANAGH RYAN & ASSOCIATES LIMITED

Date: 22.11.11

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E-mail: kmryan@eircom.net web site: www.kavanaghryan.com

BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 1 – Export Waste Storage	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004-Not determined*
Bund Dimensions(internal): 865 sq. metres	*Primary Vessels – Materials of Construction:* IBC's or plastic and steel barrels.
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* Varies- max storage $60m^3$ Majority of waste stored in this area is solid materials, like solid oily waste, batteries, aerosols etc. There fore a figure of 60 m^3 is estimated to be the maximum liquid volume to be stored in this area.
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* $1.1M^3$
Bund Retention Volume (Local/Remote): 40,000 litres	*Vessels – 25% of Total Storage Volume:* 15 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

- Not applicable

Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K. M. Ryan *for* KAVANAGH RYAN & ASSOCIATES LIMITED *Date:* 22.11.11

KAVANAGH RYAN & ASSOCIATES LIMITED.

PLANNING, DESIGN & CONSTRUCTION CONSULTANTS.

Unit 48, The Egan Centre, Dargle Road, Bray, Co. Wicklow.

Tel: 01-2765661/2 Fax: 01-2765663

E-mail: kmryan@eircom.net web site: www.kavanaghryan.com

BUND ASSESSMENT

JOB NO. C11055

BY: K. Ryan

DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminam Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 2 – Mixed Fuel Storage	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004-Not determined*
Bund Dimensions(internal): 217 sq. metres	*Primary Vessels – Materials of Construction:* IBC's or plastic and steel barrels.
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* Varies max storage 100M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 1.1 M^3
Bund Retention Volume (Local/Remote): 57,600 litres	*Vessels – 25% of Total Storage Volume:* 25 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

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Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K.M. Ryan *for* KAVANAGH RYAN & ASSOCIATES LIMITED

Date: 22.11.11

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BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminam Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 3 – Main Tank Bund	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004-Not determined*
Bund Dimensions(internal): 1882 sq. metres	*Primary Vessels – Materials of Construction:* Steel
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* 7,400 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 2,200 M^3
Bund Retention Volume (Local/Remote): 4,066,500 litres	*Vessels – 25% of Total Storage Volume:* 1,850 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

-

Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K.M. Ry –

for
KAVANAGH RYAN & ASSOCIATES LIMITED

Date: 22.11.11

KAVANAGH RYAN & ASSOCIATES LIMITED.

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BUND ASSESSMENT

JOB NO. C11055

BY: K. Ryan

DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 4 – Lime treatment area.	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004-Not determined*
Bund Dimensions(internal): 160 sq. metres	*Primary Vessels – Materials of Construction:* Steel Tanks
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* 10 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 11 M^3
Bund Retention Volume (Local/Remote): 24,000 litres	*Vessels – 25% of Total Storage Volume:* 2.5 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

-

Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K.M. Ryan *for* KAVANAGH RYAN & ASSOCIATES LIMITED *Date:* 22.11.11

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BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 5 – Stores.	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004 – Not determined.*
Bund Dimensions(internal): 220 sq. metres	*Primary Vessels – Materials of Construction:* IBC's or plastic and steel barrels.
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* Varies maximum storage 64 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 1.1 M^3
Bund Retention Volume (Local/Remote): 16,380 litres	*Vessels – 25% of Total Storage Volume:* 16 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

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Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K.M. Ryan *for* KAVANAGH RYAN & ASSOCIATES LIMITED *Date:* 22.11.11

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BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 6 - Effluent Discharge	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre 2004-Not determined*
Bund Dimensions(internal): 49 sq. metres	*Primary Vessels – Materials of Construction:* Steel tanks.
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* 130 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 55 M^3
Bund Retention Volume (Local/Remote): 21,400 litres	*Vessels – 25% of Total Storage Volume:* 32.5 M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

-

<u>*Description and Results of Visual Inspection:*</u>

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

<u>*Recommendations:*</u>

- Nothing further as of the date of the inspection.

K. M. Ryan *for* KAVANAGH RYAN & ASSOCIATES LIMITED *Date:* 22.11.11

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BUND ASSESSMENT

JOB NO. C11055
BY: K. Ryan
DATE: 22.11.11

Company: Enva Portlaoise	*Reference No.:* W0184-1
Site: Clonminham Industrial Estate, Portlaoise, Co. Laois.	*Category:* Waste
Bund Ref. No.: 7 – Wastewater Treatment.	*Bund Type – Local, Remote, Combined:* Local.
Bund location: See attached map.	*Bund Risk Classification 1, 2 or 3.* *Installed Pre-2004-Not determined*
Bund Dimensions(internal): 140 sq. metres	*Primary Vessels – Materials of Construction:* Steel tanks
Bund Materials of Construction: Concrete	*Primary Vessels – Total Storage Volume:* 82 M^3
Bund Lining Material: None	*Primary vessels – 110% of volume of largest vessel:* 40.1 M^3
Bund Retention Volume (Local/Remote): 11,400 litres	*Vessels – 25% of Total Storage Volume:* 20.5M^3
Deemed practicable/safe to conduct hydrostatic test? Yes/No: No	*Date of Hydrostatic test:* N/A

If No, give reasons: Not practicable – area currently in use.

Description and results of Hydrostatic Test:

-

Description and Results of Visual Inspection:

- The weather was overcast at the time of the inspection.
- There was no evidence of leakage of the bund at the time of the inspection.
- The bund walls are in adequate condition and are fit for purpose.

Recommendations:

- Nothing further as of the date of the inspection.

K. M. Ry *for* KAVANAGH RYAN & ASSOCIATES LIMITED *Date:* 22.11.11

Appendix 12

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V25 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.0	0.0	0
25.0	25.0	25.0	0
50.0	50.0	50.0	0
75.0	75.0	75.0	0
100.0	100.2	100.2	+ 0.2

Instrument Calibration Results

75.0	75.2	75.2	+ 0.2

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 11	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 11	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V24 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Au 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	- 0.3	- 0.3	- 0.3
25.0	24.9	24.9	- 0.1
50.0	49.8	49.8	- 0.2
75.0	74.8	74.8	- 0.2
100.0	99.7	99.7	- 0.3

Instrument Calibration Results

75.0	76.7	75.4	+ 0.4

Comment: Wire terminations in PT100 head rewired. High Level Sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature Date 16/8/11	**Accepted By:** Signature Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V32 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	- 0.3	- 0.3	- 0.3
25.0	25.1	25.1	+ 0.1
50.0	49.9	49.9	- 0.1
75.0	74.8	74.8	- 0.2
100.0	99.9	99.9	- 0.1

Instrument Calibration Results

75.0	N/A	N/A	N/A

Comment: ***Unable to remove instrument from tank due to pipework***

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V11 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.2	0.2	+ 0.2
25.0	25.2	25.2	+ 0.2
50.0	50.4	50.4	+ 0.4
75.0	75.2	75.2	+ 0.2
100.0	100.4	100.4	+ 0.4

Instrument Calibration Results

75.0	75.0	75.0	0

Comment: Terminals in PT100 head replaced. High Level Sounder Alarm & SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th April 2011	9889
Time Electronics	1042 Resistance	1203B2	29th April 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V12 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.4	+ 0.4	+ 0.4
25.0	25.3	25.3	+ 0.3
50.0	50.3	50.3	+ 0.3
75.0	75.3	75.3	+ 0.3
100.0	100.3	100.3	+ 0.2

Instrument Calibration Results

75.0	75.5	75.5	+ 0.5

Comment: High Level Sounder Alarm & SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature		Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V13 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.4	+ 0.4	+ 0.4
25.0	25.4	25.4	+ 0.4
50.0	50.3	50.3	+ 0.3
75.0	75.4	75.4	+ 0.4
100.0	100.3	100.3	+ 0.3
Instrument Calibration Results			
75.0	75.8	75.8	+ 0.8

Comment: High Level Sounder Alarm & SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	Model	Serial Number	Calibration Date	Certificate No.
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V14 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.1	+ 0.1	+ 0.1
25.0	25.2	25.2	+ 0.2
50.0	50.3	50.3	+ 0.3
75.0	75.3	75.3	+ 0.3
100.0	100.3	100.3	+ 0.3

Instrument Calibration Results

75.0			

Comment: High Level Sounder Alarm & SCADA screen Alarm found working OK
PT100 Pocket found leaking: instrument calibration only possible with tank empty

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature		Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V15 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.1	+ 0.1	+ 0.1
25.0	25.2	25.2	+ 0.2
50.0	50.3	50.3	+ 0.3
75.0	75.2	75.2	+ 0.2
100.0	100.3	100.3	+ 0.3

Instrument Calibration Results

75.0	75.2	75.2	+ 0.2

Comment: High Level Sounder Alarm & SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	Model	Serial Number	Calibration Date	Certificate No.
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V16 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.2	+ 0.2	+ 0.2
25.0	25.5	25.5	+ 0.5
50.0	50.4	50.4	+ 0.4
75.0	75.5	75.5	+ 0.5
100.0	100.5	100.5	+ 0.5

Instrument Calibration Results

75.0	75.4	75.4	+ 0.4

Comment: ***High level sounder and SCADA screen Alarm found working OK***

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V26 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.4	+ 0.4	+ 0.4
25.0	25.6	25.6	+ 0.6
50.0	50.4	50.4	+ 0.4
75.0	75.6	75.6	+ 0.6
100.0	100.5	100.5	+ 0.5

Instrument Calibration Results

75.0	75.5	75.5	+ 0.5

***Comment:** High level sounder and SCADA screen Alarm found working OK*

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

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Valentia Place, Newcastle, Co Down

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CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V22 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Au 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.3	+ 0.3	+ 0.3
25.0	25.5	25.5	+ 0.5
50.0	50.5	50.5	+ 0.5
75.0	75.5	75.5	+ 0.5
100.0	100.6	100.6	+ 0.6

Instrument Calibration Results

75.0	75.3	75.3	+ 0.3

Comment: ***High Level sounder and screen alarm found working OK***

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V37 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11^{th} Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.3	+ 0.3	+ 0.3
25.0	25.2	25.2	+ 0.2
50.0	50.3	50.3	+ 0.3
75.0	75.3	75.3	+ 0.3
100.0	100.4	100.4	+ 0.4

Instrument Calibration Results

75.0	75.4	75.4	+ 0.4

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29^{th} Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29^{th} Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***113202***
Customer Instrument ID	V18 Bottom	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.2	+ 0.2	+ 0.2
25.0	25.3	25.3	+ 0.3
50.0	50.2	50.2	+ 0.2
75.0	75.2	75.2	+ 0.2
100.0	100.0	100.0	0

Instrument Calibration Results

75.0	0	73.2	- 1.8

Comment: Head Terminations found corroded and replaceed. High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	[signature] Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	V18 Top Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	- 0.2	- 0.2	- 0.2
25.0	25.2	25.2	+ 0.2
50.0	50.0	50.0	0
75.0	74.9	74.9	- 0.1
100.0	100.0	100.0	0
150.0			

Instrument Calibration Results

75.0	75.3	75.3	+ 0.3

Comments: Field signal replaced with screened Beldon. High level sounder and SCADA screen Alarmfound working OK.

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I132032*
Customer Instrument ID	PFO 7	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	July 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.7	0.7	+ 0.7
25.0	25.7	25.7	+ 0.7
50.0	50.7	50.7	+ 0.7
75.0	75.1	75.1	+ 0.1
100.0	100.5	100.5	+ 0.5

Instrument Calibration Results

75.0	75.1	75.1	+ 0.1

Comment: Instrument renamed and fitted to new PFO tank Dec 2010

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	PFO 8	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.4	0.4	+ 0.4
25.0	25.5	25.5	+ 0.5
50.0	50.4	50.4	+ 0.4
75.0	75.6	75.6	+ 0.6
100.0	100.9	100.9	+ 0.9

Instrument Calibration Results

75.0	75.6	75.6	+ 0.6

Comment: Instrument renamed and fitted to new PFO tank Dec 10

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	UCO9 Bottom Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.3	0.3	+ 0.3
25.0	25.3	25.3	+ 0.3
50.0	50.2	50.2	+ 0.2
75.0	75.1	75.1	+ 0.1
100.0	100.2	100.2	+ 0.2

Instrument Calibration Results

75.0	75.4	75.4	+ 0.4

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	UCO9 Top Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interva	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	July 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0			
25.0			
50.0			
75.0			
100.0			

Instrument Calibration Results

75.0	N/A	N/A	N/A

Comment: Instrument not wired or fitted to tank…. Not is use

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	UC10 Bottom Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interva	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	July 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.2	+ 0.2	+ 0.2
25.0	25.3	25.3	+ 0.3
50.0	50.4	50.4	+ 0.4
75.0	75.5	75.5	+ 0.5
100.0	100.6	100.6	+ 0.6

Instrument Calibration Results

75.0	75.1	75.1	+ 0.1

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	[signature] Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD
Valentia Place, Newcastle, Co Down
Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***113202***
Customer Instrument ID	UC10 Top Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	August 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0	0	0
25.0	25.3	25.3	+ 0.3
50.0	50.0	50.0	0
75.0	74.9	74.9	- 0.1
100.0	100.0	100.0	0

Instrument Calibration Results

75.0	75.6	75.6	+ 0.6

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	***I13202***
Customer Instrument ID	Water Discharge Line	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.1	+ 0.1	+ 0.1
25.0	25.1	25.1	+ 0.1
50.0	50.0	50.0	0
75.0	75.0	75.0	0
100.0	100.3	100.3	+ 0.3

Instrument Calibration Results

75.0	N/A	N/A	N/A

Comment: ***New probe fitted to replace temporary probe that was installed June 2011. Require validation by Lab.***

Calibration Equipment

Manufacturer	Model	Serial Number	Calibration Date	Certificate No.
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature [signature]	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	SS1 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0	0	0
25.0	25.3	25.3	+ 0.3
50.0	50.3	50.3	+ 0.3
75.0	75.5	75.5	+ 0.5
100.0	100.6	100.6	+ 0.6

Instrument Calibration Results

75.0	75.1	75.1	+ 0.1

Comment: High level sounder and SCADA screen Alarm found working OK. Probe not fitted to Tank.

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature G Clarke	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	SS2 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	August 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.3	+ 0.3	+ 0.3
25.0	25.5	25.5	+ 0.5
50.0	50.6	50.6	+ 0.6
75.0	75.7	75.7	+ 0.7
100.0	100.6	100.6	+ 0.6

Instrument Calibration Results

75.0	75.4	75.4	+ 0.4

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	SS3 Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	+ 0.2	+ 0.2	+ 0.2
25.0	25.4	25.4	+ 0.4
50.0	50.5	50.5	+ 0.5
75.0	75.6	75.6	+ 0.6
100.0	100.7	100.7	+ 0.7

Instrument Calibration Results

75.0	75.5	75.5	+ 0.5

Comment: High level sounder and SCADA screen Alarm found working OK

Calibration Equipment

Manufacturer	Model	Serial Number	Calibration Date	Certificate No.
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aolcom

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V19 Top Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	- 0.2	- 0.2	- 0.2
25.0	24.6	24.6	- 0.4
50.0	49.6	49.6	- 0.4
75.0	74.6	74.6	- 0.4
100.0	99.9	99.9	- 0.1

Instrument Calibration Results

75.0	75.1	75.1	+ 0.1

Comments: *No pocket in tank. High level sounder and SCADA screen Alarm found OK*

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 2011	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 2011	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

CERTIFICATE OF CALIBRATION

Customer	***Enva Portlaoise***	**Contract**	*I13202*
Customer Instrument ID	V19 Bottom Temp	Location	Tank Farm
Device Description	PT100 Temperature Probe	Calibration Range	0 – 150 Deg C
Calibration Date	11th Aug 2011	Interval	12 month
Instrument Accuracy	+ or – 0.1 Dec C	Calibration Due Date	Aug 2012

Loop Calibration Results

INPUT	AS FOUND	AS LEFT	DEVIATION
0.0	0.2	0.2	+ 0.2
25.0	25.0	25.0	0
50.2	50.2	50.2	+ 0.2
75.2	75.2	75.2	+ 0.2
100.2	100.2	100.2	+ 0.2

Instrument Calibration Results

75.0	N/A	N/A	N/A

Comments: Instrument calibration not possible. Unable to remove instrument due to no pocket being fitted in tank and tank full of oil

Calibration Equipment

Manufacturer	**Model**	**Serial Number**	**Calibration Date**	**Certificate No.**
Eurolec	PC Temp PT2	84/PT2/100	29th Apr 11	9889
Time Electronics	1042 Resistance	1203B2	29th Apr 11	9890

DECLARATION: The calibration references used can be traced back to recognised national standards.

Tested By: Signature	Date 16/8/11	**Accepted By:** Signature	Date

SCADA IRELAND LTD

Valentia Place, Newcastle, Co Down

Tel: 028 43725970 Mobile 07767 272203 email: scadaireland@aol.com

Appendix 13

CLOSURE, RESTORATION, AFTERCARE MANAGEMENT PLAN

Enva Ireland Ltd,
Clonminam Industrial. Estate,
Portlaoise,
Co. Laois.

License no: W0184-01

March 2011

TABLE OF CONTENT

1.0 INTRODUCTION & SCOPE STATEMENT

This Closure, Restoration, Aftercare Management Plan (CRAMP) has been prepared by Enva Ireland Ltd in respect of its facility in Portlaoise, Co. Laois in fulfilment of Condition 12.2 of Waste License number W0184-01.

An Initial Screening & Operational Risk Assessment has been carried out in accordance with the EPA guidance document on "Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision (2006)". On the basis of the initial screening and operational risk assessment the Enva facility is classified as a Category 3 facility. As such this indicates that the full requirements for a Closure, Restoration and Aftercare Management Plan must be considered.

The scope of this risk assessment is the licensed activities covered under W0184-01 excluding those activities associated with operation of the sludge drying unit and associated CHP plant. This plan shall be reviewed annually and any necessary inclusions to the scope will be accommodated accordingly.

1.1 Closure Scenarios

No site closure is envisioned in the near future. In the event of ceasing waste license activities (due to site closure or otherwise) it is envisioned that this would involve clean closure of all site infrastructure associated with the waste activities.

2.0 SITE EVALUATION

A detailed description of site activities, site location etc is set out in the Waste License Application for the waste licence which was granted for the site in January 2004.

2.1 Facility Description & History

Enva operates a waste acceptance, processing and transfer station located on a 5.65 acre site in Clonminam Industrial Estate, Portlaoise, Co. Laois. It operates a 12 hour day for 5 days a week with a half day Saturday. Enva currently employs approximately 70 employees at the Portlaoise facility

A sister company of Enva, Emo Oil Services Ltd. maintains 9 storage tanks and a gantry on the site. It is assumed that in the event of Enva ceasing business and closing the facility that Emo will continue to maintain their current use of the site.

Enva accepts the following wastes on site as per Schedule A of its waste licence (W0184-01); waste oils, sludge's, oily absorbents, oil filters, soils contaminated with hydrocarbons, mixed fuels, antifreeze, brake fluid, fluorescent tubes, batteries, paint related wastes, aerosols, grease trap waste,acids and bases.

The facility's license also provides for activities related to a sludge drying facility. This activity has not commenced and is not envisioned to do so in the foreseeable future.

Enva have a dedicated processing plant for the recovery of waste oils. The Portlaoise facility also has analytical capability provided by an in-house laboratory, which includes waste oil and effluent analysis. Enva has a bunded tank farm which comprises of 43 waste oil storage tanks

The facility also has soil bays dedicated to the treatment of contaminated soil. Enva provide bio-remediation and soil stabilisation treatment options.

Enva's 865m^2 waste storage building is dedicated to the segregation of incoming wastes and preparation of wastes prior to export.

Enva also provides a range of waste storage and spill clean up products.

There are 3 surface water collection systems on site. The interceptors are equipped with coalescence filters for improved separation of solids and water prior to discharge.

In the first system (SW-01) , the main area of the site, i.e. the surface water from the central and south areas of the site is collected by yard gullies and drains to a

58 tonne capacity, four chamber interceptor located between the process building and the old tank farm. In this unit, separation of traces of oil takes place and the oil free water is pumped under level control from a post separation pump chamber to a second 30 tonne interceptor located near the west border of the site.

In the second system (SW-02) surface water from the north end of the site is collected and fed to the second separator mentioned above. The second separator is also fitted with a sensor, upon a large influx of oil entering the interceptor the release valve will shut down automatically. The water from the interceptors leaves the site and enters the municipal surface water system.

Effluent from the processing of waste oil is treated in the on site lime treatment plant prior to release to Portlaoise wastewater treatment plant via the town sewer.

Minor contamination of groundwater was identified in quarterly groundwater reports undertaken in accordance with waste licence conditions. The following two reports, the first entitled “An Environmental Site Investigations Report” by URS in July 2005 and the second entitled “A Summary Report on the Trend of Contaminant Levels at Enva Ireland Since 2005” by RPS in 2007 have deemed contamination to be localised and due to historic activities undertaken at the site, prior to the acceptance of waste on site. The report also states that the groundwater contamination is not moving down gradient or off-site and that natural processes in the groundwater are attenuating the contamination on site. A further report was requested by the Agency in 2008 which was submitted in November 2008. Further steps were taken in 2011 to assess the impact on ground water. An additional well was installed in order to assess the underlying ground water flow direction and to assess the potential mobility of any contaminants that may be present. Further works will be carried out in 2012 by replacing well head caps and carrying out a review of the ground water risk assessment.

2.2 Facility Compliance Status

Enva have been operating under the conditions of its waste licence W0184-1 since it was issued the licence on the 16th of January 2004. Enva, Portlaoise have never been convicted under the Environmental Protection Act or any other environmental legislation. Enva, Portlaoise are largely compliant with their waste licence reference W0 184-01.

Historically, Enva experienced zinc exceedences in its wastewater emissions. To prevent reoccurrence of these exceedences Enva invested significant resources in the installation of a lime wastewater treatment plant which removes the metal content of the waste water. As a result there has been an improvement in the quality of the effluent off site.

There were 3 non-conformances reported with regard to effluent during the 2011 There were a further 2 non-conformances issued by the Agency with regard to odour. The remaining issues reported to the Agency were in relation to administrative and equipment errors.

Further to the EPA guidance document on "Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision (2006)" a compliance record score of 3 is judged to be appropriate for Enva.

2.3 Facility Processes and Activities

Enva provides a nationwide collection service for waste oils. Waste oils are collected from customers by tanker and delivered to the Enva facility. The tanker weighs in on site, connects to the unloading gantry and has its contents transferred to bulk storage tanks within the bunded tank farm on site. All operations thus take place within a bunded area. Tanks are controlled by a SCADA system and fitted with level alarms which sound at three stages these are high, high-high and high-high-high. All relevant records as required by legislation and by the license are retained.

Enva process the waste oils on site to form a final fuel oil product known as 11ls. 11ls must meet the specified limits for parameters as listed in Schedule G of Envas waste licence prior to transport off site. Some changes have been carried out to the process in light of the technical amendment B to the Enva waste licence. While this allows Enva to produce different grade products from the waste oil process it does not significantly change the nature of operations that have previously been carried out.

Mixed fuels are collected both by tanker and in suitable UN approved drums. Mixed fuels are bulk stored on site in an underground storage tank prior to being transported off site to an approved facility.

Packaged waste (e.g. batteries etc) are collected from customer sites, delivered to Enva and unloaded into waste storage areas. Packaged waste containers will be given a tracking code and entered into a database / recording system. The packages will be stored in local bunds within the waste handling area and segregated according to procedures based on UK HSE Guidelines for storage and warehousing of packaged dangerous goods, HSG 71. Packaged wastes are bulked and dispatched to approved recovery / disposal outlets.

The license allows for acceptance of non-hazardous sludge and associated on-site treatment by means of sludge drying. This activity will not commence in the foreseeable future and is therefore outside the scope of this CRAMP until such time as the situation changes.

Other activities at the site include the storage of waste storage and spill treatment products. These activities are outside the scope of the license.

2.4 Inventory of Site Buildings, Plant, Raw Materials and Wastes

In the event of closure the following inventory would have to be considered:

- Office and Laboratory with associated welfare facilities
- Lockers and Showers for operatives and drivers
- Workshop
- Electrics room
- Dry Cleaning area
- Process room
- UST of 30,000 litre capacity for the storage of Petrol
- Boiler House
- Loading/Unloading Gantries x 3
- Oil transfer pumps and valves;
- A bunded tank farm consists of 43 tanks that range in capacity from 50,000litres, 140,000, 200,000, 1,000,000 and 2,000,000 litres. The following substances are contained within these tanks are; waste oil, Product tanks, kerosene tanks, Gas Oil and Derv
- Bunded flammable waste storage area 217m^2
- Sludge bay for tanker dig out
- A bunded storage unit for the receiving and storage of hazardous waste materials
- Soil Sheds
- Weighbridge;
- Enclosed Process Building – Oil Filters, Oily Rags, Paint can processing
- 360m^2 building used for general storage of equipment etc. The floors of each section are fully bunded. The exterior of the building is cladded with fire resistant cladding;
- Bunded effluent lime treatment plant area 210m^2
- Surface water drainage network with 3 oil interceptors of 58 and 30 (2) tonnes in capacity fitted with SW1 and SW2 final interceptors being equipped with a coalescence filter.
- Concrete surfacing
- General stores area

3.0 CLOSURE CONSIDERATIONS

3.1 Clean or Non Clean Closure Declaration

In the event of permanently ceasing all waste activities at the site or in the event of full site closure, Enva would envision a clean closure. No wastes are buried on site. According to independent analysis of groundwater monitoring results; localised contamination of groundwater has been detected onsite and natural processes in the groundwater are attenuating the contamination on site.

Therefore it is expected that there would be no significant remaining environmental liabilities following full or part closure.

3.2 Plant or Equipment Decontamination Requirements

Following removal of remaining waste (liquid and packaged waste) all waste oil tanks, bunds, associated pipelines, pumps, spill trays and the oil interceptor would be decontaminated.

All bulk storage and associated pipelines, pumps, valves, spill trays, with the exception of the EMO tanks will be emptied and cleaned to a gas free standard. The process equipment will be oil free and electrically isolated.

At this point the only operational area will be the boiler room with the associated LPG supply, the treatment plant, the laboratory and some of the administration area. There will be a temporary designated storage area with adequate secondary containment to facilitate any miscellaneous or unanticipated waste or chemicals arising during latter stages of decommissioning.

All non-process related material will be removed for use to local business or sent to an approved facility for recovery or disposal.

The waste water treatment plant is only to be decommissioned at the penultimate stage in the decommissioning plan as it will be treating liquid residues from other decommissioning activities.

Surface water interceptors will be de-sludged and steam cleaned. The resulting sludge will be removed for treatment off site.

It is assumed at this stage that no further liquid effluent will be generated on site. The treatment plant will be isolated but not physically disconnected from incoming flow. A connection will be maintained for emergency purposes. Any remaining untreated effluent will be treated as normal.
Treatment tanks and equipment will then be de-sludged and the resulting sludge disposed of as a hazardous waste. The tanks will be steam cleaned and the resulting washings disposed of as hazardous waste.

Once all areas of the site are considered adequately clean, the boiler will be decommissioned. The LPG supply boiler may be isolated but this will depend on the need for the boiler by Emo Oil. The boiler house floors and fuel pipework will be cleaned and the washings treated on site.

All remaining packaged wastes would be sent to approved facilities for final disposal/recovery.

All bunded areas and the floor of the waste handling area would be inspected for any signs of surface contamination and if necessary these would be washed from the surfaces as above.

A CCTV inspection of stormwater drains and gullies would be carried out and any residues washed to the oil interceptors as appropriate. Following this the oil interceptor would be desludged and washed out to remove any residual traces of oil. The interceptors would be inspected for signs of contamination or presence of residue and cleaned out with clean water.
All drains associated with the foul sewer system would also be flushed with clean water.

Lab equipment used for on-site environmental analysis would be cleaned / wiped down if necessary.

Any hazardous residuals such as the following:

- Asbestos cement tiles in the warehouse roof – a survey of the roof will be undertaken at the decommissioning stage and its recommendations followed where practicable.
- Fire-fighting foam and other extinguishers will remain assuming EMO assume operation of the site.
- Lab and workshop chemicals will be disposed of in an appropriate manner to a licenced facility.
- Lab instrumentation containing radioactive material – There is a radioactive source on-site, in the Gas Chromatography (GC) instrument and GC. However, it is anticipated that the GC and XRF instrument would most likely be sold on as an asset.
- Emergency generator fuel – since Emo Oil would presumably remain on site, the emergency generator will not be decommissioned and the diesel oil supply maintained locally for the generator.
- Boiler treatment chemicals
- Packaged wastes will be sent via existing disposal/recovery routes.

3.3 Plant Disposal or Recovery

All plant items have inherent value for reuse within Enva Ireland Ltd or for sale to a third party as appropriate. Infrastructure such as the building, bunds, diversion tank, stormwater drains, groundwater monitoring wells, weighbridge, foul sewer network would remain in situ as they form part of the inherent capital value of the site and do not themselves present potential for environmental pollution.

Tanks, pumps, spill trays, laboratory equipment etc may either be removed for use on another Enva Ireland Ltd site or sale to third party or they may remain in place for use on-site (i.e. for non-waste activities).

3.4 Waste Disposal or Recovery

All wastes including those listed below will be dispatched to approved third party waste contractors. Recovery/reuse options for wastes will be sought in preference to treatment/disposal where this is possible and appropriate.

- Packaged wastes.
- Waste oil from bulk oil tanks.
- Sludge / residue from the interceptor.
- Washings from tanks, bunds, floors, equipment, and diversion tank.
- General refuse.
- Lab wastes.

Unused absorbent material for spillage control may be reused within Enva Ireland Ltd or sold to a third party.

3.5 Soil Removal

There is no on-site landfilling at the Enva facility. Contaminated soil accepted from customers prior to the cessation of waste acceptance activities will be removed to existing approved treatment routes and where required via TFS.

4.0 CRITERIA FOR SUCCESSFUL CLOSURE

4.1 Addressing of Site Environmental Liabilities at Closure

Successful clean closure will be expected to be achieved when it can be demonstrated that there are no remaining environmental liabilities at the site. In practice this will require demonstration that the following criteria have been met:

- There are no residues which could pose an environmental hazard remaining on or within plant and equipment associated with waste activities.
- All wastes associated with licensed waste activities and with the cleaning and decontamination of plant and equipment as part of the closure have been removed off site to appropriately licensed facilities and carried by hauliers who have appropriate waste collection permits.
- Groundwater monitoring carried out following plant decontamination and waste removal indicates that no residual contamination exists within the soils or groundwater as a result of site activities.
- All relevant records relating to the closure have been retained on file.

5.0 CLOSURE PLAN COSTING

5.1 Decontamination Costs

Costs associated with decontamination of tanks, bunds, floors, drains, interceptors would include detergent/caustic wash, labour, use of tanker / IBCs, hire of power washer unit. Labour would be supplied from within Enva's own existing resources. Hire of a tanker and power washer would also be from within Enva's existing resources. Water and energy is supplied to the site and is not expected to present a significant cost over and above normal operating costs.

Desludging of the 3 oil interceptors would cost approximately €5,000.

Washing of floors with detergent / caustic would cost approximately €3,000.

5.2 Plant & Waste Disposal Costs

As indicated earlier plant and equipment would have inherent value and in many cases would in fact add to the capital value of the site following closure. There are therefore no net costs associated with plant and equipment.

Waste oil and packaged wastes from customers are accepted to the facility on a commercial basis. Thus costs of disposal are directly charged to the customer, therefore there would be no net cost associated with disposal of these wastes.

The principal wastes for disposal would therefore be the waste washings from the decontamination activities. It is anticipated that there could be up to 50 tonnes of washings for disposal which would be treated and discharged from the facility. Sludge's from the cleaning out of tanks is estimated to create up to 250 tonnes of oily sludge's. These would have to be exported for disposal/recovery, the estimated cost of disposal/recovery is €400/tonne amounting to €100,000.

The cleaning and decontamination of all the tanks on site is estimated to be approximately €241,250. This is based on 96 days required to carry out the cleaning of each tank at a cost of €2, 500 for each days activities.

Other wastes may include a small quantity of lab waste as well as general refuse. Estimated costs for these would be expected at less than €10,000.

5.3 On-going monitoring

It is not envisioned that any on-going monitoring would be required at the site. However, prior to closure the following monitoring and reports would be required to finalise the closure:

- CCTV of stormwater drains.
- One round of groundwater monitoring.
- Validation audit.

It is estimated that the costs of the CCTV would be of the order of €3,000 and the groundwater monitoring and report would be of the order of €10,000. €35,000 is allowed for the remediation of any possible soil contamination present on site. The use of an excavator is also allowed should it be required.
An independent audit will be carried out by external competent specialists in order to validate the implementation of the CRAMP. Costs of this are expected to be in the order €4,000.

5.4 Facility Security and Staffing

During closure facility security would be provided in the normal way and would not be expected to constitute additional costs. The site is surrounded with an 8 foot high palisade fence with three entrance gates which are operated by a fob system. The gates can additionally be padlocked if required.

Staffing would be provided from within Enva's own resources for the purposes of decontamination and cleanup. No additional costs are envisioned in respect of this.

5.5 Summary of Costs

The total costs associated with this CRAMP are estimated as follows;

DESCRIPTION	**COST**
Desludging of oil interceptors	€5,000
Cost of floor washing	€3,000
Desludging/cleaning of storage tanks	€241,250
Disposal of oily sludge's	€100,000
Disposal of other wastes	€10,000
CCTV of stormwater drains	€3,000
One round of soil and groundwater monitoring report	€10,000
Remediation of soil	€35,000
Excavator for ground investigations	€2,352
Validation audit and report	€4,000
TOTAL	**€413,602**

6.0 CLOSURE PLAN UPDATE AND REVIEW

6.1 Proposed Frequency of Review

As per the waste license condition 4.3.1 it is proposed to review this CRAMP annually and to revise it whenever this is warranted due to significant changes to costs, site conditions, plant, infrastructure or waste activities.

6.2 Proposed Scope of Review

The annual review of the CRAMP referred to above will include the entire document.

7.0 CLOSURE PLAN IMPLEMENTATION

7.1 EPA Notification

In the event that closure is planned. Enva will notify the Agency in writing as soon as is feasible in advance of the closure. Enva would aim to ensure that this notification takes place at least one week in advance of implementing the CRAMP.

7.2 Local or other Statutory Authority notifications

The closure of waste activities at Enva Ireland Ltd in Portlaoise would not be likely to concern any other agencies or authorities. It is therefore not envisioned that any notification other than that mentioned in Section 7.1 above would be required.

7.3 Test Programme

There are no test programmes relevant to the closure.

7.4 Full or Partial Closure considerations

It is conceivable that a part of Enva's waste activities could be closed while others continue. In this event the plant, equipment, raw materials and wastes relating only to the part of the waste activities which are closed will be closed in accordance with this plan. For partial closure the specific components which are within the scope of the closure will be listed within the notification referred to in Section 7.1 above and validation against successful closure criteria will be carried out in respect of the listed items only.

8.0 CLOSURE PLAN VALIDATION

8.1 Closure Validation Audit

As part of the closure, Enva would employ an independent environmental specialist with experience and recognised qualifications as an environmental auditor (e.g. membership of IEMA or similar) to conduct a validation audit against the requirements of this CRAMP particularly the criteria set out in Section 4.1. The scope of the audit shall be the same as the scope of the closure.

8.2 Closure Validation Audit Report

An audit report would be prepared by the independent auditor clearly setting out the overall conclusions of the audit and specifying whether the audit criteria had been achieved.

8.3 Closure Validation Certificate

The closure will be deemed to be complete if all criteria set out in Section 4.1 have been deemed to be achieved in the auditor's report. This shall be regarded as certification of completion of the closure in accordance with this plan. The auditor's report will then be submitted to the Agency.

9.0 RESTORATION AND AFTERCARE MANAGEMENT PLAN (RAMP)

As indicated in Section 1, Enva is classified as a Category 3 risk site by default and therefore must consider the need for a Restoration and Aftercare Management Plan (RAMP). The EPA guidance document recognises that the majority, but not all, Category 3 facilities will require a restoration and aftercare management plan. In particular, the guidance document states that RAMP is needed for non-clean closure.

Enva Ireland Ltd would envision a clean closure for its Portlaoise waste activities and therefore would not envision the need for restoration or any aftercare. Part of the site closure plan includes verification that no significant contamination remains with soils/groundwater following closure. In the event that there are any remaining residues which could pose a hazard to the environment or that soil / groundwater contamination is discovered this situation will be reviewed.

9.1 Site Restoration and Aftercare Management Costs

In view of the above there are no anticipated costs associated with site restoration and aftercare management post closure.

Appendix 14

Environmental Liability Risk assessment.

Enva Ireland Ltd,
Clonminam Industrial. Estate,
Portlaoise,
Co. Laois.

License no: W0184-01

March.2011

Table of contents

1. INTRODUCTION

1.1. General

Enva Ireland Limited (Enva) operates a waste licensed facility in Clonminam Industrial estate, Portlaoise, Co. Laois comprising of the following:

- Office and Laboratory with associated welfare facilities
- Lockers and Showers for operatives and drivers
- Workshop
- Electrics room
- Dry Cleaning area
- Process room
- UST of 30,000 litre capacity for the storage of Petrol
- Boiler House
- Loading/Unloading Gantries x 3
- Oil transfer pumps and valves;
- A bunded tank farm consists of 43 tanks that range in capacity from 50,000litres, 140,000, 200,000, 1,000,000 and 2,000,000 litres. The following substances are contained within these tanks are; waste oil, Product kero tanks, Gas Oil and Derv
- Bunded flammable waste storage area 217m^2
- Sludge bay for tanker dig out
- A bunded storage unit for the receiving and storage of hazardous waste materials
- Soil Sheds
- Weighbridge;
- Enclosed Process Building – Oil Filters and Oily Rags
- 360m^2 building used for general storage of equipment etc. The floors of each section are fully bunded. The exterior of the building is cladded with fire resistant cladding;
- Bunded effluent lime treatment plant area 210m^2
- Surface water drainage network with 3 oil interceptors of 58 and 30 (30) tonnes in capacity fitted with coalescence filter.
- General stores area.
- Concrete surfacing

Environmental management of the site is regulated by the conditions prescribed in the sites Waste Management Licence Register No. W0184-01 issued on the 16th of January 2004 by the Environmental Protection Agency (Agency).
Clause 12.2 of the Waste Licence requires the preparation and submittal to the Agency of an Environmental Liabilities Risk Assessment (ELRA). The specific requirements are as follows:

12.2.2 The licensee shall arrange for the completion by an independent and appropriately qualified consultant, of a comprehensive and fully costed Environmental Liabilities Risk Assessment (ELRA), which addresses the liabilities from past and present activities. A report on this assessment shall be submitted to the Agency for agreement within twelve months of date of grant of this licence. The ELRA shall be reviewed as necessary to reflect any significant change on site, and in any case every three years following initial agreement: review results are to be notified as part of the AER.

12.2.3 *As part of the measures identified in Condition 12.2.1, the licensee shall, to the satisfaction of the Agency, make financial provision to cover any liabilities identified in Condition 12.2.2. The amount of indemnity held shall be reviewed and revised as necessary, but at least annually. Proof of renewal or revision of such financial indemnity shall be included in the annual 'statement of measures' report identified in Condition 12.2.1.*

The most recent EPA Guidance Document entitled *"Guidance on Environmental Liabilities Risk Assessment, Residuals Management Plans and Financial Provision, copyright 2006)"* – (hereafter referred to the EPA ELRA Guidance Document 2006) was used in the preparation of this Environmental Liabilities Risk Assessment.

Enva Ireland Ltd – Portlaoise - Environmental Liabilities Risk Assessment

Enva Ireland, Clonminam Industrial Estate, Portlaoise, Co. Laois was granted a Waste Licence (Register Number 184-1) on the 16th of January 2004. Included in this licence was the provision to install a sludge drying facility and associated CHP plant. However Enva has not as yet installed a sludge drying facility and associated CHP plant and therefore it has not been considered within the ELRA.

1.2. Environmental Liabilities Risk Assessments

Any industrial site has the potential to generate environmental liabilities, i.e. damage to the environment, which must be remedied, such remediation being associated with a quantifiable financial cost.

Environmental liabilities may arise from *anticipated* or *foreseeable* events, i.e. known and quantifiable releases to the environment, which arise due to the day-to-day operation of the facility. For a site subject to Waste Licensing, regular emissions to air, water and land have typically been the subject of detailed quantification and consequence analysis, i.e. assessment of the impact of emissions, during the licence application process. The resulting Waste Licence either establishes emission limits and other conditions at a level which prevents the arising of new liabilities, or which may require bonding or other secure funding mechanism to cover any expected liability. The latter case applies usually to, for example, on-site land filling activities.

Environmental liabilities may also arise from unanticipated or unforeseen events. Such events may be generally classified under the following headings:

• Events which are *sudden*, and which are identifiable as an incident or a series of related incidents, which give rise to an environmental liability concurrent with the incident or shortly thereafter;

• Events, which develop gradually or go unnoticed for a long period of time, which gradually gives rise to an environmental liability.

Examples of the former would include explosion/fire or accidental release of chemicals from a storage tank to a watercourse.

An example of the latter would be leaks in underground storage tanks or transfer lines, which would result in the gradual build-up of soil and/or groundwater contamination.

The costs of dealing with unanticipated or unforeseen events are usually issues which are addressed in the insurance cover for the industrial site in question. The degree to which existing insurance policies cover environmental liabilities depends on many factors including the specific wording of the policies and legal precedence. Most Public Liability insurance policies will contain some element of cover for environmental liabilities.

However, the extent and applicability of coverage is dependent on analysis of and professional judgement on the particular insurance policy.

Environmental liability risk assessment (ELRA) considers the risk of unplanned events occurring during the operation of a facility that could result in unknown liabilities materialising. Based on an initial risk categorisation of the activity into Low, Medium or High risk, different approaches are recommended according to the risk category. Simple approaches are proposed for low risk facilities to more detailed site-specific approaches involving detailed environmental liability risk assessment for higher risk facilities.

1.3. Basis for the ELRA

This report has been provided for the sole use of Enva and for submission to the EPA in accordance with the EPA guidance document entitled “Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision”.

The basis of this ELRA is as follows:

- A review of the activities carried out at the site, including process and services;
- A review of the following documentation:
  - Waste Licence Application Files;
  - Environmental Aspects and Impacts Register;
  - Environmental Management Programme;
  - HSE Management System Manual
  - Emergency Response Plan
  - Risk Assessments Register
  - Closure, Restoration, Aftercare Management Plan
  - Bund Integrity Report; and,
  - Operational Procedures.

- Identification of existing and potential hazards, including evaluation of materials and wastes generated; and,
- Consideration of historic environmental incidents and remediation works undertaken.

This report is based on the desk-based study research and a site inspection, a thorough assessment was made of potential environmental liabilities requiring

remediation to which costs could be assigned. Remedial actions are described for these and remediation or corrective costs are identified.
This reported is reviewed as minimum every three years as part of the Annual Environmental Report.

1.4. Key Considerations

There is a reasonable degree of subjectivity and uncertainty involved in Environmental Liabilities Risk Assessment so it is important to identify at an early stage that the following was taken into account:

Enva maintains site conditions in accordance with their Waste License No. W0184-01 and has an Environmental Management System (EMS) accredited to ISO 14001. No provision has been made for costs associated with any criminal proceedings that could arise, as firstly, it is understood that there is goodwill and a strong desire by Enva to remain compliant with relevant legislation and EPA requirements, and secondly, such costs are uninsurable and therefore cannot be underwritten by any third party or insurance organisation.

The ELRA has been based upon historic and current operational activities. It does not consider potential environmental liabilities associated with significant changes in use of the site, such as redevelopment for other commercial or industrial purposes by Enva or any other party, as these would require a separate risk assessment exercise should they arise. Furthermore, the ELRA does not include a costing of the decommissioning and oversight of the facility in the event of a full site closure.

1.5. Structure of the ELRA

The ELRA report is structured as follows:
Section 2 provides an overview of the Enva facility including details of existing processes, buildings and structures present on the site at the time this report was prepared.
Section 3 describes the initial screening and operational risk assessment carried out for the facility.
Section 4 provides an overview of the historical environmental liabilities at the facility.
Section 5 provides an overview of the existing measures in place at the site to minimise possible environmental liabilities associated with the facility.
Section 6 describes the site specific risk assessment, which was carried out for the facility. It includes section on Risk Identification, Occurrence Likelihood, Severity Assessment, Risk Evaluation and Prevention/Mitigation
Section 7 describes the financial provisions in place to deal with any unknown liabilities and identifies possible gaps between the level of cover provided and the level of risk associated with the facility.
Section 8 provides a summary and conclusion.

2. OVERVIEW OF ENVA

2.1. Site Location & Site History

Enva operates a waste acceptance, processing and transfer station located in Clonminam Industrial Estate, Portlaoise, Co. Laois. A site location map is shown in **Figure 1** (See Appendix 1)

Prior to Enva Ireland Ltd. acquiring the site it is understood that the site was developed from a greenfield site

2.2. History of Enva

Enva can trace its history back to 1972, when Atlas Oil(now known as Enva) was set up to collect waste oil primarily from the automotive industry, making it the longest standing hazardous waste management company in Ireland. The original waste facility was established in Portlaoise in 1978 initially to process waste oil.

In 1987, the company was purchased by Irish sales marketing and business support services group DCC plc, and between 1988 and 2000, services grew to include; Industrial and Automotive Services; Field Services; Environmental Products and Emergency Response. In 1999 Atlas Oil was issued an IPPC licence. In 2000, the facility in Portlaoise was awarded the first and only license for off-site treatment of petroleum contaminated soil by the EPA. In 1994 the Portlaoise facility was issued a Waste Licence ref 184-01 under which it currently operates

As part of DCC's ongoing expansion of DCC Environmental, Cork based water and effluent treatment firm Envirotech, was purchased in 2001. In January 2003, DCC acquired Shannon Environmental Services. This company based in Shannon provides key hazardous waste infrastructure in Ireland. The Shannon facility offers a range of Physico-Chemical and Biological treatment & disposal options.

In May 2005 Atlas purchased a waste licensed facility in Dublin. The facility currently acts as a base for their Underground Services division which now forms part of the Field Services division..

As the original business had grown significantly through a series of acquisitions, in June 2006, the decision was taken to re-brand all businesses under one new name and logo – Enva.

2.3. Site and Process Description

Enva operates a waste acceptance, processing and transfer station located in Clonminam Industrial Estate, Portlaoise, Co.Laois. It operates a 12 hour day for 5 days a week with a half day Saturday. Enva currently employs approximately 70 employees at the Portlaoise facility.

Enva accepts the following wastes on site as per Schedule A of its waste licence W0184-01; waste oils, sludge's, oily absorbents, oil filters, soils contaminated with hydrocarbons, mixed fuels, antifreeze brakefluid, fluorescent tubes, batteries, paint wastes, aerosols, contaminated packaging and acids and bases.

Enva applied to accept non-hazardous sludges under its waste licence however have yet to commence this activity with prior approval from the EPA.

Enva also provides warehousing for a range of waste storage and spill clean up products. The Portlaoise facility also has analytical capability provided by an in-house laboratory, which includes effluent and waste oil analysis.
The main features of this facility are summarised as follows:

- Office and Laboratory with associated welfare facilities
- Lockers and Showers for operatives and drivers
- Workshop
- Electrics room
- Dry Cleaning area
- Process room
- UST of 30,000 litre capacity for the storage of Petrol
- Boiler House
- Loading/Unloading Gantries x 3
- Oil transfer pumps and valves;
- A bunded tank farm consists of 43 tanks that range in capacity from 50,000litres, 140,000, 200,000, 1,000,000 and 2,000,000 litres. The following substances are contained within these tanks are; waste oil,product tanks, kero tanks, Gas Oil and Derv
- Bunded flammable waste storage area of 217m^2
- Sludge bay for tanker dig out
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- 360m^2 building used for general storage of equipment etc. The floors of each section are fully bunded. The exterior of the building is cladded with fire resistant cladding;
- Bunded effluent lime treatment plant area 210m^2
- Surface water drainage network with two oil interceptors of 58 and 30 tonnes in capacity fitted with coalescence filter.
- Concrete surfacing

3. SCREENING AND OPERATIONAL RISK ASSESSMENT

3.1. General

As a starting point in the process, a relatively simple risk assessment decision matrix can be used to classify sites into Risk Categories (1-3) and thereby select the specific ELRA and Financial Provision (FP) requirements that will be needed. The risk assessment decision matrix outlined in the EPA ELRA Guidance Document 2006 was used.

The risk category assigned to the facility depends on the complexity of operations at the site, the environmental sensitivity of the receiving environment and the compliance record of the facility.

- **Complexity** – the extent and magnitude of potential hazards present due to the operation of the facility (e.g. a function of the nature of the activity, the volumes of hazardous materials stored on site etc.). A Complexity Band (G1 least complex to G5 most complex) for each class of activity has been assigned and included in a Look-Up Table (Appendix B of the EPA ELRA Guidance Document 2006).

- **Environmental Sensitivity** – the sensitivity of the receiving environment in the vicinity of the facility, with more sensitive locations given a higher score (e.g. the presence of aquifers below the site, groundwater vulnerability, the proximity to surface water bodies and their status, the proximity to sensitive human receptors, etc). The Environmental Sensitivity is calculated on a site-specific basis using a sub-matrix (Table 3.1).

- **Compliance Record** – the compliance history of the facility.
  Each aspect is multiplied to give the **Total Score** for the facility, and this can be used to place the facility into an appropriate Risk Category as follows:
  Risk Category 1 = Score < 5
  Risk Category 2 = Score 5-23
  Risk Category 3 = Score > 23.
  Once this has been completed, the licensee proceeds through the relevant steps of ELRA and FP that are considered appropriate for the Risk Category.

3.2. Complexity

Significant work has been done by the Environment Agency (England and Wales) in the development of the Environmental Protection Operator and Pollution Risk Appraisal (EPOPRA) methodology for classifying activities, and a similar but shortened version of this methodology has been developed for this process. Complexity Bands have where available, been derived from similar classification in the EP OPRA Complexity Score. A look up table for Irish activities has been included in Appendix B of the EPA's ELRA Guidance Document 2006.

The Complexity Band is used to determine the value used in the Operational Risk Assessments as follows: G1 = 1, G2 = 2, G3 = 3, G4 = 4 and G5 = 5
In January 2004, Enva were granted a revised Waste License Registration No. W0184-01, under Classes 6, 7, 12 and 13 in accordance with the Third Schedule of the Waste Management Acts 1996 to 2005 and Classes 2, 4, 5, 8, 9, 11, 12 and 13 in accordance with the Fourth Schedule of the Waste Management Acts 1996 to 2005.
The relevant complexity band for Enva according to the EPA's ELRA Guidance Document 2006 is based on the following:

The following are activities that Enva are licensed to undertake under the following classes;

Class 6 (third schedule) and Class 2 (fourth schedule):

Class 6: Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule.

Class 2: Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes):

Under Class 6 and 2 Enva accepts soils contaminated with hydrocarbons on site for biological treatment and remediation. Where soils cannot be fully remediated on the Portlaoise site they are sent to hazardous landfill.
Enva have covered treatment bays dedicated to the acceptance, storage and treatment of contaminated soil.

Class 8 (fourth schedule) and Class 9 (fourth schedule):

Class 8(fourth): Oil re-refining or other re-uses of oil:
This activity is limited to the recycling and treatment of waste oil and waste fuel, and the separation of hydrocarbon sludges, into oil, water and sludge fractions, and the subsequent recovery of segregated fractions, and the re-refining of other oils subject to the agreement of the Agency.

Class 9 (fourth)**:** Use of any waste principally as a fuel or other means to generate energy: This activity is limited to the use of recovered oil as a fuel for the generation of power or steam.

Class 11 (fourth schedule):

Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule: This activity is limited to the use of wastes obtained from any activity referred to in a preceding (paragraph of this Schedule for onward recovery, on or offsite, subject to the agreement of the Agency.

Class 12 (third and fourth scheduled)

Repacking prior to submission to any activity referred to in a preceding paragraph of this Schedule. This activity is limited to the recovery of oily solid wastes and used filters for onward recovery. Enva currently repackage oily absorbents, oil filters and batteries prior to disposal off site.

Class 13 (third and fourth schedule):

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 (third & fourth schedule).

The acceptance of waste oils in bulk tankers is currently undertaken at the Enva site in Portlaoise. Enva has 18 waste oil storage tanks varying in capacity from 50,000 to 1,000,000 litres. These tanks are located in the tank farm where all the waste oil is stored. Waste oil is classified as a hazardous waste and this site processes approximately 24,000 tonnes per annum.

The following activities have as yet to be undertaken on the Enva Portlaoise site-

Enva is also licensed to undertake activities under Class 4 (fourth schedule), Class 5 (fourth schedule) and Class 7 (third schedule) however Enva have not undertaken activities assigned to these classes to date.

Class 4 (fourth schedule): Recycling or reclamation of other inorganic materials:

Class 5 (fourth schedule): Regeneration of acids or bases:
This activity is limited to the reconditioning of acids or bases for reuse.

Class 7 (third schedule): Physio-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcinations) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraph 1 to 10 of this Schedule.

Based on the information above and the EPA's ELRA Guidance Document 2006, the relevant complexity band for Enva according to this activity is G5. More than one scheduled activity is located at Enva Portlaoise therefore in accordance with the EPA's ELRA Guidance Document 2006 the highest Complexity Band was chosen.

Enva stores >10, 000 tonnes per annum of hazardous waste destined for recovery. This is deemed to be a Class 13 activity as listed in the third and fourth schedules.
Based on this information, Appendix B of the EPA's ELRA Guidance Document 2006 places Enva in the G5 complexity band in accordance with guidance document the G5 complexity band gets a score of 5.

3.3. Environmental Sensitivity

A sub-matrix for environmental sensitivity for the Enva site is presented in Table 3.2. This considers 6 key potential environmental receptors and assigns individual scores that are added together to arrive at a total environmental attribute score. The scoring system used is outlined in EPA ELRA Guidance Document 2006. The total environmental attribute score is used to look up the environmental sensitivity classification in Table 3.1 below.

The environmental sensitivity sub matrix has been developed based on professional judgment and with reference to the system designed in the EP OPRA Scheme by the Environment Agency (UK). The environmental sensitivity classification is used in the operational risk assessment to calculate the total score. The relevant scores are highlighted and underlined in Table 3.2.

The key receptors include:

- Human Beings
- Groundwater
- Surface Water
- Air Quality
- Protected Ecological Sites
- Sensitive Agricultural Receptors

Table 3.1 - Environmental Sensitivity Sub-Matrix

Environmental Attribute Environmental	Attribute Score (Notes1,2)
Human Occupation	
<50m	5
50m-250m	**3**
250m–1,000m	1
>1km	0
Groundwater Protection	
Regionally Important Aquifer	**2**
Locally Important Aquifer	1
Poor Aquifer	0
Vulnerability Rating – Extreme	3
Vulnerability Rating – High	2
Vulnerability Rating – Moderate	1
Vulnerability Rating - Low	0
Sensitivity of Receiving Water	N/A
Class A	3
Class B	2
Class C	1
Class D	**0**
Designated Coastal & Estuarine Waters	2
Potentially Eutrophic Coastal & Estuarine Waters	1
Air Quality & Topography	
Complex Terrain	2
Intermediate Terrain	1
Simple Terrain	**0**
Protected Ecological Sites	
Within or directly bordering protected site	2
<1km to protected site	1
>1km to protected site	**0**
Sensitive Agricultural Receptors	
<50m from site boundary	2
50m-150m from site boundary	1
>**150m from site boundary**	**0**

Note 1 – The environmental attribute which is relevant to the Enva facility is underlined and bold.
Note 2 – The scoring system used is taken from the EPA ELRA Guidance Document 2006.

Based on the above Environmental Sensitivity Sub-Matrix, the total environmental attribute score for Enva is calculated as follows

Table 3.2

Environmental Attribute	**Attribute Score**
Human Beings	3
Groundwater	2
Surface Water	0
Air Quality	0
Protected Ecological Sites	0
Sensitive Agricultural Receptors	0
TOTAL SCORE	**5**

Based on the above Environmental Sensitivity Sub-Matrix, the total environmental attribute score for Enva Portlaoise site is 5. Using Table 3.1 from the EPAs ELRA Guidance Document.

Table 3.3 Environmental Sensitivity Classification

Total Environmental Attribute Score	**Environmental Sensitivity Classification**
1	<7
2	7-12 2
3	>12 3

Table 3.1 and 3.2 above indicates that the Total Environmental Attribute Score for the Enva Portlaoise site is 5. Based on Table 3.3 the Environmental Sensitivity Classification for a site that has a Total Environmental Attribute Score less than 7 is low. Therefore Enva has low Environmental Sensitivity Classification.

3.4. Compliance Record

The compliance record score is derived from the compliance history of the facility and whether the activities carried on resulted in contamination or pollution.

For newly licensed facilities and those operating without non-compliance of emission limits, then these are classified as **Compliant/New Facility** and have a score of 1.

Licensed facilities with administrative non-compliances only are classified as administrative non-compliant and have a score of 2.

Licensed facilities with minor non-compliances (< 5 non-compliances in 12 month period) are classified as being **Minor Non-Compliant** and have a score of 3. Facilities with minor soil and groundwater contamination (i.e. those with concentrations above background but not posing risk to the environment) are also considered in the class.

Licensed facilities with major non-compliance history ($\geq$ 5 non-compliances in a 12 month period) and/or those with significant soil and groundwater contamination (i.e. requiring remediation and/or long-term monitoring requirements) are classified as **Major Non-Compliant/Significant Ground Contamination** and have a score of 4.

Those facilities with repeated non-compliances (>10 Total) during a 12 month period are classified as **Repeat Non-Compliance** and have a score of 5.

As part of the preparation of this ELRA a review of soil or groundwater assessments for the Portlaoise site and of the compliance status for Enva Portlaoise in relation to their Waste Licence was examined.

In relation to the sites soil and groundwater, minor contamination of groundwater was identified in quarterly groundwater reports. However the following reports undertaken by URS and RPS respectively have identified that this contamination is localised and is due to historic activities undertaken at the site prior to the acceptance of waste on site.

"An Environmental Site Investigations Report" (July 2005) and "A Summary Report on the Trend of Contaminant Levels at Enva Ireland Ltd. Since 2005" (2007) which states that the groundwater contamination is not moving down gradient or off-site and that natural processes in the groundwater are attenuating the contamination on site.

Enva, Portlaoise have never been convicted under the Environmental Protection Act or any other environmental legislation. Enva, Portlaoise are largely compliant with their waste licence reference W0 184-01. In 2010 there was 1 non conformance in relation to the effluent exceedance. Other incidents reported to the Agency included two relating to the the malfunction of equipment.

From the compliance review as detailed above a compliance record score of 3 is judged to be appropriate for Enva.

3.5. Risk Category

The preceding subsection of this report has determined the:

Complexity Score (G5) = 5
Environmental Sensitivity Score = 5
Compliance Record Score = 3

The product of these scores is used to calculate a total score, which is then used to assign the site specific risk category (Table 3.3). The product of the above scores is 175, which according to table 3.3 below indicates that Risk Category 3 would be applicable to the Enva Site.

Table 3.3 – Risk Category

Risk Category Total Score	
Category 1	<5
Category 2	5-23
Category 3	>23

Based on the calculations above the Enva site would be classified in Risk Category 3. In addition, based on guidance provided in the EPA ELRA Guidance Document 2006 for activities with complexity of G4 or G5 these facilities are automatically classified as Risk Category 3.

4. HISTORICAL ENVIRONMENTAL LIABILITIES

4.1. Releases to Air

With regard to sudden and accidental releases to air, there is no history of:

- Major fires or explosions at the site;
- Run-away reactions resulting in significant discharge to atmosphere;
- Significant accidental releases of hazardous gases.

Licensed emissions to atmosphere arise from the on-site boiler and have been the subject of a comprehensive monitoring programme, the results of which are forwarded to the Agency on an annual basis.
There is an emission point which relates to a sludge drying facility that was part of the licence application but which has not as yet been installed.Therefore this emission point can be considered outside the scope of this ELRA.

Based on a review of the sites activities there is no evidence to suggest that site operations have resulted in the development of any off-site environmental liability with respect to air emissions.

4.2. Process Water

Process effluent consists of water removal from the waste oil processing system. The process effluent is then released to the effluent lime treatment plant to remove the heavy metal content. The effluent is sampled prior to and following release. Envas in house laboratory determines the COD loading of the effluent and sets the Scada system on site to release accordingly. The Scada system is an electronic system that alerts staff of the levels within tanks and releases tank contents as programmed. The Scada is linked to the auto sampler which takes an effluent sample every $2m^3$ on release or can be re-adjusted if the volume of the batch is lower than the normal volume. The final effluent from the wastewater treatment system is discharged to the sewer and finally Portlaoise Waste Water Treatment Plant.

In the past Enva incurred exceedences of its effluent limits as set out in Schedule C.4 of its waste licence W0 184-1 in respect of zinc. However the installation and use of the lime treatment plant eliminated the occurrence of these exceedences. There were no exceedances with regard to zinc in 2011.

There is no evidence to suggest that process wastewater releases from the site have had any significant impact or resulted in an environmental liability.

4.3. Surface Water Discharges

All Envas waste storage areas are bunded and all Envas main operational activities undertaken within the bunded area of the site. Surface water from the yard area and roof areas is collected by 3 interceptors.
SW-01 comprises of two interceptors, an interceptor which collects the run off from the southern end of the site (i.e. waste oil offloading area) which then drains to the main interceptor for the yard area. This interceptor is a class I with a coalescence filter and v-notch weir.

At the beginning of 2009 improvements were made to the surface of the yard at the north end of the site, additional drainage channels were put in place and a second Class I interceptor was installed this collects water from the general yard area and the roofs of all the waste storage buildings. A small portion of the north end of the site remains un sealed. This area of the site is used for the storage of cleaned redundant plant.

Envas waste licence Schedules C.3. and D.4. sets out emission limit values and monitoring requirements in relation to surface water. Enva are compliant with these licence limits.

With regard to sudden and accidental discharges, there is no history of:

- Major fires or explosions at the site resulting in significant discharges of firewater;
- There is no evidence to suggest that surface water releases from the site have had any significant impact or resulted in an environmental liability.

4.4. Releases to Ground/Groundwater
4.4.1. Background

The bedrock below the site is considered to be locally important fractured aquifer by the Geological Survey of Ireland (GSI). Regional groundwater flow is expected to be in an easterly direction towards the Triogue River, which is a tributary of the River Barrow. The Triogue River is located 1.5km to the east of the site. It would be expected that the groundwater will discharge to the Triogue and possibly its tributaries as base flow in the rivers.

Groundwater was encountered in the sand and gravel during borehole drilling on the site as part of the URS investigation, and groundwater level measurements have indicated that groundwater flows in an east-south-easterly direction in the sand and gravel below the site. The Shallow groundwater flow is generally towards the east. Groundwater flow within the limestone bedrock occurs within fractures. The boreholes at the site are intersecting different fracture zones and the connection between them is unknown.

Public water supply for Portlaoise is obtained from two groundwater supplies in the area. The primary source is located at Ballydavis, which is approximately 4km to the northeast of Portlaoise, and the second location is located along R426 to the south east of Portlaoise. The Ballydavis site is located at considerable distance from the site and on the opposite side of the Triogue River and would therefore not be a risk from any groundwater contamination present on the site.

4.4.2 Prevention of Groundwater Contamination

All process operations and storage of wastes are within bunded areas. Stormwater drains are provided with oil interceptors fitted with coalescence filters. These containment measures ensure that accidental release of these compounds do not impact soil and groundwater quality below the site. An extensive programme of groundwater monitoring is required as part of Enva's waste licence ref. 184-01. Enva is required under its licence to monitor parameters as listed in Schedule D.6 of the licence on an annual, quarterly and monthly basis.

Envas groundwater monitoring programme includes the monitoring of four shallow boreholes (BH101, BH102, BH 103 and BH 104) which were drilled to depths of 6 to 7 metres below ground level (mbgl) and three deep boreholes (MW01, MW02 and MW03) which were drilled to depths of up to 30mbgl.
Groundwater monitoring is undertaken on a quarterly basis by external consultants. During each round of monitoring both deep and shallow ground water wells are sampled and the results presented in a groundwater monitoring report which is submitted to the EPA as part of the EPA quarterly report.

4.4.3 Previous Soil and Groundwater Investigations

In 2005 Enva requested URS to summarise all soil investigations and groundwater monitoring carried out by URS at the site up until 2005. This report was entitled "The Environmental Site Investigations Summary Report" and stated that ongoing monitoring indicated that there is some localised residual hydrocarbon contamination of BH104b. The laboratory also reported low levels of tentatively identified compounds in MW03 as possible alkenes. However the report also stated that at the monitoring round for June 2005 indicated concentrations of hydrocarbon contaminants are decreasing over time.

In 2007 Enva made a formal response to issues raised in the EPAs audit report of February 2007. This formal response took the form of a study undertaken by RPS consultants entitled "Summary report on the Trend of Contaminant Levels at Enva Ireland Ltd. Since 2005". This report determines that following from the risk assessment and trend analysis undertaken by RPS that there are no unacceptable risks and that the observed contaminants in BH104b, BH103 and MW03 are in reality at trace levels typical of other waste handling facilities. The report goes on to state that "Under the philosophy of UK EA R&D 20 no action is required as the observed concentrations do not represent a risk to water quality down gradient on-site and particularly off-site.
A further Summary report was requested in January 2008 by the Agency and a report was submitted by Enva in November 2008. This report has summarised that the risk to the ground water off site is low as the contamination present is in non aqueous phase liquids with in the water and therefore not significantly mobile.
Additional measures were requested by the Agency to demonstrate that the risk to ground water from site activitities was not significant. An additional borehole

was installed in 2011 to further assess the underlying ground water flow direction. Replacement well heads and a review of the risk assessment for the site is planned for 2012.

5. EXISTING ENVIRONMENTAL CONTROLS AT ENVA

5.1. General

The Enva waste facility at Portlaoise is equipped with a high level of environmental protection systems. Ongoing care for the environment is demonstrated by the efficient operation and maintenance of environmental protection systems/practices, and their upgrade where necessary, together with ongoing efforts aimed at the continuous minimisation of emissions. The site has a programme of continuous improvement, through for example the training of people to maintain good environmental practices, and replacement, upgrading, retro-fitting, as needed, of instrumentation and equipment.

Enva, have a Health, Safety and Environmental Policy that covers all it's facilities in Ireland. The policy aims to instil high environmental values in all employees, utilising the best environmental practices in processing and contributing to global sustainable developments.

The Enva facility in Portlaoise has invested in infrastructure designed to assure a high level of environmental compliance and protection. Examples of this include the following:

- Office and Laboratory with associated welfare facilities
- Lockers and Showers for operatives and drivers
- Workshop
- Electrics room
- Dry Cleaning area
- Process room
- UST of 30,000 litre capacity for the storage of Petrol
- Boiler House
- Loading/Unloading Gantries x 3
- Oil transfer pumps and valves;
- A bunded tank farm consists of 43 tanks that range in capacity from 50,000litres, 140,000, 200,000, 1,000,000 and 2,000,000 litres. The following substances are contained within these tanks are; waste oil, product tanks, cooking oil, kero tanks, Gas Oil and Derv
- Bunded flammable waste storage area 217m^2
- Sludge bay for tanker dig out
- A bunded storage unit for the receiving and storage of hazardous waste materials
- Soil Sheds
- Weighbridge;
- Enclosed Process Building – Oil Filters and Oily Rags
- 360m^2 building used for general storage of equipment etc. The floors of each section are fully bunded. The exterior of the building is cladded with fire resistant cladding;
- Bunded effluent lime treatment plant area 210m^2

- Surface water drainage network with 3 oil/water interceptors of 58 and 30(2) tonnes in capacity fitted with coalescence filter.
- Concrete surfacing

Environmental protection and compliance is integrated into the sites decision-making process through the management of change mechanisms defined in the site's certified ISO14001 Environmental Management System (EMS).

5.2. Environmental Management

Enva operates an integrated approach to the management of environmental aspects of the site, and environmental protection and compliance has always been a key consideration. Since January 2004, the site has operated under the waste licensing system. The site was audited for accreditation to ISO 14001 and OHSAS 18001 and was certified in August 2007.

The environmental management system is based on a combination of technical measures, documented environmental management programmes and documented procedures, whose objectives include:

- Complying with all the requirements of the site waste licence,
- Eliminating the risk of accidental events which could give rise to significant releases to the environment, and
- Ongoing continuous improvement of site environmental performance.

5.3. Releases to Atmosphere

There are no process emissions to atmosphere. Licensed emissions to atmosphere arise from the on-site boiler and have been the subject of a comprehensive monitoring programme, the results of which are forwarded to the Agency on an annual basis.

Minor emissions may result from laboratory fume hoods or from machinery/plant (e.g. vehicles). Pipeline inspection as required by the license and preventive maintenance will also minimise potential for fugitive loss.

Regular maintenance of vehicles and plant will minimise unnecessary atmospheric releases.

The waste licence includes a process (sludge drying facility), which is not intended to be carried out within the foreseeable future. In the event that this changes the evaluation of this aspect will be revised accordingly.

5.4. Releases to Surface Water and Groundwater

5.4.1. General

All storm water runs to the site drainage system and is discharged to municipal surface water system having first passed through a two-stage oil interceptor fitted with coalescence filters. In the event of large volumes of contaminated firewater being generated the interceptor release valves will be manually shut down and fire water pumps used to pump the contaminated firewater back into the bunded tank farm.

Storm drains are monitored on a weekly basis as per license requirements.

Wastewater generated from the processing of waste oil is treated in Envas onsite lime treatment plant prior to release to Portlaoise waste water treatment plant.

All process operations and storage of wastes are within bunded areas. Studies undertaken on the analysis and trends of groundwater monitoring results to date show any contamination of hydrocarbons noted are decreasing overtime
Envas waste licence requires extensive ongoing monitoring of surface, wastewater and groundwater.

5.5. Emergency Planning/Preparedness

The site has a detailed and documented Emergency Response Plan (ERP). The ERP describes the emergency response system onsite and also contains specific action plans in the event of particular incidents such as fire/explosions, chemical spillage or medical emergency. The priority in the event of any emergency situation will be to ensure the safety of all people potentially affected by the incident, whether they are on-site or outside the site boundary. After this, the aim will be to prevent releases of pollutants and prevent damage to property or the environment.

The primary front line of defence against most emergency situations (such as fires and some major spills) will be the local Fire Services. No Enva Portlaoise personnel are expected to carry out front line defence in major emergency situations.

An Emergency Core Team set up internally at the site, will coordinate an emergency response, which will aim to support the Fire Services' front line response. The Emergency Core Team will carry out specific duties but will not include direct front line (e.g. fire fighting) duties.

A permit to work system is in place on site and all staff have received fire extinguisher training. Full evacuation drills are held periodically to familiarise employees with evacuation requirements and to ensure head counts are completed effectively.

The fire- fighting services have been brought on site and made fully aware of the available on-site fire fighting and detection systems.

5.6. Prevention of Fire

5.6.1. Procedures

The plant ERP specifies the actions taken on discovering a fire or other emergency. The ERP includes the activation of fire alarms, evacuation and assembly requirements. Fire prevention is emphasised by engineering design, work permit restrictions, work practices, and ongoing audits of process taking into consideration fire risk and safety awareness. Standard operational procedures (SOPs) and Safety Data Sheets (SDSs) specify emergency response requirements for various materials being used.

5.6.2. Training

All employees and contractors working on site are provided with induction training. The contents of the induction course for employees includes the following;

HSE Manual and Policy
Environmental requirements
HSE requirements
Emergency Response Plan

Only employees and contractors trained in the equipment, plant or machinery that they intend to operate are permitted to use it. Training must also be received in the procedures and risk assessments to which these items and activities relate before being permitted to use them. A training programme is in place to ensure each employee is made aware of HSE requirements related to their work activities. Job specific HSE training is also provided within each Department. This consists of training on appropriate risk assessments, standard operating procedures (SOPs), external task specific training and awareness training relating to our business.

Relevant employees also receive training on the permit to work system in place on site and all staff has received fire extinguisher training. Envas emergency response team members have received fire warden training. Full evacuation drills are held periodically to familiarise employees with evacuation requirements and to ensure head counts are completed effectively.

Considerable time and resources are utilised in the provision of training across the company. An annual training needs assessment is carried out and covers all personnel within the company. This is carried out by the HSE Department in conjunction with Line Managers and supervisors. A training plan is then drafted for the year ahead and courses organized accordingly.

The delivery of training involves both external training using training contractors to provide industrial task related training and internal training focusing on company specific procedures.

5.6.3. Equipment

The plant fire protection system includes smoke, heat and flame detector alarms, which are installed in appropriate areas around the site. There are four fire hydrants and a number of fire extinguishers available on site. All fire protection systems are subject to monthly and 6 monthly and annual maintenance inspections.

Enva have a security monitoring system in place that operates after hours on site. The gate at the main entrance to the site operates using a secure key system provided to authorised members of staff.

5.6.4. Storage and Handling of Flammable Materials

The Enva Portlaoise site has a designated bunded storage area for flammable materials.

An underground storage tank (UST) containing three chambers with a capacity of 30,000 litres is used specifically for the storage of petrol. This UST is linked to the Scada system to ensure that any leaks are communicated to operational staff.

The movement of waste oils is through direct pumping from tankers into one of the storage tanks on site. These storage tanks are bunded and the bunds subject to bund integrity testing as per licence requirements. Transfer to and from the tanks by tankers is done within the bunded area of the site. Tanks have high level alarms and are controlled by a computer system. Waste Oils have a flash point >220^{o}C. Operational procedures are in place to ensure that all waste oils are pumped to a designated tank as approved by the yard operative.

Enva employed the services of PM consultancy to undertake an ATEX report which included; “Risk Assessment of Hazardous Areas”, “Explosion Protection Document” and “Hazardous Area Classification Report”. This reports details the existing controls in place and has identified zoned areas on site.

5.6.5. Firewater Retention

Further to a firewater risk assessment undertaken by URS Dames & Moore, the Enva, Portlaoise site was deemed to have a medium risk rating. This overall risk rating is dominated by the environmental risk of a migration of oil contaminated fire water from the site. In this regard the largest volume calculated is that for a tank fire in the 2,300 tonne storage tank of final product in the tank farm. The total volume estimated is 842m^2 to include a simultaneous major rainfall event. This volume coupled with a medium risk of a fire occurring in the EMO Oil storage tanks which are located in the same area. However, there is adequate retention volume in the bund surrounding the tank farm to take estimated volume of fire water runoff.

In the event of large volumes of contaminated firewater being generated from fire fighting from areas such as the process room, unloading gantry and warehouse, the interceptor release valves will be manually shut down and fire water pumps used to pump the contaminated firewater back into the bunded tank farm.

5.7. Hazard Studies

Enva have a register of risk assessments for this site. The register of risk assessments includes environmental risk assessments such as this ELRA and firewater retention. The register lists actions to be taken on identified risks and outlines progress made to date.

6. SITE SPECIFIC ELRA ASSESSMENT

6.1. General

Enva Portlaoise is classified as a Risk Category 3 facility. The objectives of the ELRA are:

- To identify and quantify environmental liabilities at the facility focusing on: unplanned, but possible and plausible events occurring during the operational phase;
- To calculate the value of financial provisions required to cover unknown liabilities;
- To identify suitable financial instruments to cover the identified financial provisions; and
- To provide a mechanism to encourage continuous environmental improvement through the management of potential environmental risks.

The methodology presented in the EPA, ELRA Guidance Document, 2006 will be outlined in the proceeding section of this report. It includes a Risk Management Programme for the mitigation and management of any environmental liabilities identified at Enva. This programme is not required for the calculation or implementation of a financial provision at a facility. However, such a programme would encourage continuous environmental improvement and the reduction of environmental liabilities.
The ELRA will cover environmental risks leading to a potential or anticipated liability.
Environmental risks will be deemed to cover all risks to surface water, groundwater, atmosphere, land and human health.

6.2. Methodology – Risk Identification, Likelihood and Consequence

The following steps were undertaken as part of the site-specific ELRA;

- Risk Identification
- Risk Classification (includes an Occurrence Assessment and a Severity Assessment)
- Risk Evaluation
- Risk Prevention/Mitigation

6.2.1. Risk Identification

Risks were identified on the site through a combination of:

1. What-if analysis - A suggested method of carrying out this process is to initially identify all the 'processes' on site, list the hazards associated with each process, identify potential causes of failure of the processes and analyse the potential impacts on the environment.

Table 6.1 Example Hazard Identification Table

Risk ID	Potential Hazard	Environmental Effect
1	Describe scenario for occurrence of potential liability e.g. spill of solvent from solvent storage tank	Describe consequence of proposed scenario e.g. spill of solvent goes to surface water.

6.2.2. Risk Classification-Occurrence Analysis

Having identified the potential risk, the likelihood of its occurrence needs to be assessed.

An analysis of historical data and existing environmental controls, as outlined in previous actions of this report, was utilised when estimating *likelihood* of identified potential risks occurring at Enva. The following table defines various likelihoods of occurrence:

Table 6.2 Risk Classification Table - Occurrence

Rating/ Score	*Category*	*Description*	*Likelihood of Occurrence (%)*
1	Very Low	Very low chance of hazard occurring in 30 yr period	0-5
2	Low	Low chance of hazard occurring in 30 yr period	5-10
3	Medium	Medium chance of hazard occurring in 30 yr period	10-20
4	High	High chance of hazard occurring in 30 yr period	20-50
5	Very High	Greater than 50% chance of occurring in 30 yr period	>50

6.2.3. Risk Classification-Severity Assessment

Once the environmental impact had been identified one of the following consequences is assigned.

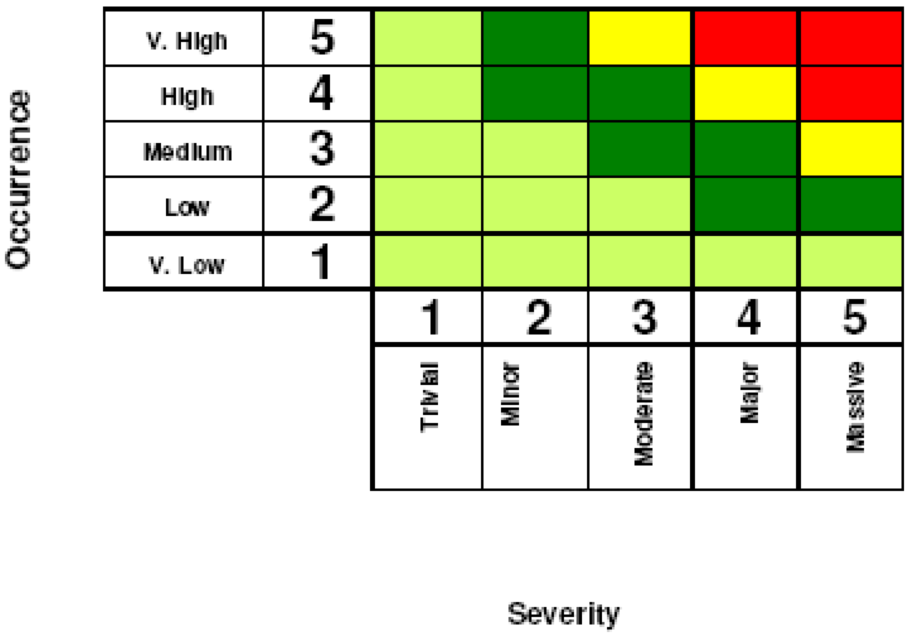
Table 6.3 Risk Classification Table - Severity Criteria

Rating/ Score	*Category*	*Description*	*Cost of Remediation (€)Note 1*
1	Trivial	No damage or negligible change to the environment	<10,000
2	Minor	Minor impact/localised or nuisance	10,000-100,000
3	Moderate	Moderate damage to the environment	100,000-500,000
4	Major	Severe damage to the environment	500,000-1,000,000
5	Massive	Massive damage to a large area, irreversible in medium term	>1,000,000

Note 1 – Costs specific to Enva

6.2.4. Risk Evaluation

Having identified the hazard and decided on its likelihood and severity, the significance of the risk is assigned. A risk score is determined by multiplying the occurrence score by the severity score. The risk scores can be tabulated in a risk matrix.



Where:

- **Red** – These are considered to be high-level risks requiring priority attention.
These risks have the potential to be catastrophic and as such should be addressed quickly.

- **Amber / Yellow** – These are medium-level risks requiring action, but are not as critical as a red coded risk.

- **Green (light and dark green**) – These are lowest-level risks and indicate a need for continuing awareness and monitoring on a regular basis. Whilst there are currently low or minor risks, some have the potential to increase to medium or even high-level risks and must therefore be regularly monitored and if cost effective mitigation can be carried out to reduce the risk even further this should be pursued.

For all identified risks appropriate financial provision must be made to address any associated liabilities. With regard to ‘medium’ and ‘high’ risks the ELRA must detail how these risks will be minimised to acceptable levels.

6.2.5. Risk Prevention/Mitigation

Mitigation measures are assigned to each risk and each Risk Score is revised using post-mitigation severity and occurrence rankings. The risks are then re-ranked and tabulated in the risk matrix to illustrate the overall degree of risk reduction resulting from the risk mitigation measures. Where appropriate, the mitigation measures are accepted for implementation. A Risk Management Programme is then prepared for the ongoing management of risks and the implementation of risk mitigation measures. Target timeframes are also allocated for the implementation of each risk mitigation measure.

6.3. Identification of Risks at Enva

'Processes' on the Enva, Portlaoise site were identified, the hazards associated with each process listed along with the identification of any potential causes of process failures. If any effect to the environment could be identified from the failure, the effect was analysed and this was listed as a risk. A Risk Register was then developed which contained all of the Risks identified on site.
The costs associated with the known environmental liabilities (e.g. closure and aftercare costs) for the Enva facilities were calculated through the preparation and costing of the Closure, Restoration and Aftercare Management Plan (refer to Site Specific CRAMP).
Each process was considered separately and a 'what if' analysis was utilised to identify all risks associated with the process in question. A list of risks was developed and these were entered into a Risk Register. Table 6.4 illustrates the Risk Register.

Table 6.4 Enva Risk Register Risk

Risk ID	Potential Failure Mode
1	A spill occurring during the loading/unloading of waste on-site.
2	A failure of one of the bulk storage tanks resulting in a spill of waste oil.
3	Loss of integrity within bunded areas.
4	Improper disposal of hazardous waste.
5	Failure of underground drainage network or wastewater treatment system resulting in significant release to ground and groundwater
6.	An on-site fire/explosion
7	Failure of on-site environmental control and monitoring systems.

These risks were assessed against the risk classification tables (RCTs) as provided in Table 6.2 and 6.3. The risk classification table was designed to reflect the critical levels of risk appropriate to the Enva site. Ratings, taken from the relevant risk classification table, were applied to the severity and likelihood of occurrence of each risk
Table 6.5 below illustrates the assessment carried out for each risk in terms of its severity and likelihood of occurrence.

Table 6.5 Enva site Risk Assessment

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
1	Loading/ Unloading of wastes	Spill of waste oil, or packaged waste, which could migrate to surface water or ground.	Contamination of Surface Water Groundwater or Soil Contamination.	**1**	Waste oils are delivered to site on a daily basis. Loading and unloading of waste oil takes place in designated bunded areas. Packaged waste are delivered to site in suitable receptacles following documented procedures and stored in designated bunded areas. Large storage areas are covered reducing run off from these areas Enva staffs are trained in the procedures and risk assessments on the acceptance, collection and transport as well as processing of hazardous wastes. Unknown wastes are sampled and analysed prior to acceptance. Enva has trained Dangerous Goods Safety Advisors on site. Enva only permits the transport of dangerous goods by ADR licensed drivers. Site surface water passes through an oil interceptor with fitted coalescence filter prior to discharge.	**2**	Based on the systems in place to control surface water contamination. There should be minor impact of any spilled waste.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
2	Storage of waste oil .	Bulk storage tank failure.	Contamination of Surface Water, Groundwater or Soil Contamination.	**1**	All bulk storage tanks are located within the bunded tank farm; retention capacity is at least 110% of the largest tank. Bund, tank and container integrity assessments are undertaken every three years and reported to the EPA. Envas Scada system monitors the levels within each tank electronically. Level alarms sound at high, high-high and high-high-high levels and as a result will alert staff to the potential for overflow.The system can be operated manually if required. The UST is fitted with a leak detection system which is also linked to the Scada system.	**2**	Large volume bulk storage tanks on-site. Materials therein have the capacity to cause environmental damage if failure was to occur resulting in ground and /or surface water contamination. Any impact on soil, groundwater or surface water would be localised.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
3	Storage of waste oil and used cooking oil in bulk storage tanks. Mixed Fuels in UST and packaged waste in bunded incoming bay.	Loss of integrity of bunded areas	Surface Water, Groundwater or Soil Contamination.	**1**	Bund, tank and container integrity assessments are undertaken every three years and reported to the EPA. It is very unlikely that all bunded areas will fail at the same time. The yard surface where general operational activities take place is concreted and bunded. Comprehensive Emergency Response Plan in place at the site that includes dealing with spills. Operational personnel are trained in spill response. Operational staff are directed to stop spill at source and to place covers on site drains in the event of a spill. Enva has a dedicated spill response service. Spill kits are located on site. Any spillage observed within the bunds would be promptly detected and cleaned up. The UST is fitted with a leak	**3**	Large volume bulk storage tanks on-site. Different categories of hazardous waste storage on-site. Certain materials therein have the capacity to cause significant environmental damage if failure was to occur resulting in ground and/or surface water contamination. However spilled material will be caught in the interceptor Any impact on soil, groundwater or surface water would be localised.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
3 cont'd	As above	As above	As above	As above	detection system. The incoming bay on-site is a purpose built bunded building with the capacity for segregation of waste types. All surface water runoff enters the sites drainage system and is discharged to municipal surface water system having first passed through an oil interceptor fitted with coalescence filters. A sensor is fitted on the onsite interceptors which in the event of a large influx of oil entering the interceptor will cause the release valve to shut down and so prevent any release of oil. An alarm sounds to notify staff when this occurs.	As above	As above

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
4	Disposal of Hazardous / Non Hazardous Wastes	Improper classification / disposal of waste.	Contamination of Surface Water Groundwater or Soil Contamination. Public Health Risk if hazardous waste is disposed of in an appropriate manner.	**1**	Waste oils are collected nationally and brought to the Enva facility in Portlaoise to be stored in tanks prior to processing into a fuel oil product known as 11ls which is the end product and therefore will not be transported to another site as a waste. Packaged wastes are accepted on site and sent to appropriately licensed facilities for ultimate disposal. These facilities must first be approved by the EPA for use, as per waste licence requirements. Enva tracks the movement of hazardous waste through the use of C1 forms and TFS documents. Enva also uses a bar-code system to track certain waste streams from the customer's site to the final point of destination. With enva's standard operating procedure and the considerable experience in managing hazardous waste, it is very unlikely that hazardous waste would be incorrectly managed.	**2**	In the event of hazardous waste being treated as a non-hazardous waste it would not pose a threat to the environment as all wastes with the exception of waste oil, which is processed on site, are sent to licensed facilities whose acceptance criteria must be fulfilled.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
4 cont'd	As above	As above	As above		Enva organise the collection and transport of waste from the Enva site. Enva staff are responsible for loading waste and therefore have additional control. Enva staff are trained in the procedures and risk assessments on the acceptance, collection and transport as well as processing of wastes. Enva customer service representatives and sales personnel are trained in the hazards of dangerous goods. Unknown wastes are sampled and analysed prior to acceptance. Enva has trained Dangerous Goods Safety Advisors on site. Enva only permits the transport of dangerous goods by ADR licensed drivers.		As above

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
5	Disposal of Wastewater	Failure of drainage network or wastewater treatment system resulting in significant release to ground and groundwater.	Contamination of Surface Water Groundwater or Soil Contamination.	**1**	Envas process effluent is pumped across the site in pipelines above ground. Only treated effluent is released to sewer via an underground pipeline. Enva's process effluent is sent to the effluent lime treatment plant prior to release to remove the heavy metal content. The effluent is sampled prior to and following release. Enva's laboratory determines the COD loading of the effluent and sets the Scada system on site to release accordingly. Effluent tanks are on a cleaning schedule to remove build up of residues which could contaminate the effluent for discharge off site. A leaks inspection is carried out as part of the sites preventative maintenance schedule. Enva's effluent must meet the limits for the parameters as set out in Enva's waste licence reg no. W0 184-01.	**2**	Severity is based mainly on potential need for soil remediation should leak occur.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
5 cont'd	As above	As above	As above		The final effluent from the wastewater treatment system is discharged to Portlaoise Waste Water Treatment Plant via the towns sewer. Effluent from canteen, toilet and shower areas are discharged directly to the Portlaoise town sewer which is directed to the Portlaoise waste water treatment plant. Liquid wastes from the laboratory are collected in containers and treated/disposed of through approved waste treatment/recovery outlets. The underground drainage networks are inspected every three years and repaired as necessary as per Envas waste licence conditions.		As above

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
6	Any	Major on-site fire or explosion.	Release of toxic and hazardous material to atmosphere, surface water, groundwater or soil	1	Enva requested PM Consultancy to complete an ATEX report for the site. This included a risk assessment of hazardous areas. The areas identified as hazardous around the Enva Portlaoise site were assessed and zoned accordingly. Waste oil accepted on site has a flash point > 220^{o}C No credible scenarios have been identified which would result in the formation of a flammable atmosphere or the creation of mist droplets from either the tanks that store kerosene or diesel or from the heating of oils. UST leak detection system is in place and linked to Scada. There is a flame arrestor on the vent line to prevent propagation of flame from the vent back into the tank. Very low likelihood of tank being open at same time as un-noticed fire in adjacent premises. Manhole cover is made of non-sparking fibrolite polymer. Procedures require that all	4	In the unlikely event of an explosion that resulted in contaminated firewater entering the local surface water it is likely that there would be severe damage to the local environment. All fire water run off can be prevented from leaving the site by turning off the valve on the final interceptor.

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
6 **cont'd**	As above	As above	As above		equipment is earthed and bonded Permit to work procedure regulates hot work activities. All fixed electrical equipment in the area is rated for use in hazardous areas. Comprehensive control systems and maintenance programme in place to minimise the risk of fire. Flammable liquids are only accepted in UN approved containers. ADR trained drivers are only permitted to accept drums of flammable liquid that are in good condition. Enva have trained DGSA staff on site to identify non-conforming containers and re-package as necessary. Enva staff have received ATEX awareness training. Enva have a fully addressable fire alarm system in place. Enva also have a site security alarm that is linked to a 24hour monitoring service. A comprehensive Emergency Response plan is in place at the		As above

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
6 **cont'd**	As above	As above	As above		site. An internal Emergency Response Team are in place if fire does occur. Emergency response drills are undertaken. Suitable personnel have been designated and trained as fire wardens. All staff have received fire safety awareness and extinguisher training All bulk storage tanks are located within bunded tank farm; retention capacity is at least 110% of the largest tanks. Following from a report undertaken by URS Dames & Moore there is deemed to be adequate retention volume in the bund surrounding the tank farm to take an estimated volume of 842m^3 fire water runoff. This estimated volume of firewater runoff is based on the following events occurring; a large volume of contaminated firewater being generated from fighting a fire in the 2300t storage tank of		As above

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
6 **cont'd**	As above	As above	As above		final product (11ls) and a medium risk fire in an EMO oil storage tank while simultaneously a major rainfall event occurs. The retention of fire water from fighting fires in areas such as the process room, unloading gantry and warehouse, will be managed by the manual shut down of the interceptor release valves while the fire water pumps will be used to pump the contaminated firewater from the interceptors back into the bunded tank farm.		As above
7	Monitoring and Control Systems	Failure of on-site procedures	Release of hazardous material to atmosphere, surface water, groundwater	1	The site has developed procedures for environmental monitoring and control such as loading and unloading of waste oil tankers, bund inspections and drainage system inspections. Internal process audits are undertaken annually. Enva are certified by SGS to both ISO 14001 and OHSAS 18001 and are audited by their holding company DCC. The EPA undertake un-notified compliance audits against the sites waste licence. Annual reports are also submitted	2	Minor impact/localised or nuisance

Risk ID	Process	Potential Hazard	Environmental Effect	Occurrence Rating	Basis of Occurrence	Severity Rating	Basis of Severity
7					to both Envas holding company, DCC and the EPA.		

6.4. Assessment of Risks at Enva

6.4.1. Risk Register

The risk register below ranks the risks in order to prioritise mitigation and management measures.

Table 6.6 Risk Register ranked by Risk Score

Risk ID	Description	Occurrence Rating	Severity Rating	Risk Score
6	Major Fire/Explosion	**1**	**4**	**4**
3	Bund Integrity Failure	**1**	**3**	**3**
5	Failure of underground drainage network.	**1**	**2**	**2**
1	Loading/unloading operations.	**1**	**2**	**2**
2	Bulk Storage tank failure.	**1**	**2**	**2**
4	Improper disposal of hazardous waste.	**1**	**2**	**2**
7	Failure of on-site environmental control procedures.	**1**	**2**	**2**

6.4.2. Risk Matrix

The risk matrix below indicates the critical nature of each risk. (Risk ID's from the Risk
Register have been used to complete this matrix.)

Table 6.7 – Risk Matrix

OCCURRENCE						
V.High	5					
High	4					
Medium	3					
Low	2	**Risk ID 5**				
V.Low	1		**Risk ID 1, 2, 4 and 7**	**Risk ID 3**	**Risk ID 6**	
		1	**2**	**3**	**4**	**5**
		Trivial	**Minor**	**Moderate**	**Major**	**Massive**
		SEVERITY				

Where:
Red is a high level risk.
Yellow is a medium level risk.
Green (light and dark) is a low level risk.

Table 6.7 above indicates that there are currently no risks identified in the red zones or yellow zones requiring priority attention. This is as a result of existing environmental controls in place at the site. All risks identified are located in the (dark and light) green zone indicating that these are currently low risk. However, it is important to note that these risks are considered low risk as a result of existing control measures employed at the site aimed at reducing/eliminating both the occurrence and where this is not possible the severity of these risks. There is a need for continuing awareness and monitoring of these risks on a regular basis.

6.5. Risk Prevention, Mitigation and Management

The risk assessment and categorisation phase identified no red or yellow zone risk, which requires immediate action. All risks were classified in the (dark and light) green zone risks and require monitoring on a regular basis.

However, the (dark and light) green zone risks may have the potential to increase to yellow or red zone risks, and where additional risk management measures are available to manage them at their current levels or reduce them further, these may be implemented if considered cost-effective.

Table 6.8 illustrates the risk mitigation measures, which have been identified or are currently in use at the site. This table provides the risks in descending order of risk score with the proposed mitigation measure.

Table 6.8 Risk Mitigation Form

Risk ID	Process	Potential Hazard	Risk Score before Mitigation	Existing/Possible Mitigation measures	Risk Manager	Time to Complete	Revised Risk Score
6	Any	Major Fire/Explosion	4	Enva requested PM Consultancy to complete an ATEX report for the site. This included a risk assessment of hazardous areas. The areas identified as hazardous around the Enva Portlaoise site were assessed and zoned accordingly. Waste oil accepted on site has a flash point > 220^{o}C No credible scenarios have been identified which would result in the formation of a flammable atmosphere or the creation of mist droplets from either the tanks that store kerosene or diesel or from the heating of coils in tanks containing waste oils. UST leak detection system is in place and linked to Scada. There is a flame arrestor on the vent line to prevent propagation of flame from the vent back into the tank. Very low likelihood of tank being open at same time as un-noticed fire in adjacent premises.	HSE & Compliance Manager	Ongoing / Existing Practice	4

6 cont'd				Manhole cover is made of non-sparking fibrolite polymer. Procedures require that all equipment is earthed and bonded Permit to work procedure regulates hot work activities. All fixed electrical equipment in the area is rated for use in hazardous areas. Comprehensive control systems and maintenance programme in place to minimise the risk of fire. Flammable liquids are only accepted in UN approved containers. ADR trained drivers are only permitted to accept drums of flammable liquid that are in good condition. Enva have trained DGSA staff on site to identify non-conforming containers. Enva staff have received ATEX awareness training. Enva have a fully addressable fire alarm system in place. Enva also have a site security alarm that is linked to a 24hour monitoring service. Comprehensive Emergency Response Plan is in place at the site.			

6 cont'd				An internal Emergency Response Team are in place if fire does occur. Emergency response drills are undertaken. Suitable personnel have been designated and trained as fire wardens. All staff have received fire safety awareness and extinguisher training All bulk storage tanks are located within bunded tank farm; retention capacity is at least 110% of the largest tanks. Following from a report undertaken by URS Dames & Moore there is deemed to be adequate retention volume in the bund surrounding the tank farm to take an estimated volume of 842m3 fire water runoff. This estimated volume of firewater runoff is based on the following events occurring; a large volume of contaminated firewater being generated from fighting a fire in the 2300t storage tank of final product (11ls) and a medium risk fire in an EMO oil storage tank while simultaneously a major rainfall event occurs. The retention of fire water from fighting fires in areas such as the process room, unloading gantry and warehouse, will be			

6 cont'd				managed by the manual shut down of the interceptor release valves and while the fire water pumps will be used to pump the contaminated firewater from the interceptors back into the bunded tank farm. Additional fire detection units were placed in the tank farm for improved fire prevention of fire spread.			
3 3	Storage of waste oil and used cooking oil in bulk storage tanks. Mixed Fuels in UST and packaged waste in bunded incoming bay.	Bund Integrity Failure	3	Bund, tank and container integrity assessments are undertaken every three years and reported to the EPA. It is very unlikely that all bunded areas will fail at the same time. The yard surface where general operational activities take place is concreted and bunded. Comprehensive Emergency Response Plan in place at the site that includes dealing with spills. Operational personnel are trained in spill response. Operational staff are directed to stop spill at source and to place covers on site drains in the event of a spill. Enva has a dedicated spill response service.	HSE & Compliance Manager	Ongoing / Existing Practice	**3**

cont'd				Any spillage observed within the bunds would be promptly detected and cleaned up. The UST is fitted with a leak detection system. The incoming bay on-site is a purpose built bunded building with the capacity for segregation of waste types. All surface water runoff enters the sites drainage system and is discharged to municipal surface water system having first passed through an oil interceptor fitted with coalescence filters. The interceptors are fitted with a sensor that in the event of a large influx of oil entering the interceptor the release valve shuts down automatically to prevent any release of oil. An alarm sounds to notify staff when this occurs.			
5 5 cont'd	Disposal of wastewater	Failure of underground drainage network.	2	Envas process effluent is pumped across the site in pipelines above ground. Only treated effluent is released to sewer via an underground pipeline. Enva's process effluent is released to the effluent lime treatment plant to remove the heavy metal content.	HSE & Compliance Manager	Ongoing / Existing Practice	2

				The effluent is sampled prior to and following release. Enva's laboratory determines the COD loading of the effluent and sets the Scada system on site to release accordingly. Effluent tanks are on a cleaning schedule to remove build up of residues contaminate the effluent for discharge off site. Enva's effluent must meet the limits for the parameters as set out in Enva's waste licence reg no. W0 184-01. The final effluent from the wastewater treatment system is discharged to Portlaoise Waste Water Treatment Plant via the towns sewer. Effluent from canteen, toilet and shower areas are discharged directly to the Portlaoise town sewer which is directed to the Portlaoise waste water treatment plant. Liquid wastes from the laboratory are collected in containers and treated/disposed of through approved waste treatment/recovery outlets. The underground drainage networks are tested every three years and repaired as necessary as per Envas waste licence conditions.			

1	Loading/and unloading of wastes	Spill from loading/unloading operations.	2	Waste oils are delivered to site on a daily basis. Loading and unloading of waste oil takes place in designated bunded areas. Packaged waste are delivered to site in suitable receptacles following documented procedures and stored in designated bunded areas. Large storage areas are covered reducing run off from storage areas Enva staff are trained in the procedures and risk assessments on the acceptance, collection and transport as well as processing of hazardous wastes. Enva customer service representatives and sales personnel are trained in the hazards of dangerous goods. Unknown wastes are sampled and analysed prior to acceptance. Enva has trained Dangerous Goods Safety Advisors on site. Enva only permits the transport of dangerous goods by ADR licensed drivers. Site surface water passes through an oil interceptor with fitted coalescence filter prior to discharge.	HSE & Compliance Manager	Ongoing / Existing Practice	2

2	Storage of waste oil and cooking oil in bulk storage tanks.	Bulk Storage tank failure.	2	All bulk storage tanks are located within the bunded tank farm; retention capacity is at least 110% of the largest tank. Bund, tank and container integrity assessments are undertaken every three years and reported to the EPA. Envas Scada system monitors the levels within each tank electronically. Level alarms sound at high, high-high and high-high-high levels and as a result will alert staff to the potential for overflow. The UST is fitted with a leak detection system which is also linked to the Scada system.	HSE & Compliance Manager	Ongoing / Existing Practice / Regular reviews	2
4	Disposal of Hazardous / Non Hazardous Wastes	Improper disposal of hazardous waste.	2	Waste oils are collected nationally and brought to the Enva facility in Portlaoise to be stored in tanks prior to processing into a fuel oil product known as 11ls which is the end product and therefore will not be transported to another site as a waste. Packaged wastes are accepted on site and sent to appropriately licensed facilities for ultimate disposal. These facilities must first be approved by the EPA for use, as per waste licence requirements.	HSE & Compliance Manager	Ongoing / Existing Practice	2

4 cont'd				Enva tracks the movement of hazardous waste through the use of C1 forms and TFS documents. Enva also uses a bar-code system to track certain packaged waste streams from the customers site to the final point of destination. Enva's standard operating procedures and the considerable experience Enva have in managing hazardous waste; it is very unlikely that hazardous waste would be incorrectly managed. Enva organise the collection and transport of waste from the Enva site. Enva staff are responsible for loading waste and therefore have additional control. Enva staff are trained in the procedures and risk assessments on the acceptance, collection and transport as well as processing of wastes. Enva customer service representatives and sales personnel are trained in the hazards of dangerous goods. Unknown wastes are sampled and analysed prior to acceptance. Enva has trained Dangerous Goods Safety Advisors on site. Enva only permits the transport of dangerous goods by ADR			

4 cont'd				licensed drivers.			
7	Monitoring and Control Systems	Failure of on-site environmental control procedures.	2	The site has developed procedures for environmental monitoring and control such as loading and unloading of waste oil tankers, bund inspections and drainage system inspections. Internal process audits are undertaken annually. Enva are certified by SGS to both ISO 14001 and OHSAS 18001 and are audited by their holding company DCC. The EPA undertake un-notified compliance audits against the sites waste licence. Annual reports are also submitted to both Envas holding company, DCC and the EPA.	HSE & Compliance Manager	Ongoing / Existing Practice	2

The risk matrix below remains unchanged from that presented in figure 6.7.
Table 6.8 – Risk Matrix

OCCURRENCE	**V.High**	**5**					
	High	**4**					
	Medium	**3**					
	Low	**2**	**Risk ID 5**				
	V.Low	**1**		**Risk ID 1, 2, 4 and 7**	**Risk ID 3**	**Risk ID 6**	
			1	**2**	**3**	**4**	**5**
			Trivial	**Minor**	**Moderate**	**Major**	**Massive**
			SEVERITY				

Where:
Red is a high level risk
Yellow is a medium level risk
Green (light and dark) is a low level risk

The control measures and monitoring techniques employed at the site to deal with the risks identified were deemed adequate and these risks remain unchanged, however, this does not take away the need for continuing awareness and monitoring on a regular basis of these risks.

6.5.1. Quantification of Unknown Environmental Liabilities

The costs associated with the known environmental liabilities (e.g. closure and aftercare costs) for the Enva facility were calculated through the preparation and costing of the
Closure, Restoration, Aftercare Management Plan (refer to Site Specific CRAMP prepared for Enva).

For the unknown liabilities identified in this report a financial model is necessary to estimate the environmental liability associated with these risks.

Each Risk has two characteristics that are derived from the Risk Classification Tables
(See tables 6.2 and 6.3) that is used in the financial models:

• The range in probability (X-Y%) of the risk occurring

• The range in cost implications (€A-B) if the risk occurs

The requirements of the financial model must first be defined in terms of worst, most likely or best case scenarios. If the model is for the worst case scenario, then the higher end of each range is used in the calculations, if the model is for the most likely case then the median of each range is used and similarly if the best case scenario is required then the lower end of each range is used resulting in the lowest cost.
The simplest form of financial model can be based on simply multiplying the minimum, median or maximum value of each range for each Risk (depending on the scenario considered) and totalling the values for each Risk in the Register.
For the Enva facility the worst case scenario was calculated. Table 6.10 illustrates how the financial output for the worst case scenario is calculated.
From this, financial instruments for unknown liabilities can be selected as outlined in Section 7 of this report.

Table 6.10 - Worst Case Scenario Financial Model

Risk ID	Potential Hazard	Occurrence Rating	Likelihood of Occurrence Range	Severity Rating	Cost Range (€)	Worst Case Probability	Worst Case Severity (€)	Worst Case Cost (€) Note 1
6	Major Fire/Explosion	1	0-5%	4	50,000-1,000,000	5%	1,000,000	50,000
3	Bund Integrity Failure	1	0-5%	3	50,000 -500,000	5%	500,000	25,000
5	Failure of underground drainage network.	1	5-10%	2	100,000- 250,000	10%	250,000	25,000
1	Spill from loading/unloading operations.	1	0-5%	2	10,000 – 50,000	5%	50,000	2,500
2	Bulk Storage tank failure.	1	0-5%	2	10,000-50,000	5%	50,000	2,500
4	Improper disposal of hazardous waste.	1	0-5%	2	100,000 – 500,000	5%	500,000	25,000
7	Failure of on-site environmental control procedures.	1	0-5%	2	100,000 - 500,000	5%	500,000	25,000
					Total worst-case cost of unknown liabilities			155,000

Note 1: The financial provision was estimated using the guidance document provided by the EPA. It is noted that this is an estimated cost potential based on estimated probability of a risk occurring and estimated magnitude of any resulting environmental liability. It is the opinion of Enva that liabilities in excess of the total shown on the table above could conceivably occur and that consequently financial provision in excess of this figure will be maintained by the site.

7. FINANCIAL PROVISIONS

In the preceding sections the site sensitivity, known historic environmental liabilities and the measures, both technical and managerial, currently in place to eliminate/reduce the risk of new environmental liabilities arising have been summarised.
It can be concluded that the site environmental and safety management system are robust in terms of preventing the development of any new significant off-site environmental liability.
In the these sections, we will discuss the financial provisions at the site and whether these provisions are adequate to satisfactorily address the liabilities identified in section 6.

7.1. Current Financial Provisions

Enva is a wholly owned subsidiary of DCC. DCC was founded, and listed on the Irish and London stock exchanges in 1994. DCC is headquartered in Ireland and currently employs approximately 7,200 people

DCC maintain various insurance policies, which provide a range of cover subject to certain exclusions, excess and warranties. These insurance policies provide a range of cover for all DCC sites, subsidiaries or associated companies. There are a number of policies which provide cover for the following risks:

- Employers liability
- Public/Products Liability;
- Motor Insurance;
- Engineering Combined.

The public/products liability provides indemnity in respect of legal liability for accidental bodily injury to any person or accidental loss or damage to property arising from the performance of the contract work (i.e. activities undertaken by Enva as defined in the Insurance policy). The policy has a limit of indemnity of €13,000,000. The policy is subject to an excess of €15,000 each and every claim.
The policy provides limited cover in respect of pollution or contamination risks in that cover is only provided where same has been caused by a sudden identifiable unintended and unexpected incident which takes place in its entirety at a specific time and place during the period of insurance. The liability of the underwriter for all damages and compensation payable in respect of all Pollution or Contamination which is deemed to have occurred during the period of insurance shall not exceed €13,000,000.

7.2. Assessment of Enva Financial Provision

The environmental liabilities identified and assessed in this report (refer to Section 6) are in the main unforeseen or unanticipated events that could occur suddenly as a result of an accident or failure of control systems. Other liabilities identified are the result of gradual and unforeseen discharge consequent upon failure of control systems, which may result in a discharge to the environment such as leaking drains or undetected leaks in drainage systems.

Having consideration for the worst-case costs calculated in Table 6.10, a comparison of existing financial provisions presented in Section 7.1 above may be made with the type of unknown liabilities identified at the site.

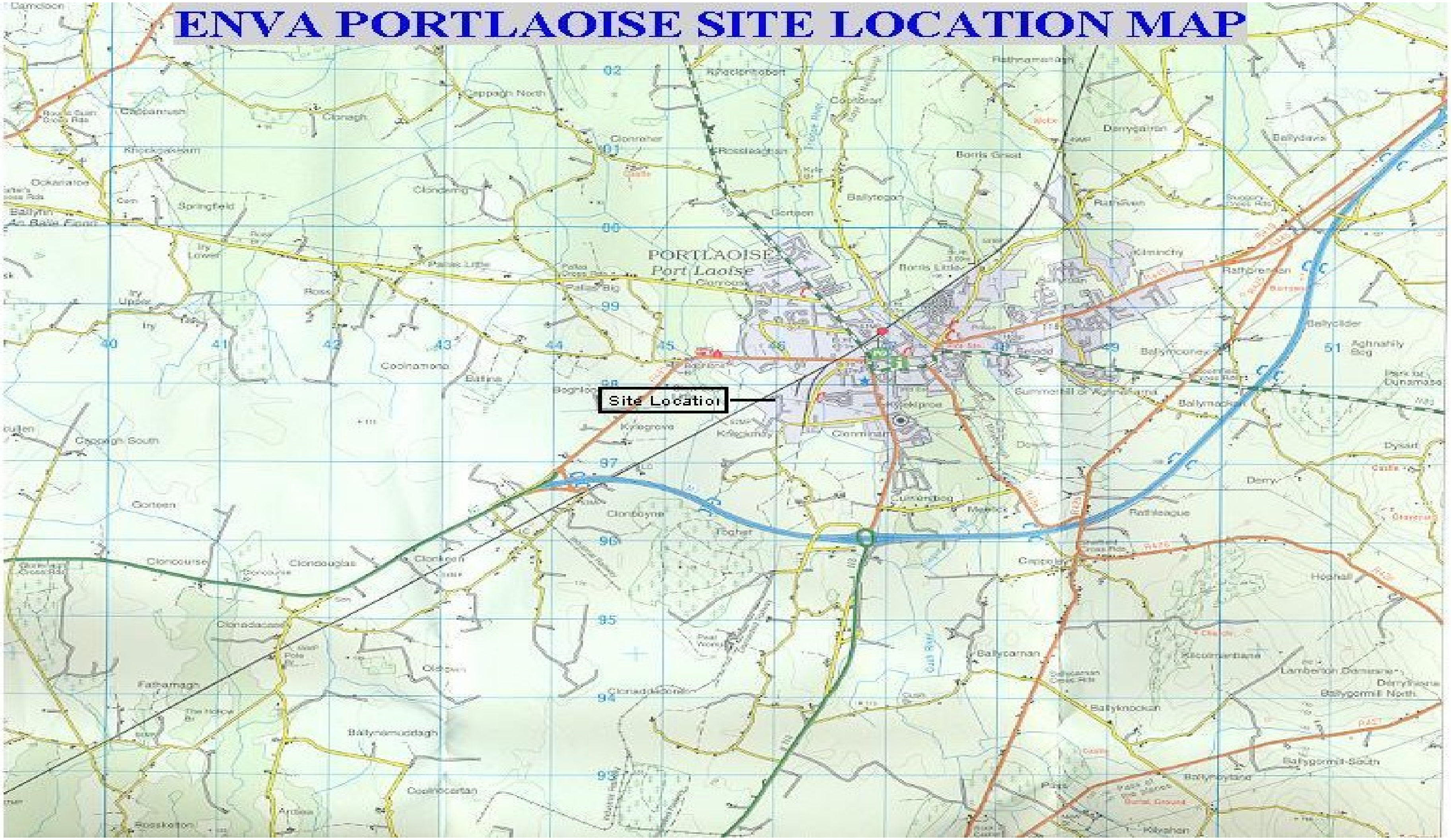
Risk Type	**Existing Enva Financial Provision**	**Comment**
Immediate, sudden and unforeseen discharge consequent upon an accident.	DCC UK and Ireland Insurance policies Insurance - Public/Products Liability	Each claim has an excess of €15,000 which must be paid by Enva.
Gradual unforeseen discharge consequent upon failure of control systems.	Financed internally by DCC and/or Enva funds.	Unlikely that these are included within the current insurance cover for the site. Potential liabilities which arise that are not covered under existing insurance polices would be paid for with Enva based funds.
Closure Restoration and Aftercare Liabilities	Financed internally by DCC and/or Enva funds.	Enva have completed a Closure, Restoration, Aftercare Management Plan for the site with a specified total cost of €413,602 for effective site closure and aftercare. This document will be reviewed annually by enva

Table 7.1 – Assessment of Enva Financial Provision annually by Enva.

Based on a review of the current level of insurance maintained by the site, it appears that environmental liabilities resulting from Risk Ids 1,2,6 and 7 as shown in table 6.10 above would be covered under the existing insurance policies. Indemnity in respect of Risk IDs 3 and 4 would depend on the circumstances, which lead to any potential liability. Liabilities associated with Risk ID 5 would appear to be excluded from the existing cover and therefore any financial liabilities associated with this would need to be financed by Enva.

Appendix 1

Figure 1


ENVA PORTLAOISE SITE LOCATION MAP
Site Location
PORTLAOISE
Port Laoise

Appendix 15

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.13

REFERENCE YEAR	2011

1. FACILITY IDENTIFICATION

Parent Company Name	ENVA Ireland Ltd
Facility Name	ENVA Ireland Ltd
PRTR Identification Number	W0184
Licence Number	W0184-01

Waste or IPPC Classes of Activity

No.	class_name
4.8	Oil re-refining or other re-uses of oil.
3.12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
3.13	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.
3.6	Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule.
3.7	##
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.12	Exchange of waste for submission to any activity referred to in a preceding paragraph of this Schedule.
4.13	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.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.4	Recycling or reclamation of other inorganic materials.
4.5	Regeneration of acids or bases.
4.9	Use of any waste principally as a fuel or other means to generate energy.
Address 1	Clonminam Industrial Estate
Address 2	Portlaoise
Address 3	County Laois
Address 4	
	Laois
Country	Ireland
Coordinates of Location	-7.31391 53.0294
River Basin District	IESE
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Anna O'Brien
AER Returns Contact Email Address	aobrien@enva.ie
AER Returns Contact Position	HSE Coordinator
AER Returns Contact Telephone Number	0578678600
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	0578678699
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	www.enva.ie

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(a)	Installations for the recovery or disposal of hazardous waste
5(c)	Installations for the disposal of non-hazardous waste
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 ?	

4.1 RELEASES TO AIR Link to previous years emissions data

10

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
08	Nitrogen oxides (NOx/NO2)	C	OTH	Kane May Quintox KM9160-Electrochemical cells	76.68	76.68	0.0	0.0
11	Sulphur oxides (SOx/SO2)	C	EN 14791:2005		2.67	2.67	0.0	0.0
02	**Carbon monoxide (CO)**	C	OTH	Kane May Quintox KM9160-Electrochemical cells	1.6	1.6	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: ENVA Ireland Ltd

Please enter summary data on the quantities of methane flared and / or utilised			**Method Used**			
	T (Total) kg/Year	**M/C/E**	**Method Code**	**Designation or Description**	**Facility Total Capacity m3 per hour**	
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# : W0184 | Facility Name : ENVA Ireland Ltd | Filename : W0184_2011.xls | Return Year : 2011 | 29/03/2012 16:43

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 this only concerns Releases from your facility

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

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
06	Ammonia (NH3)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 4000, section 4500 –Nitrogen (Ammonia) F Phenate Method.	178.42	178.42	0.0	0.0
79	Chlorides (as Cl)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 4500 – Cl⁻ - C, Mercuric Nitrate Method.	10509.05	10509.05	0.0	0.0
71	Phenols (as total C)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 5530, Phenols.	49.35	49.35	0.0	0.0
13	Total phosphorus	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 4500–E, Phosphorus Ascorbic Acid Method.	356.36	356.36	0.0	0.0
20	Copper and compounds (as Cu)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B - Modified	0.25	0.25	0.0	0.0
18	Cadmium and compounds (as Cd)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B - Modified	0.07	0.07	0.0	0.0
23	Lead and compounds (as Pb)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B - Modified	0.53	0.53	0.0	0.0
24	Zinc and compounds (as Zn)	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, Metals by Flame Atomic Absorption Spectrometry – Direct Air-Acetylene Flame Method. 3111B - Modified	0.72	0.72	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
314	Fats, Oils and Greases	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 5520 D Soxhlet Extraction Method	322.02	322.02	0.0	0.0

343	Sulphate	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 4500 - $SO4^{2-}$ E	1220.08	1220.08	0.0	0.0
306	COD	C	OTH	Standard Methods for the Examination of Water and Wastewater, 21st edition, 2005.– Chemical Oxygen Demand.	21385.91	21385.91	0.0	0.0
240	**Suspended Solids**	C	OTH	Standard Methods for the Examination of Water and Wastewater, 18th edition, 1995, Part 2540, D - Solids.	829.36	829.36	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
POLLUTANT		
No. Annex II	Name	

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

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

		RELEASES TO LAND
POLLUTANT		
Pollutant No.	Name	

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

			Please enter all quantities
METHOD			
M/C/E	Method Used		
	Method Code	Designation or Description	Emission Point 1
			0.0

) then click the delete button

			Please enter all quantities
METHOD			
M/C/E	Method Used		
	Method Code	Designation or Description	Emission Point 1
			0.0

) then click the delete button

in this section in KGs	
	QUANTITY
T (Total) KG/Year	A (Accidental) KG/Year
0.0	0.0

in this section in KGs	
	QUANTITY
T (Total) KG/Year	A (Accidental) KG/Year
0.0	0.0

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE | PRTR# : W0184 | Facility Name : ENVA Ireland Ltd | Filename : W0184_2011.xls | Return Year : 2011 | 29/03/2012 16:45

Please enter all quantities on this sheet in Tonnes

0

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used M/C/E	Method Used	Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
Within the Country	13 08 02	Yes	21.92	other emulsions	D9	M	Weighed	Offsite in Ireland	Enva,W0196-1	JFK Road Naas Road,.,Dublin,Dublin 12,Ireland	Enva,W0196-01,JFK Road Naas Road,.,Dublin,Dublin 12,Ireland	JFK Road Naas Road,.,Dublin,Dublin 12,Ireland
Within the Country	16 10 02	No	117.7	aqueous liquid wastes other than those mentioned in 16 10 01	D9	M	Weighed	Offsite in Ireland	Enva,W0196-1	JFK Road Naas Road,.,Dublin,Dublin 12,Ireland		
Within the Country	19 02 03	No	98.94	premixed wastes composed only of non-hazardous wastes	D9	M	Weighed	Offsite in Ireland	Enva,W0196-1	JFK Road Naas Road,.,Dublin,Dublin 12,Ireland		
Within the Country	19 11 03	Yes	6394.85	aqueous liquid wastes	D9	M	Volume Calculation	Offsite in Ireland	Laois County Council,DO00 1-0 1	Ridge Road,.,Portlaoise,.,Ireland	Laois County Council,DO00 1-0 1,Ridge Road,.,Portlaoise,.,Ireland	Ridge Road,.,Portlaoise,.,Ireland
To Other Countries	13 05 03	Yes	117.41	interceptor sludges	R1	M	Weighed	Abroad	Geocycle ,38.152/BP	Rue de Courriere 49 Zoning Industrial de Feluy ,. ,. ,B 7181 Seneffe ,Belgium	Geocycle ,38.152/BP, Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium	Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium
To Other Countries	13 05 03	Yes	24.38	interceptor sludges	R1	M	Weighed	Abroad	Lindenschmidt , 04 714 98089	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	17 05 04	No	5966.6	soil and stones other than those mentioned in 17 05 03	R5	M	Weighed	Offsite in Ireland	Hinch Plant hire ,WFP-LS-09-0002-01	Straboe ,. , Portlaoise ,Co Laois ,Ireland		
To Other Countries	16 01 07	Yes	651.12	oil filters	R12	M	Weighed	Abroad	RD Recycling ,Ovam approved	Centrum Zuid 3017 ,.,.,3530,Belgium.	RD Recycling ,Ovam approved,Centrum Zuid 3017 ,.,.,3530,Belgium.	Centrum Zuid 3017 ,.,.,3530,Belgium.
To Other Countries	16 06 01	Yes	2538.82	lead batteries	R4	M	Weighed	Abroad	Campine,Ovam Approved	Niljverheidsstraat 2 Belgium.,.,.,B- 2340 Beerse ,Belgium	Campine,Ovam Approved, Niljverheidsstraat 2 Belgium.,.,.,B- 2340 Beerse ,Belgium	Niljverheidsstraat 2 Belgium.,.,.,B- 2340 Beerse ,Belgium
Within the Country	20 01 21	Yes	2.88	fluorescent tubes and other mercury-containing waste	R4	M	Weighed	Offsite in Ireland	Irish Lamp Recycling ,WFP-KE-08-0348-01	Woodstock Industrial Estate ,.,Athy ,Co. Kildare. ,Ireland	Irish Lamp Recycling ,WFP-KE-08-0348-01,Woodstock Industrial Estate ,.,Athy ,Co. Kildare. ,Ireland	Woodstock Industrial Estate ,.,Athy ,Co. Kildare. ,Ireland
Within the Country	20 01 21	Yes	0.01	fluorescent tubes and other mercury-containing waste	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
To Other Countries	15 02 02	Yes	240.81	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	R12	M	Weighed	Abroad	Lindenschmidt , 04 714 98089	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
To Other Countries	15 02 02	Yes	4.84	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	R1	M	Weighed	Abroad	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
To Other Countries	19 12 11	Yes	139.56	other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances	D9	M	Weighed	Abroad	KWA,E17012100	Graftstr. 25 ,.,.,47475 Kamp-Lintfort ,Germany	KWA,E17012100,Graftstr. 25 ,.,.,47475 Kamp-Lintfort ,Germany	Graftstr. 25 ,.,.,47475 Kamp-Lintfort ,Germany

						Method Used						
Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	M/C/E	Method Used	Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
Within the Country	08 01 11	Yes	0.48	waste paint and varnish containing organic solvents or other dangerous substances	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
To Other Countries	08 01 11	Yes	28.07	waste paint and varnish containing organic solvents or other dangerous substances	R1	M	Weighed	Abroad	Geocycle ,38.152/BP	Rue de Courriere 49 Zoning Industrial de Feluy ,. ,. ,B 7181 Seneffe ,Belgium	Geocycle ,38.152/BP, Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium	Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium
To Other Countries	08 01 11	Yes	266.56	waste paint and varnish containing organic solvents or other dangerous substances	R3	M	Weighed	Abroad	Nehlsen GmbH & Co.kg, A-4187 HH	Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany	Nehlsen GmbH & Co.kg, A-4187 HH,Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany	Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany
To Other Countries	15 01 10	Yes	18.56	packaging containing residues of or contaminated by dangerous substances	R3	M	Weighed	Abroad	Nehlsen GmbH & Co.kg, A-4187 HH	Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany	Nehlsen GmbH & Co.kg, A-4187 HH,Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany	Louis-Krages-Strabe ,.,Bremen., D-28237 ,Germany
Within the Country	15 01 02	No	35.16	plastic packaging	D1	M	Weighed	Offsite in Ireland	Kyletalesha Landfill , W0026-02	Clonsoughy Kyleclonhobert ,.,Portlaoise,County Laois.,Ireland		
To Other Countries	13 07 03	Yes	59.9	other fuels (including mixtures)	R12	M	Weighed	Abroad	Lindenschmidt , 04 714 98089	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	19 12 03	No	139.18	non-ferrous metal	R4	M	Weighed	Offsite in Ireland	MSM Recycling , W079-1	Cookstown Industrial Estate ,Unit 41,Tallaght ,Dublin 24,Ireland		
Within the Country	15 01 02	No	3.14	plastic packaging	R5	M	Weighed	Offsite in Ireland	Leinster Environmentals , WP 2004/30	Clermont Park Haggardstown ,.,Dundalk ,Co. Louth.,Ireland		
Within the Country	15 01 10	Yes	2.96	packaging containing residues of or contaminated by dangerous substances	R12	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	17 02 01	No	7.05	wood	R5	M	Weighed	Offsite in Ireland	Concrete Recycling Specialist Ltd. , WP 138-06	Barnan ,., Rhode ,Co. Offaly,Ireland		
Within the Country	15 01 10	Yes	3.86	packaging containing residues of or contaminated by dangerous substances	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
To Other Countries	13 07 03	Yes	113.42	other fuels (including mixtures)	R1	M	Weighed	Abroad	KS Recycling ,12 150 13984/01TMS	Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany	KS Recycling ,12 150 13984/01TMS,Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany	Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany
To Other Countries	13 07 03	Yes	16.88	other fuels (including mixtures)	R1	M	Weighed	Abroad	Geocycle ,38.152/BP	Rue de Courriere 49 Zoning Industrial de Feluy ,. ,. ,B 7181 Seneffe ,Belgium	Geocycle ,38.152/BP, Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium	Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,B 7181 Seneffe ,Belgium
To Other Countries	16 01 14	Yes	2.0	antifreeze fluids containing dangerous substances	R3	M	Weighed	Abroad	KS Recycling ,12 150 13984/01TMS	Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany	KS Recycling ,12 150 13984/01TMS,Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany	Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
To Other Countries	16 05 04	Yes	17.14	gases in pressure containers (including halons) containing dangerous substances	R4	M	Weighed	Abroad	SBH ,121296753	Austrabe 5 ,.,.,D74238 Krautheim,Germany	SBH ,121296753,Austrabe 5 ,.,.,D74238 Krautheim,Germany	Austrabe 5 ,.,.,D74238 Krautheim,Germany
Within the Country	16 05 07	Yes	8.32	discarded inorganic chemicals consisting of or containing dangerous substances	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	16 05 07	Yes	11.07	discarded inorganic chemicals consisting of or containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	20 01 27	Yes	2.02	paint, inks, adhesives and resins containing dangerous substances	R12	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	20 01 28	No	0.65	paint, inks, adhesives and resins other than those mentioned in 20 01 27	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland		
Within the Country	20 01 27	Yes	13.0	paint, inks, adhesives and resins containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	06 01 01	Yes	0.8	sulphuric acid and sulphurous acid	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	16 05 06	Yes	0.49	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	20 01 29	Yes	2.34	detergents containing dangerous substances	R12	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	16 05 06	Yes	0.02	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	16 05 08	Yes	25.78	discarded organic chemicals consisting of or containing dangerous substances	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	16 05 08	Yes	0.48	discarded organic chemicals consisting of or containing dangerous substances	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Geocycle ,38.152/BP, Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,.,B 7181 Seneffe ,Belgium	Rue de Courriere 49 Zoning Industrial de Feluy ,.,.,.,B 7181 Seneffe ,Belgium
Within the Country	16 05 08	Yes	15.17	discarded organic chemicals consisting of or containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	17 02 04	Yes	22.6	glass, plastic and wood containing or contaminated with dangerous substances	R12	M	Weighed	Offsite in Ireland	Enva,W0196-1	JFK Road Naas Road,.,Dublin,Dublin 12,Ireland	Reiling MS GmBH ,121197630, Weetfelder Str.36 59199 Bonen ,.,.,.,.,Germany	Weetfelder Str.36 59199 Bonen ,.,.,.,.,Germany

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	17 02 04	Yes	1.14	glass, plastic and wood containing or contaminated with dangerous substances	R12	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	08 03 12	Yes	0.02	waste ink containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
Within the Country	16 02 13	Yes	0.02	discarded equipment containing hazardous components (16) other than those mentioned in 16 02 09 to 16 02 12	R4	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	KMK ,W0113-03,Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland	Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland
Within the Country	07 01 04	Yes	0.02	other organic solvents, washing liquids and mother liquors	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Enva ,W041-1,Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland
To Other Countries	07 01 04	Yes	26.0	other organic solvents, washing liquids and mother liquors	R12	M	Weighed	Abroad	Caldic Chemie Produktie B.V. , Permit 695619/695624	Schansdijk 12.,.,., P.O. Box 33 4761 RH Zevenbergen ,The Netherlands.	Caldic Chemie Produktie B.V. , Permit 695619/695624,Schansdijk 12.,.,., P.O. Box 33 4761 RH Zevenbergen ,The Netherlands.	Schansdijk 12.,.,., P.O. Box 33 4761 RH Zevenbergen ,The Netherlands.
Within the Country	20 01 19	Yes	0.08	pesticides	R1	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland	Lindenschmidt , 04 714 98089,Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany
Within the Country	20 01 25	No	1.08	edible oil and fat	R13	M	Weighed	Offsite in Ireland	Frylite ,WFP-DS-10-0009-01	Ballymount Drive Ballymount Industrial Estate,Unit J1 ,Dublin,Dublin 12,Ireland		
Within the Country	20 01 25	No	22.0	edible oil and fat	R3	M	Weighed	Offsite in Ireland	Acorn Recycling ltd ,W0249-01	Ballybeg Composting facility Ballybeg Littleton ,.,.,Co. Tipperary. ,Ireland		
Within the Country	20 01 25	No	13.78	edible oil and fat	D8	M	Weighed	Offsite in Ireland	Beofs ,WFP-KK-09-0004-01	Camphill Community Ballytobin ,.,Callan ,Co. Kilkenny,Ireland		
To Other Countries	16 01 15	No	40.34	antifreeze fluids other than those mentioned in 16 01 14	R1	M	Weighed	Abroad	Lindenschmidt , 04 714 98089	Krombacher Strasse 42-46 ,.,Kreutzal,D57223 ,Germany		
To Other Countries	16 01 15	No	14.0	antifreeze fluids other than those mentioned in 16 01 14	R12	M	Weighed	Abroad	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland		
To Other Countries	16 01 15	No	1.94	antifreeze fluids other than those mentioned in 16 01 14	R1	M	Weighed	Abroad	Geocycle ,38.152/BP	Rue de Courriere 49 Zoning Industrial de Feluy ,. ,. ,B 7181 Seneffe ,Belgium		
To Other Countries	16 01 15	No	117.54	antifreeze fluids other than those mentioned in 16 01 14	R1	M	Weighed	Abroad	KS Recycling ,12 150 13984/01TMS	Raiffeisenstraße 38 ,.,., D-47665 Sonsbeck ,Germany		
Within the Country	16 01 15	No	8.0	antifreeze fluids other than those mentioned in 16 01 14	D9	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland		
Within the Country	16 06 04	No	1.91	alkaline batteries (except 16 06 03)	R4	M	Weighed	Offsite in Ireland	KMK ,W0113-03	Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland		

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	20 01 33	Yes	0.26	batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	R4	M	Weighed	Offsite in Ireland	KMK ,W0113-03	Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland	KMK ,W0113-03,Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland	Cappincur Industrial Estate Daingean Rd. ,.,Tullamore ,Co. Offaly.,Ireland
Within the Country	16 05 09	No	0.35	discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	R12	M	Weighed	Offsite in Ireland	Enva ,W041-1	Smithstown Industrial estate ,.,Shannon ,Co. Clare,Ireland		
Within the Country	19 09 04	No	5.74	spent activated carbon	R3	M	Weighed	Offsite in Ireland	Acorn Recycling ltd ,W0249-01	Ballybeg Composting facility Ballybeg Littleton ,.,.,Co. Tipperary. ,Ireland		
Within the Country	20 03 06	No	31.32	waste from sewage cleaning	D9	M	Weighed	Offsite in Ireland	Kildare County Council Waste Water Treatment Plant,D0004-01	.,.,Leixlip,Co.Kildare,Ireland		
Within the Country	17 02 01	No	4.44	wood	R5	M	Weighed	Offsite in Ireland	AES Advanced Environmental Solutions (Ireland) Limited,W0104-02	.,.,Tullamore,Co. Offaly,Ireland		

* Select a row by double-clicking the Description of Waste then click the delete button

Link to previous years waste data
Link to previous years waste summary data & percentage change

Appendix 16

Certificate IE00/51683

The management system of

Enva Ireland Limited,
A division of DCC Environmental

Smithstown Industrial Estate, Shannon, Co Clare, Ireland

Clonminam Industrial Estate, Portlaoise, Co. Laois, Ireland

JFK Road, Naas Road, Dublin 12, Ireland

Raffeen Industrial Estate, Ringnaskiddy, Co. Cork, Ireland

has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Hazardous and non- hazardous waste management, treatment, recovery and associated site services. Operation of waste transfer stations. Manufacture and supply of waste water treatment products and services. Supply of drain cleaning and survey services. Blending according to customer specification.

This certificate is valid from 02 July 2010 until 02 July 2013 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 02 July 2013
Issue 7. Certified since 30 June 2000

Authorised by

UKAS
MANAGEMENT
SYSTEMS
005

SGS United Kingdom Ltd Systems & Services Certification
Rossmore Business Park Ellesmere Port Cheshire CH65 3EN UK
t +44 (0)151 350-6666 f +44 (0)151 350-6600 www.sgs.com

SGS EMS 04 0310

Appendix 17

Enva Ireland Ltd
Raffeen Ind Est, Ringaskiddy, Co.Cork

Tel: 021 438 7200
Fax: 021 438 7299
Email: cork@enva.ie
Web: www.enva.ie

ISO 9001 Registered

RESPIROMETRY REPORT

ENVA PORTLAOISE

One sample was received on the 09/06/2011 for evaluation of their effect on activated sludge micro organisms at given dilutions. The methodology for this is by respirometry, which assesses the oxygen uptake of a standard activated sludge versus sludge containing the samples for evaluation, over a 30 minute period. The samples submitted were as follows:

Sample 1	08.06.11	Enva Portlaoise

The results were as follows: (all results mg/l 0_2)

Sample Time/Mins.	*Control*	*1/5 Dilution*	*½ Dilution*
0	10.2	10.5	10.4
1	8.2	5.6	3.7
2	7.8	4.0	2.7
3	7.4	2.6	1.8
4	7.0	1.2	0.8
5	6.7	0	0.1
10	5.1		0
15	3.5		
20	0.5		
25	0		
30			
% Inhibition		- 2 %	- 3%

Only samples showing +30% or greater inhibition are considered to have a negative effect on the activated sludge.

As we can see all of the samples proved lower than this in inhibition terms. This indicates that there was no inhibition of the activity of the activated sludge micro organisms from the samples at their respective dilutions.

Signed: ____________ Date: 20/1/1

Enva Ireland Ltd
Raffeen Ind Est, Ringaskiddy, Co.Cork

Tel: 021 438 7200
Fax: 021 438 7299
Email: cork@enva.ie
Web: www.enva.ie

RESPIROMETRY REPORT

ENVA PORTLAOISE

One sample was received on the 20/12/2011 for evaluation of their effect on activated sludge micro organisms at given dilutions. The methodology for this is by respirometry, which assesses the oxygen uptake of a standard activated sludge versus sludge containing the samples for evaluation, over a 30 minute period. The samples submitted were as follows:

Sample 1	20.12.11	Enva Portlaoise

The results were as follows: (all results mg/l 0_2)

Sample Time/Mins.	*Control*	*$^1/_5$ Dilution*
0	16.9	11.5
1	10.3	9.1
2	8.0	7.1
3	7.0	5.8
4	6.4	4.6
5	5.9	3.4
10	4.5	2.3
15	2.8	0.9
20	1.6	0
25	1.0	
30	0	
% Inhibition		11.6 %

Only samples showing +30% or greater inhibition are considered to have a negative effect on the activated sludge.

As we can see all of the samples proved lower than this in inhibition terms. This indicates that there was no inhibition of the activity of the activated sludge micro organisms from the samples at their respective dilutions.

Signed: Jame B Date: 10/1/12

Appendix 18

ANNUAL ENVIRONMENTAL; REPORT (AER)

SIGNOFF

All licensees are required to include an appropriately signed declaration, as outlined below, as part of their AER submission to the Agency. This declaration is made in reference to all the data and information in the AER.

Declaration:

All the data and information presented in this report has been checked and certified as being accurate. The quality of the information is assured to meet licence requirements.

Signature
Installation/Facility manager
(or nominated, suitably qualified and experienced deputy)

29/3/12
Date

Appendix 19

Bank of Ireland
Corporate

Head Office, Lower Baggot Street
Dublin 2, Ireland
Tel +353 (0)1 604 4000
Fax +353 (0)1 604 4005
www.boi.ie/corporate

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that we **ATLAS ENVIRONMENTAL IRELAND LIMITED** whose registered office is at C/O Atlas Oil, Clonminan Industrial Estate, Portlaoise, Co Laois (hereinafter called "the Licensee") and **THE GOVERNOR & COMPANY OF THE BANK OF IRELAND** whose registered office is at Lower Baggot Street, Dublin 2 (hereinafter called "the Surety") are held and firmly bound unto the **ENVIRONMENTAL PROTECTION AGENCY** having its registered office at PO Box 3000 Johnstown Castle Estate, County Wexford (hereinafter called "the Agency") in the sum of € 278,670 (Two hundred and seventy eight thousand six hundred and seventy Euro) to be paid to the Agency for the payment of which said sum well and truly to be made and done the said Licensee and the Surety bind themselves, their successors and assigns jointly and severally by these presents.

Signed/sealed with our respective seals and dated this ....11th..... day of ..JAN..... 2005

WHEREAS the Bond of Surety is supplemental to a Waste Licence Register number 184-1 dated 16th January 2004 (hereinafter called the "Licence") allowing the Licensee to carry on waste activities at Clonminam Industrial Estate, Portlaoise, County Laois in strict accordance with the terms of the said Licence. The Licensee is required to observe all of the conditions of the Licence, and in particular to clean up the site in the event of a closure. NOW THEREFORE the condition of the above-written bond is such that (i) if the Licensee shall duly perform and observe all the terms provisions conditions and stipulations of the said Licence on the Licensee's part to be performed and observed or (ii) if on default by the Licensee the Surety shall satisfy and discharge the damages sustained by the Agency thereby up to the amount of the above-written bond or (iii) if no claim is made by the Agency on or before the expiry date then this obligation shall be null and void, but otherwise shall be and remain in full force and effect.

The initial expiry date of this Bond is 31st January 2006 and it is a condition of this Bond that it shall be deemed automatically extended without amendment for one year from its expiry date, or from any future expiry date, unless at least thirty (30) days prior to any such expiry date the Surety shall notify the Agency by registered mail, that it elects not to consider this Bond renewed for any such additional period.

The Surety shall be notified in writing of any non-performance or non-observance on the part of the Licensee of any of the said terms covenants clauses provisions stipulations and conditions contained in the said Licence or on its part to be performed and observed which may involve a loss for which the Surety is responsible hereunder within three months after such non-performance or non-observance shall have come to the knowledge of the Agency or their representative or representatives having supervision of the said Licence and a Registered Letter posted to the Surety at its registered offices shall be notice required within the meaning of this Bond and the Agency shall in so far as it may be lawful permit the Surety (at the Surety's request and solely at the Surety's option) to perform the terms covenants clauses provisions stipulations and conditions of the same Contract which the Licensee shall have failed to perform or observe.

PROVIDED ALWAYS that:

(1) No liability shall attach to the Surety under this bond in consequence of any delay or failure by the Licensee to honour the terms of the Licence whether directly or indirectly arising out of War Invasion Act of Foreign Enemy Hostilities Civil War Rebellion Revolution Insurrection or Military or Usurped Power.

This Bond and the benefits thereof shall not be assigned without the prior written consent of the Surety.

This Bond shall be construed in accordance with and governed by the laws of Ireland and there parties hereto hereby submit to the non-executive jurisdiction of the Courts of Ireland

In witness whereof the Licensee and the Surety have signed this document by an Authorised Signatory or caused their common seals to be hereunto affixed the day and year first written above.

The Common Seal of the Licensee
was hereunto affixed in the presence of:

____

12th January 2005
____

Signed by

____

____
on behalf of The Governor and Bank of Ireland