

**The East Galway Landfill
EPA Waste Licence W0178-02**

Annual Environmental Report

January 2014 - December 2014



Document Amendment Record

Client: *Galway County Council*

Project: Environmental Monitoring at The East Galway Landfill

Title: Annual Environmental Report


Project Number: 7154		Document Ref:			
A	Annual Environmental Report	JQ	CR	DG	30/03/15
Revision	Purpose / Description	Originated	Checked	Authorised	Date
					

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1 Introduction

Greenstar Holdings Ltd. was granted a Waste Licence (Reg.No.W0178-01) to construct and operate a landfill at Killagh More, Ballybaun, Ballintober, Ballinasloe, by the Environmental Protection Agency (Agency, EPA) on the 26th of July 2004. Following a review by the EPA a revised Waste Licence (Reg. No.W0178-02) was issued on the 23rd of March 2010. The facility has accepted waste since December 2005 at a rate of 100,000 tonnes per annum for disposal and up to 27,320 tonnes of engineering materials per annum for recovery purposes. To date approximately 820,000 tonnes of waste has been placed into 7 of the 9 constructed cells. The facility has not accepted any waste since March 2013.

The Environmental Protection Agency has exercised powers to enter the site under S.I. No. 547 of 2008 – European Communities (Environmental Liability) Regulations 2008 and appointed Galway County Council and TOBIN Consulting Engineers as Agents and Authorised Officers on an emergency basis for the ongoing management of liabilities at the site. This decision arose from the decision of the receiver of the Greenstar group of companies to cease operating the facility with effect from May 2013.

The facility is situated in east County Galway, approximately 16km west of the town of Ballinasloe. The landfill is located in an area bounded to the north by the Athenry to Ballinasloe road (R348) with local roads immediately to the east and south; the L7442 and the L7439, respectively. A site location map is provided in Appendix A.

This report addresses Condition 11.11 of Waste Licence 178-02. Condition 11.11 states that:

11.9.1 – The licensee shall submit to the Agency for its agreement by 31st March each year, an Annual Environmental Report (AER) covering the previous year.

11.9.2 – The AER shall include as a minimum the information specified in Schedule G: Content of Annual Environmental Report of this licence and shall be prepared in accordance with any written relevant guidance issued by the Agency.

This report addresses the items listed in Schedule G: Content of Annual Environmental Report of the waste licence for the facility and the format follows guidelines set in the “Guidance Note for Annual Environmental Report” issued by the Environmental Protection Agency. Account is also taken of the AER Draft Guidance Document and AER Information Templates issued by the Agency in January 2013. This AER covers the reporting period from 1st January 2014 to the 31st December 2014.

2 Waste Activities & Records

2.1 WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

The East Galway Landfill (also known as the Connaught Regional Residual Landfill, CRRL) is a fully engineered and contained landfill site. It is licensed to accept 100,000 tonnes per annum of waste, as follows:

Table 2.1 Waste Acceptance Tonnages– 2014

Waste Type	Maximum (Tonnes per Annum)
Household	45,000
Commercial	27,500
Industrial non-hazardous	24,500
Asbestos Waste	3,000
Total	100,000

Note: The tonnage of household waste, commercial waste and industrial non-hazardous waste may be altered with the prior agreement of the Agency provided that the total amount of all wastes accepted at the facility does not exceed the combined tonnage of 100,000 tonnes per annum **and the amount of asbestos does not exceed 3,000 tonnes per annum** (as specified in Table 2.1 above).

The facility is also licensed to accept 27,320 tonnes per annum of inert waste for recovery for the purposes of restoration and aftercare.

Waste activities at the facility are restricted to those outlined in Part 1 - Activities Licensed of the Waste Licence. Licensed waste disposal and recovery activities are summarised in Table 2.2 and Table 2.3 below.

Table 2.2 Licensed Waste Activities (Third Schedule of Waste Management Acts, 1996 - 2010)

Class 1	Deposit on, in or under land (including landfill): This activity is limited to the disposal of non-hazardous waste into lined cells.
Class 4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons: This activity is limited to the management of leachate and surface water at the facility.
Class 5	Specifically engineered landfill, including placement into discrete lined cells which are capped and isolated from one another and the environment: This is the principal activity. This activity is limited to the disposal of non-hazardous waste into lined cells.
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: This activity is limited to potential future treatment of leachate at the facility
Class 13	Storage prior to submission of any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced: This activity is limited to the temporary storage of unacceptable wastes in the waste quarantine area prior to dispatch off-site to an alternative facility.

Table 2.3 Licensed Waste Recovery Activities (Fourth Schedule of the Waste Management Acts, 1996 - 2010)

Class 4	Recycling or reclamation of other inorganic materials: This activity is limited to the use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses.
Class 11	Use of waste obtained from any activity referred to in a preceding paragraph of the Schedule: This activity is limited to the use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses.
Class 13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced: This activity is limited to the temporary storage prior to use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses.

2.2 WASTE QUANTITIES AND COMPOSITION 2005 - 2014

The quantities and types of wastes accepted for disposal and recovery at the East Galway Landfill between 2005 and 2014 are summarised in Table 2.4 below. There was no waste accepted at the facility either for disposal or for recovery purposes during 2014.

Table 2.4 Quantities of waste accepted, disposed of and recovered from 2005 - 2014

Waste Type Disposed	Description	Total Accepted 2005 (tonnes)	Total Accepted 2006 (tonnes)	Total Accepted 2007 (tonnes)	Total Accepted 2008 (tonnes)	Total Accepted 2009 (tonnes)	Total Accepted 2010 (tonnes)	Total Accepted 2011 (tonnes)	Total Accepted 2012 (tonnes)	Total Accepted 2013 (tonnes)	Total Accepted 2014 (tonnes)	Licence Limit (tonnes)
Household		-	44,221.00	46,733.69	66,578.41	61,470.22	43,023.80	50,796.08	42666.15	193.76	-	45,000
Commercial		-	27,024.00	27,494.63	30,730.16	35,500.04	54,983.70	47,346.73	51809.45	182.1	-	27,500
Industrial non-hazardous	Misc. Non-Hazardous Industrial solid wastes	-	27,023.00	27,402.73	999.52	2,667.85	3,729.90	4,236.37	11039.10	67	-	24,500
Asbestos		0	0	0	0	0	0	0	0	0	-	3,000
Total Waste Disposed		161.50	98,268.00	101,631.05	98,308.09	99,638.11	101,737.40	102,379.18	105,514.70	442.86	0	100,000
Waste Type Recovered	Description	Total Accepted 2005 (tonnes)	Total Accepted 2006 (tonnes)	Total Accepted 2007 (tonnes)	Total Accepted 2008 (tonnes)	Total Accepted 2009 (tonnes)	Total Accepted 2010 (tonnes)	Total Accepted 2010 (tonnes)	Total Accepted 2012 (tonnes)	Total Accepted 2013 (tonnes)	Total Accepted 2014 (tonnes)	Licence Limit (tonnes)
Cover / Engineering Material	Shredded timber - reused on site	-	2,690	4,482.60	6,950.90	4,121.50	2,942.14	3,758.88	3582.58	-	-	-
Cover / Engineering Material	Recovered C&D Rubble reused on site	-	1,202	989.14	255.01	-	1,080.26	1584.78	69.96	-	-	-
Cover / Engineering Material	Soil and fine material reused on site for daily and intermediate cover and liner protection	-	14,538	23,692.17	6,711.11	803.32	2,800.92	2295.74	23,574.64	1778.36	-	-
Total Waste Recovered		-	18,430	29,163.91	13,917.02	4,924.82	6,823.32	7639.40	27,227.18	1778.36	-	27,320
Total Site Intake		-	116,698	130,794.96	112,225.11	104,562.93	108560.75	110018.58	132741.88	2221.22	0	127,320

2.3 CALCULATED REMAINING CAPACITY OF THE FACILITY

The remaining capacity of the landfill had been calculated to be 650,815 m³ at the end of 2013. No waste was accepted at the landfill facility in 2014. The remaining capacity of the landfill facility at the end of 2014 remains at 650,815 m³.

2.4 METHODS OF DEPOSITION OF WASTE

There was no waste accepted at the facility either for disposal or for recovery purposes during 2014.

3 Report on Environmental Emissions

This summary report has been compiled in accordance with emission limit values (ELVs) for the following media as detailed in Condition 6 and Schedule C of the current Waste Licence.

- Dust
- Noise
- Landfill Gas
- Surface Water Discharge (measured at SW6 & SW7)
- E-PRTR

3.1 DUST EMISSIONS

Dust deposition Emission Limit Values as stipulated in Licence 178-02 are 350mg/m²/day.

Dust monitoring was conducted at five locations on a quarterly basis during the 2014 reporting period, as illustrated on Drawing 3588 – 1604 (see Appendix A). City Analysts Limited (Dublin) conducted analysis on the dust deposition samples from the facility. Dust reports were included in all quarterly environmental monitoring reports issued to the Agency during 2014.

Dust monitoring results were below the required ELV (350 mg/m²/day) during all monitoring events in 2014. Dust deposition ranged between 5.7mg/m²/day at D3 in Q4 2014 and 125.8mg/m²/day at D3 in Q2 2014.

3.2 NOISE EMISSIONS

Noise emission limit values as stipulated in Licence 178-02 are detailed in Table 3.1 below.

Table 3.1 Noise Emission

Day Db(A) LAeq (15 minutes)	Night dB(A) LAeq (15 minutes)
55	45

Noise monitoring was conducted at five monitoring locations on a quarterly basis during 2014.

Results from all noise monitoring events were issued to the Agency as part of the quarterly environmental monitoring reports for 2014.

During 2014, the measured noise levels were, for the majority of the time, within the ELV of 55 dB (A) (daytime) as set out in Schedule D of Waste Licence W0178-02. Exceedances and tones observed are summarized in the points below;

- Q1 exceedance of 58.2dB(A) at N3 and 59.6dB(A) at N5 due to external factors not attributed to the site. A tone was detected at 80Hz at N2 and 160Hz at N5 which were attributed to passing traffic and activities on a nearby farm as the landfill was not audible at either location during the surveys.
- Q2 exceedance of 58.4dB(A) at N5 which was attributed to passing traffic on the local road . A tone of 80Hz observed at N2 was attributed to activities on a nearby farm as the landfill was not audible at this location at the time of the survey.
- Q3 tone recorded at 80Hz and 100Hz at N2 and at 125Hz at N3, however the landfill was not audible at either location at the time of the survey and no penalty was applied.
- Q4 tone recorded at 25Hz and 31.5Hz at N1, however the landfill was not audible at either location at the time of the survey and no penalty was applied.

3.3 LANDFILL GAS CONCENTRATIONS

Table 3.2 outlines landfill gas emission limit values as stipulated in Schedule C.2 of Waste Licence 178-02.

Table 3.2 Landfill Gas Concentrations

Methane	Carbon Dioxide
20% LEL (1% v/v)	1.5% v/v

3.3.1 LANDFILL GAS MONITORING WELLS

Methane concentrations exceeded the ELV in 3 no. monitoring wells during Q1 (LG9, LG13 and LG22), 5 no. monitoring wells during Q2 (LG9, LG19, LG22, LG24 and LG25), 5 no. during Q3 (LG5, LG9, LG11, LG19 and LG22) and 3 no. monitoring wells during Q4 (LG9, LG19 and LG22).

Carbon dioxide concentrations exceeded the ELV in 7 no. monitoring wells during Q1 (LG6, LG6-A, LG9, LG13, LG18, LG22 and LG26), 11 no. monitoring wells during Q2 (LG9, LG16, LG18, LG19, LG21, LG22, LG23, LG24, LG25, LG26 and LG28), 14 no. monitoring wells during Q3 (LG5, LG9,

LG11, LG15, LG16, LG18, LG19, LG21, LG22, LG23, LG24, LG25, LG26 and LG28) and 12 no. monitoring wells during Q4 (LG5, LG6, LG6-A, LG9, LG10, LG15, LG16, LG18, LG19, LG22, LG23 and LG28). All exceedance were reported to the Agency in a landfill gas incident report after each monthly monitoring event.

Gas monitoring carried out by White Young & Green (WYG) at the East Galway Landfill in December 2005, prior to waste acceptance at the facility, identified elevated CH₄ and CO₂ levels at several perimeter boreholes. Their report concluded that the source of elevated methane and/or carbon dioxide in perimeter gas monitoring wells is attributed to the continuous decay of organic peat.

3.3.2 LANDFILL GAS IN BUILDINGS

There were no instances of gas levels in Buildings/Offices breaching Landfill Gas Concentration limits specified in Schedule C.2 during 2014.

3.4 SURFACE WATER DISCHARGE LIMITS (MEASURED AT SW6 & SW7)

Surface water discharge emission limit values at monitoring locations SW6 and SW7 as stipulated in Schedule C.4 of Waste Licence 178-02 are detailed in Table 3.3 below.

Table 3.3 Surface Water Discharge Limits

Level (Suspended Solids mg/l)
35 mg/l

Suspended solids concentrations at SW6, SW7 complied with the 35mg/L ELVs during all monitoring events throughout 2014.

3.5 E-PRTR

The European Pollutant Release and Transfer Register (E-PRTR) for the East Galway Landfill for 2014 are included in Appendix B.

4 Summary of Environmental Monitoring Results

Environmental Monitoring was conducted at the CRRL facility in accordance with Schedule D of the Waste Licence throughout the reporting period. All monitoring results from 2014 were presented to the Agency in the quarterly environmental monitoring reports and are summarised below. The locations of all environmental monitoring points are illustrated on Drawing 3588-1604 in Appendix A.

4.1 BIOLOGICAL ASSESSMENT

4.1.1 ELECTROFISHING SURVEY

EirCo and Stillwaters Consultancy were commissioned to undertake an electro-fishing survey on selected sites (A, B, C, D, E and G) in the environs of the CRRL Landfill facility.. No fish were recorded at site D but this was likely due to inhibited access due to overgrown vegetation. The objective of the survey was to characterise fish populations in the streams within the vicinity of the landfill site.

The survey was carried out on the 2nd of September 2014. The results were submitted to the Agency as part of the Q3 2014 Surface Water and Electrofishing environmental monitoring report, and are summarised below in Table 4.1 below.

While there is normal annual fluctuation in population numbers there are no major changes to species composition at these sites to indicate that the landfill area is impacting on them.

Table 4.1 Results of Electro Fishing Survey (2011-2014)

Site	Location	Site Description	Species Recorded 2011 (Note 1 & 2)	Species Recorded 2012 (Note 1 & 2)	Species Recorded 2013 (Note 1 & 2)	Species Recorded 2014 (Note 1 & 2)
A	M708297	Overgrown bog drain Peaty Substrate	Sticklebacks (c) Gammarus (p)	Sticklebacks (c) Gammarus (p)	Stickleback (c)	Stickleback (pl)
B	M712302	Bog Drain ca. 1.5m deep, very overgrown	Sticklebacks (c) Gammarus (p)	No fish recorded due to inhibited access	No fish recorded due to inhibited access	Stickleback (p)
C	M707304	Shallow Stream ca. 5-10cm. Clean gravelly substrate maintained by local farmer.	Sticklebacks (pl) Gammarus (p) Crayfish (p)	Sticklebacks (pl) Trout 0+(p) Gammarus (p)	Stickleback (c) Crayfish (p)	Stickleback (p) Stoneloach (p)
D	M709309	Channel completely overgrown. Upstream Site Surveyed from 2008 on Site more open in 2010	Sticklebacks (p) Gammarus (p)	Sticklebacks (pl) Gammarus (p)	Stickleback (p)	No Fish recorded
E	M699313	Mainly silt with some rock. Channel overgrown except for stretch fish	Trout 0+(p) Trout 1 + (p) Stoneloach (c) Stickleback (p)	Trout 1+(p) Stoneloach (p) Pike (p) Crayfish (p)	Not Fished	Trout 0+(p) Trout 1 + (p) Stickleback (p) Stoneloach (pl) Crayfish(p)
G	M682308	Shaded channel under bank cover. Good gravel and cobble substrate, Suitable salmonid habitat	Trout 0+(a) Trout 1 + (c) Stoneloach (p) Gudgeon (p) Eel (p) Crayfish (p)	Trout 0+(p) Trout 1 + (c) Stoneloach (p) Crayfish (p)	Trout 0+ (a) Trout 1+ (c) Stoneloach (c) Crayfish (p)	Trout 0+ (p) Trout 1+ (c) Stoneloach (c) Stickleback (p)

Note 1: (p) = Present, (c) = Common, (pl) = Plentiful, (a) = Abundant.

Note 2: **Trout 0+** = trout in their 1st year but not yet 1 year old, **Trout 1+** = trout in their 2nd year but not yet 2 years old.

4.1.2 SMALL STREAM RISK SCORE (SSRS) ASSESSMENT FOR CRRL 2014

Biological assessment of the surface water quality was carried out by Openfield Ecological Services at four locations along two streams at the East Galway Landfill at Ballybaun, Kilconnell, Co. Galway. Two locations are upstream of the landfill (IN1 and IN2) and two are located downstream of the landfill (IN3 and IN4). The information obtained was used to determine the SSRS, in accordance with the Western River Basin District Project's methodology (WRBD, 2005). As outlined in previous AER's, the SSRS assessment method replaced the EPA Q-Rating system undertaken historically at the site in 2010.

Table 4.2 SSRS Assessment Results

Sampling code	Small Stream Risk	Score Risk Assessment
IN1	2.4	At Risk
IN2	0	At Risk
IN3	4.0	At Risk
IN4	4.0	At Risk

The results of the 2014 assessment provided by the SSRS, which categorises each of the streams monitored as being, "At Risk", are consistent with the previous findings for the 2013, 2012, 2011 and 2010 monitoring events. It was noted that in general, visual conditions at each location had deteriorated since 2013. An abundance of sewage fungus was observed, as well as very low flow and excessive siltation. It is thought that these observations may be due to low levels of rainfall observed during the early summer of 2014, when compared the same period in previous years. The complete SSRS Report from Openfield Ecological Services was submitted as Appendix C of the Q3 report 2014.

4.2 SURFACE WATER MONITORING

Surface water monitoring was conducted at 6 no. monitoring locations (SW1, SW3, SW4, SW5, SW6 and SW7) during 2014. Surface water monitoring locations SW1, SW2, SW3 & SW7 are located upstream of the landfill, and SW4 & SW5 are located downstream. SW6 is an outlet point from the surface water lagoon.

It should be noted that sampling was not carried out at SW2 during 2014 as it was dry during all four quarterly monitoring events. In addition, sampling could not be carried out at SW1 and SW3 during the Q3 event in 2014 as they too were almost dry. Quarterly surface water samples were analysed for parameters stipulated in Schedule D.5 of Waste Licence 178-02 and results were forwarded to the Agency as part of the quarterly environmental monitoring reports Q1 – Q4 2014. The 2014 surface water monitoring results are summarised on Tables 4.3 – 4.7 and Figures 4.1 – 4.5 below.

4.2.1 SURFACE WATER MONITORING RESULTS

All pH and conductivity results were found to be within normal ranges for natural uncontaminated surface waters.

Chloride concentrations ranged from 12.4mg/l (SW7 in Q3) to 30.62mg/l (SW3 in Q1) during 2014. These results are within the normal range for uncontaminated freshwater (15-35mg/l, EPA). Ammoniacal nitrogen (total ammonium plus total ammonia) ranged between 0.02mg/l (SW7 in Q3) to 0.4mg/l (SW4 in Q3). Ammonia is generally present in natural waters, usually at very low concentrations. Concentrations of Ammoniacal nitrogen far in exceedance of 0.1 mg/l can be an indication of contamination by sewage¹ however it can also be a result of mineralization of organic matter following the lowering of the water table in areas of peat².

Suspended solid concentrations were below the ELV (35mg/l) at sampling locations during all monitoring events in 2014.

¹ http://www.doeni.gov.uk/niea/water_report_web.pdf

² <http://agronomy.emu.ee/vol052/p5206.pdf>

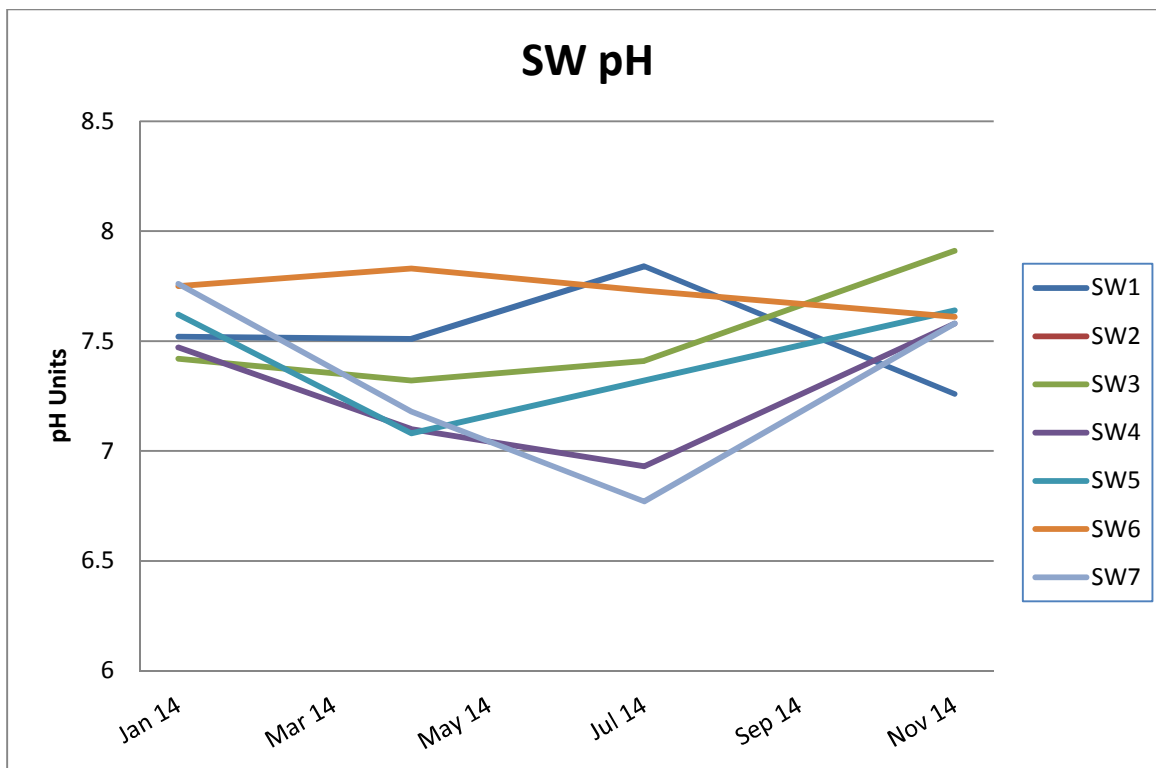


Figure 4.1 SW pH Results 2014

Table 4.3 SW pH Results - 2014

pH Units (mg/l)	January	April	July	November
SW1	7.52	7.51	7.84	7.26
SW2*	*	*	*	*
SW3	7.42	7.32	7.41	7.91
SW4	7.47	7.10	6.93	7.58
SW5	7.62	7.08	7.32	7.64
SW6	7.75	7.83	7.73	7.61
SW7	7.76	7.18	6.77	7.58

*indicates sample could not be collected as monitoring point was too dry at the time of sampling.

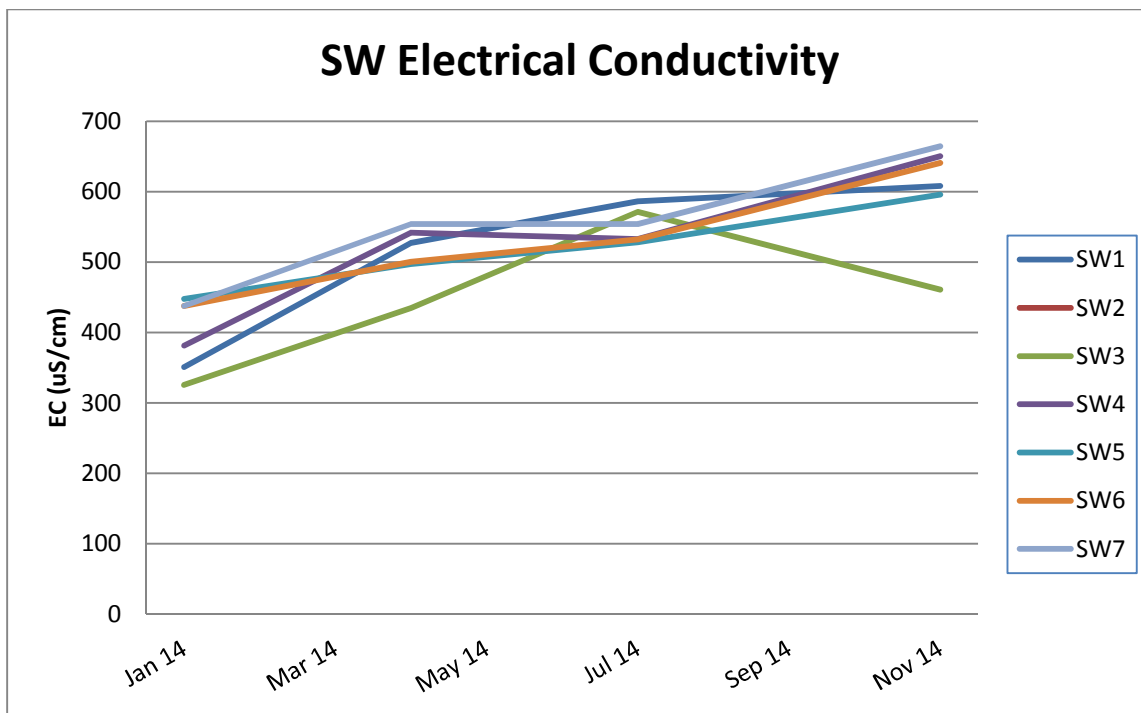


Figure 4.2 SW Conductivity Results 2014

Table 4.4 SW Conductivity Results 2014

Electrical Conductivity (mg/l)	January	April	July	November
SW1	350.9	527.4	586.4	608.2
SW2*	*	*	*	*
SW3	325.3	434.5	571.4	460.9
SW4	381.3	541.9	532.5	650.4
SW5	447.8	497.0	528.0	596.0
SW6	437.8	500.5	532.4	640.9
SW7	437.8	554.2	554.0	664.2

*indicates sample could not be collected as monitoring point was too dry at the time of sampling.

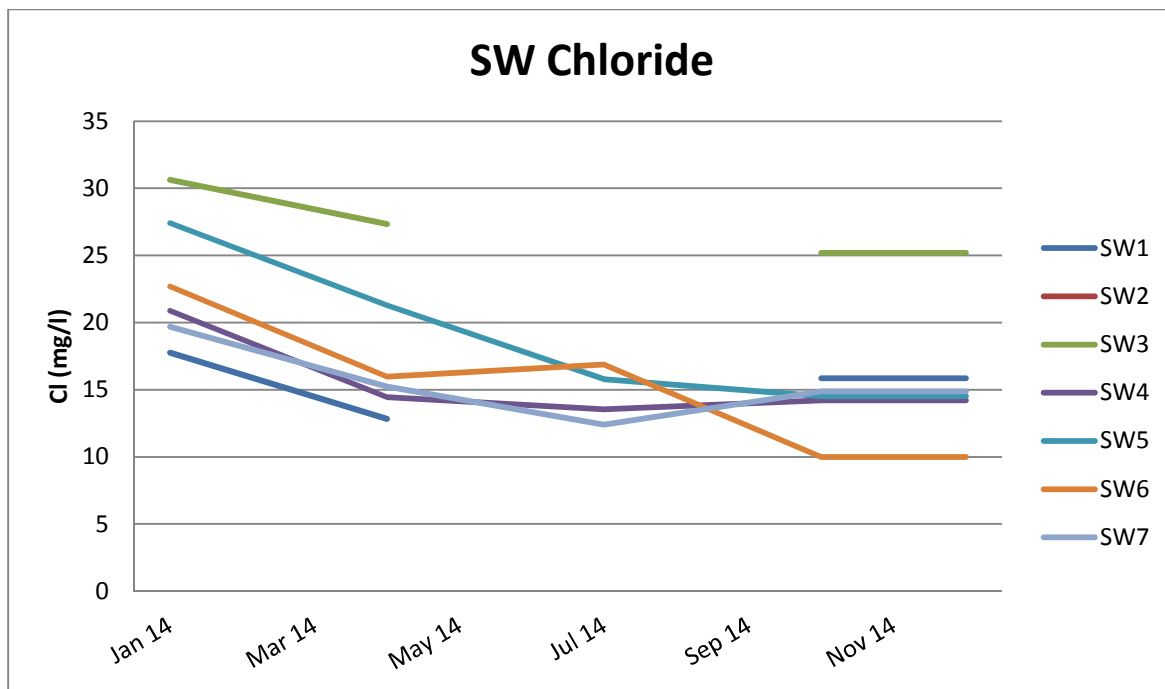


Figure 4.3 SW Chloride Results 2014

Table 4.5 SW Chloride Results 2014

Chloride (mg/l)	January	April	July	November
SW1	17.75	12.82	*	15.85
SW2*	*	*	*	*
SW3	30.62	27.34	*	25.20
SW4	20.87	14.45	13.54	14.20
SW5	27.41	21.29	15.79	14.52
SW6	22.69	15.97	16.87	<10
SW7	19.70	15.24	12.40	14.88

*indicates sample could not be collected as monitoring point was too dry at the time of sampling.

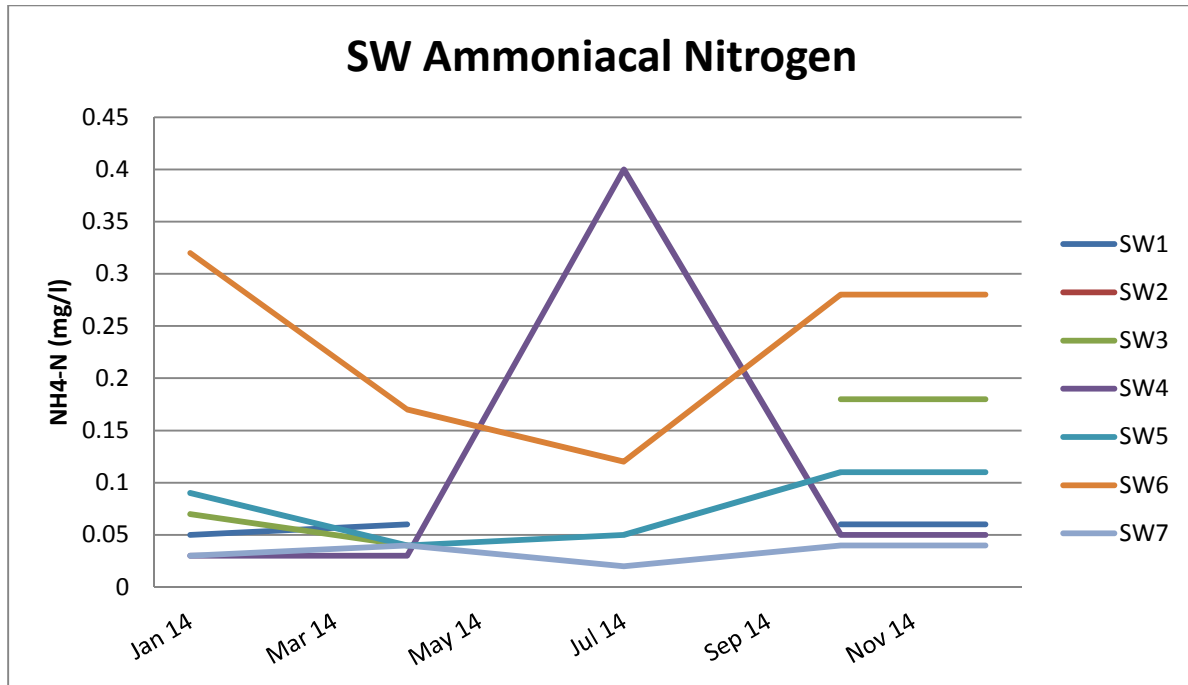


Figure 4.4 SW Ammoniacal Nitrogen Results 2014

Table 4.6 SW Ammoniacal Nitrogen Results 2014

Ammoniacal Nitrogen (mg/l)	January	April	July	November
SW1	0.05	0.06	*	0.06
SW2*	*	*	*	*
SW3	0.07	0.04	*	0.18
SW4	0.03	0.03	0.40	0.05
SW5	0.09	0.04	0.05	0.11
SW6	0.32	0.17	0.12	0.28
SW7	0.03	0.04	0.02	0.04

*indicates sample could not be collected as monitoring point was too dry at the time of sampling.

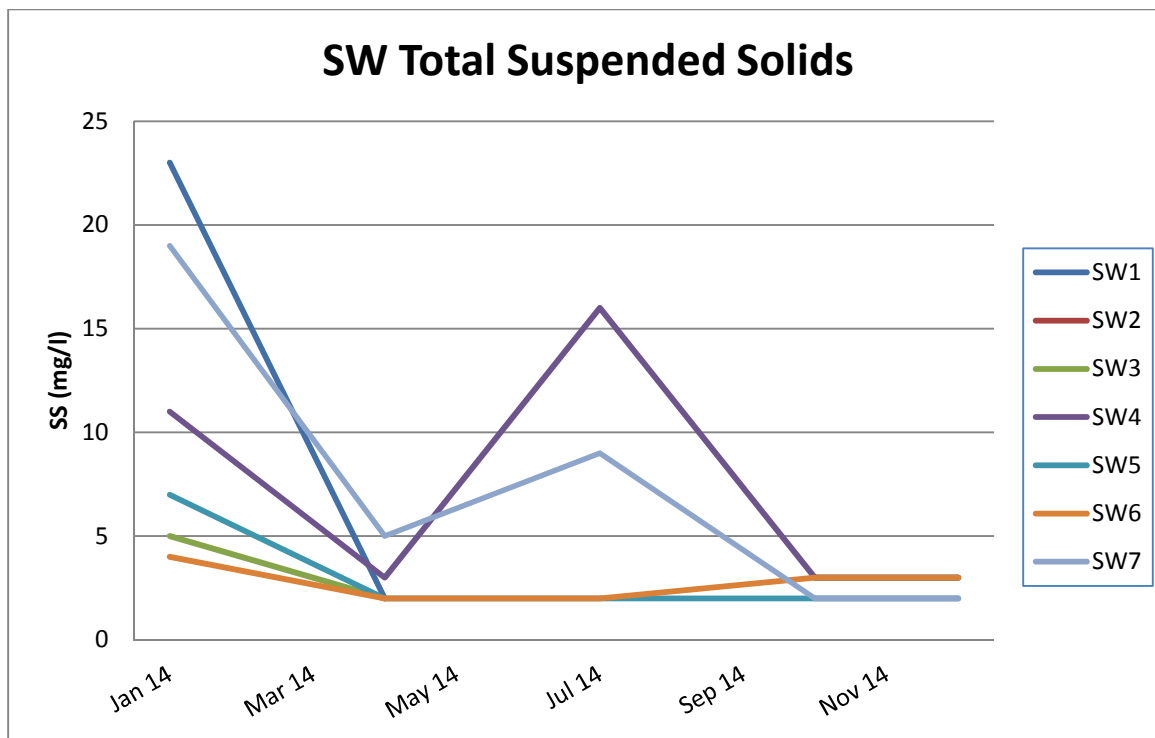


Figure 4.5 SW Total Suspended Solids Results 2014

Table 4.7 SW Suspended Solids Results 2014

Total Suspended Solids (mg/l)	January	April	July	November
SW1	23	<2	*	3
SW2*	*	*	*	*
SW3	5	<2	*	3
SW4	11	3	16	3
SW5	7	<2	<2	<2
SW6	4	<2	<2	3
SW7	19	5	9	<2

*indicates sample could not be collected as monitoring point was too dry at the time of sampling.

4.3 GROUNDWATER MONITORING

Groundwater monitoring was conducted at eight locations during 2014, in accordance with Schedule D.1 and D.5 of Waste Licence 178-02.

The trigger levels for groundwater parameters are reviewed annually and were revised in 2008 (as presented in Table 4.8 below). The East Galway Landfill requested Agency agreement of these trigger levels on 8th Dec 2009 in response to a related Agency audit observation. No response was received in relation to this. These trigger levels remain unchanged and were also used between 2008 and the 2014 monitoring period.

In November 2011, the groundwater trigger levels were reviewed and a submission discussing these levels was lodged on behalf of the East Galway Landfill to the Agency following an EPA request for same. This was precipitated by a site inspection by the EPA on 09/09/2011. The East Galway Landfill is awaiting return correspondence in relation to the submission and therefore this report has continued to refer to the trigger values from the 2008-2013 AER as given in Table 4.8 below.

The results of routine licence compliance groundwater monitoring are all under the trigger values as revised and submitted in the 2008-2013 AERs. This AER report employs the aforementioned trigger levels for the parameters listed in Condition 6.4.3 of the Waste Licence for wells GW1-A, GW2, GW3, GW4-A, GW5-A, GW6, GW7 and GW8. The 2014 groundwater monitoring results are summarised on Tables 4.9 – 4.14 and Figures 4.7 – 4.12 below.

Table 4.8 Groundwater Trigger Values for 2014 Analyses, as Revised in 2008

<i>Parameter</i>	<i>Units</i>	<i>GW1-A</i>	<i>GW2</i>	<i>GW3</i>	<i>GW4-A</i>	<i>GW5-A</i>	<i>GW6</i>	<i>GW7</i>	<i>GW8</i>
Potassium	mg/l	1.92	2.88	1.44	1.08	21.00	4.20	3.00	0.96
Sodium	mg/l	14.40	20.40	16.32	17.22	20.40	50.40	37.20	20.40
pH (lower limit)	pH Units	5.73	5.35	5.56	5.77	5.70	5.54	5.87	5.28
pH	pH Units	9.02	9.79	9.38	9.14	9.22	10.56	9.53	9.61
Chloride	mg/l	20.40	46.80	24.00	39.60	32.40	24.00	18.00	37.20
Ammoniacal Nitrogen	mg/l	1.92	6.36	5.40	3.60	8.52	7.44	2.40	3.72
TOC	mg/l	60.00	55.20	27.60	60.00	74.40	48.00	21.60	39.60

Groundwater levels were recorded on a monthly basis during 2014 and the results are presented in Figure 4.6 below. The recorded water levels remained relatively constant while allowing for seasonal variation during 2014.

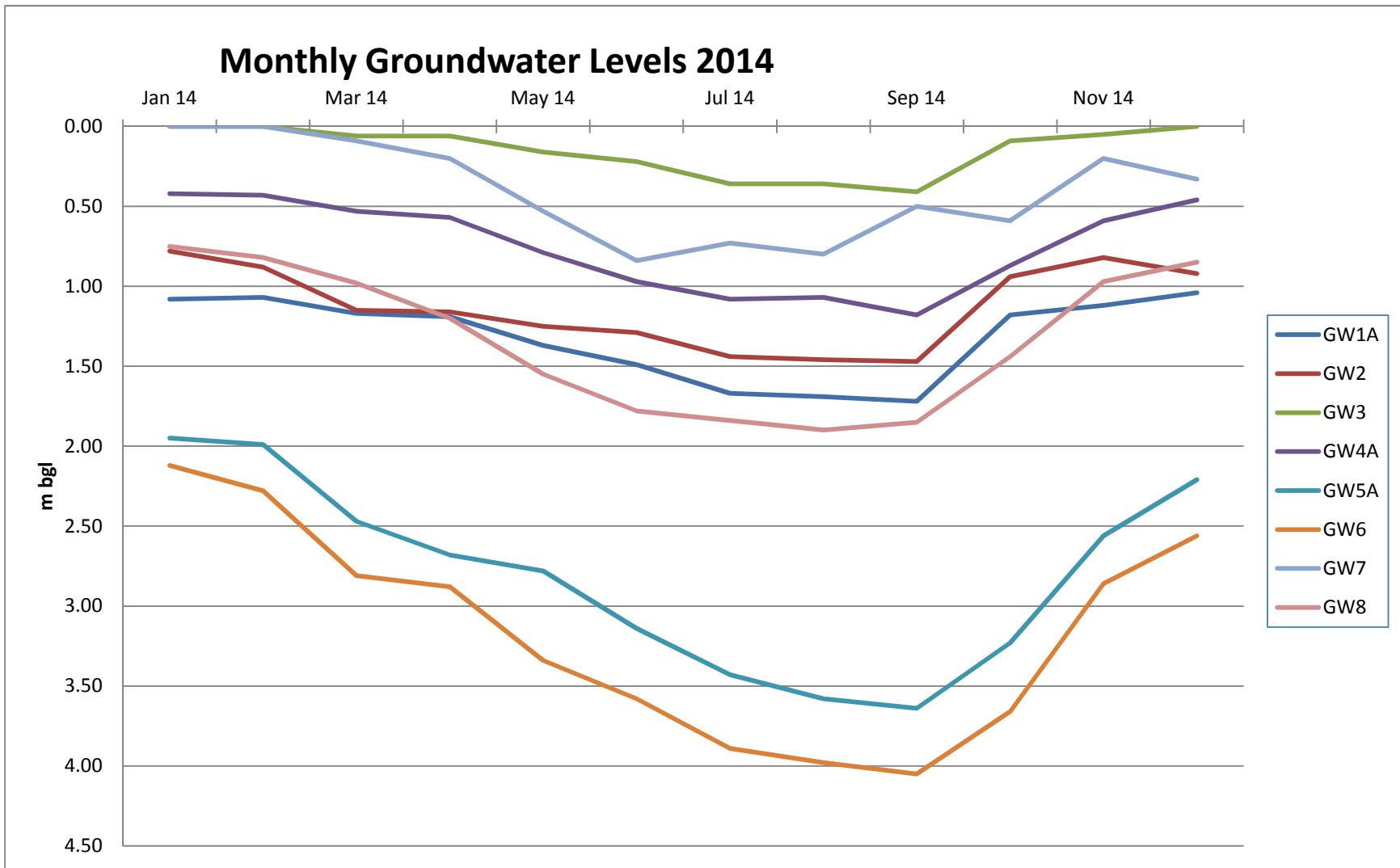


Figure 4.6 Monthly Groundwater Levels – 2014

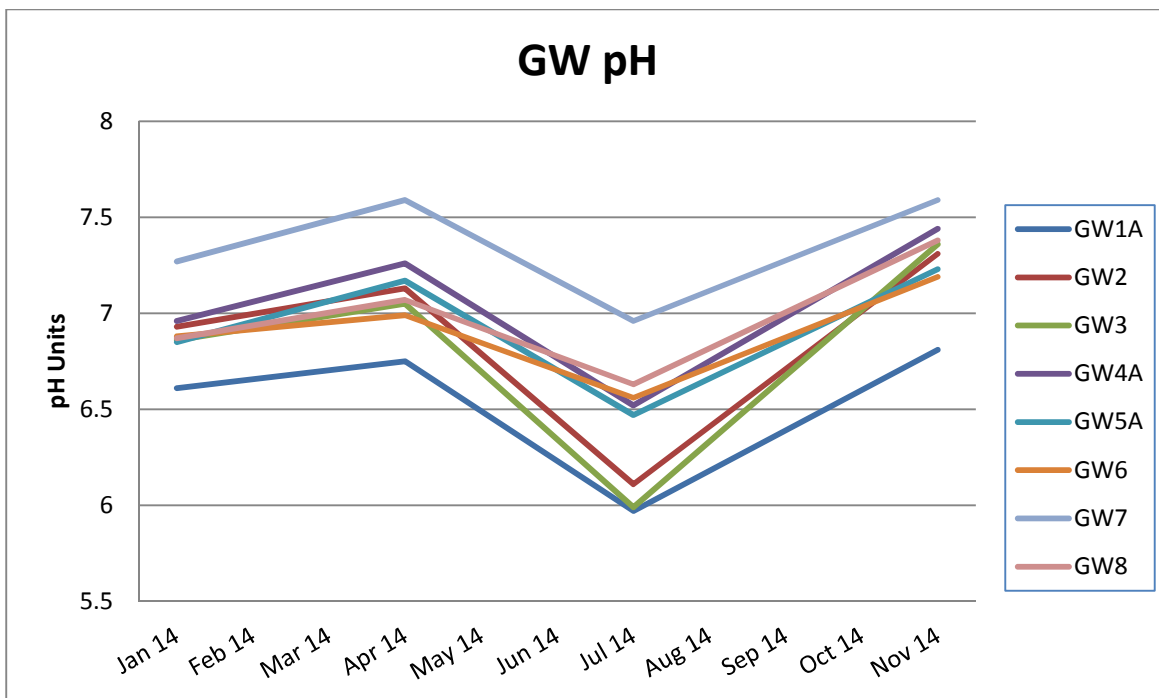


Figure 4.7 Groundwater pH Laboratory Results– 2014

Table 4.9 Groundwater pH Laboratory Results– 2014

pH (pH Units)	Trigger Values		January	April	July	November
	pH Lower Limit	pH Upper Limit				
GW 1 – A	5.73	9.02	6.61	6.75	5.97	6.81
GW 2	5.35	9.79	6.93	7.13	6.11	7.31
GW 3	5.56	9.38	6.86	7.05	5.99	7.36
GW 4 – A	5.77	9.14	6.96	7.26	6.52	7.44
GW 5 – A	5.70	9.22	6.85	7.17	6.47	7.23
GW 6	5.54	10.56	6.88	6.99	6.56	7.19
GW 7	5.87	9.53	7.27	7.59	6.96	7.59
GW 8	5.28	9.61	6.87	7.07	6.63	7.38

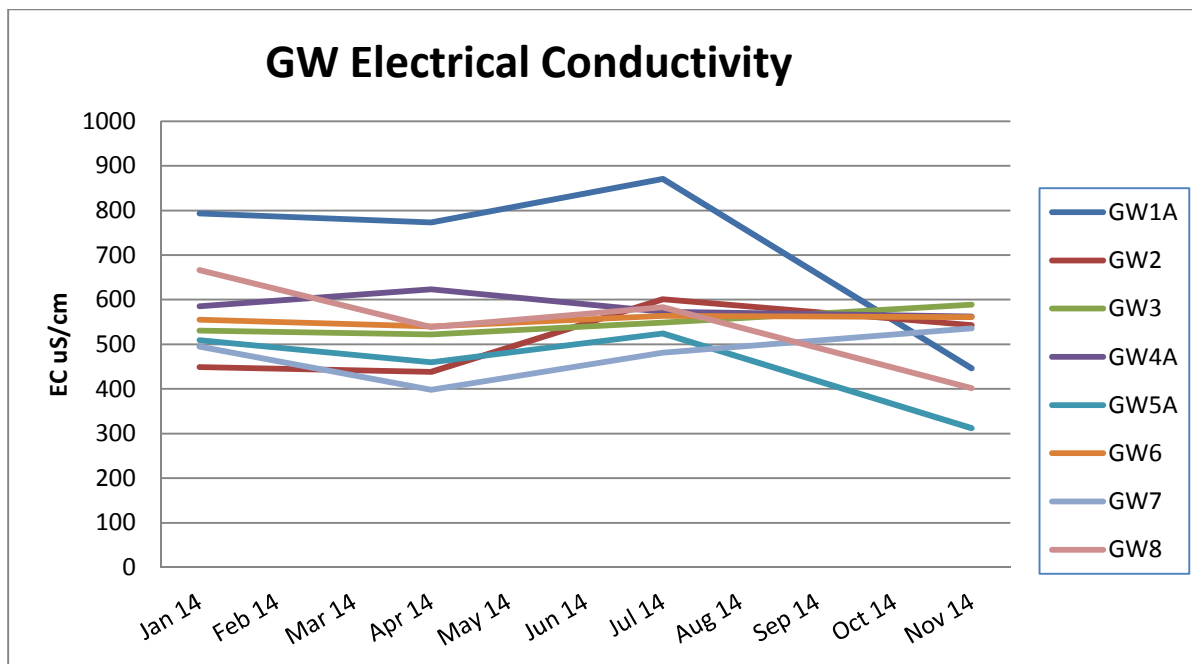


Figure 4.8 Groundwater Electrical Conductivity Results– 2014

Table 4.10 Groundwater Electrical Conductivity Results – 2014

Electrical Conductivity (uS/cm)	Trigger Values (Note 1)	January	April	July	November
GW 1 – A	-	793	773	871	446
GW 2	-	449	438	601	543
GW 3	-	531	522	549	589
GW 4 – A	-	585	623	573	562
GW 5 – A	-	509	460	524	312
GW 6	-	555	540	564	561
GW 7	-	495	398	481	536
GW 8	-	666	539	583	402

Note 1: No Set limit for electrical conductivity in groundwater trigger values.

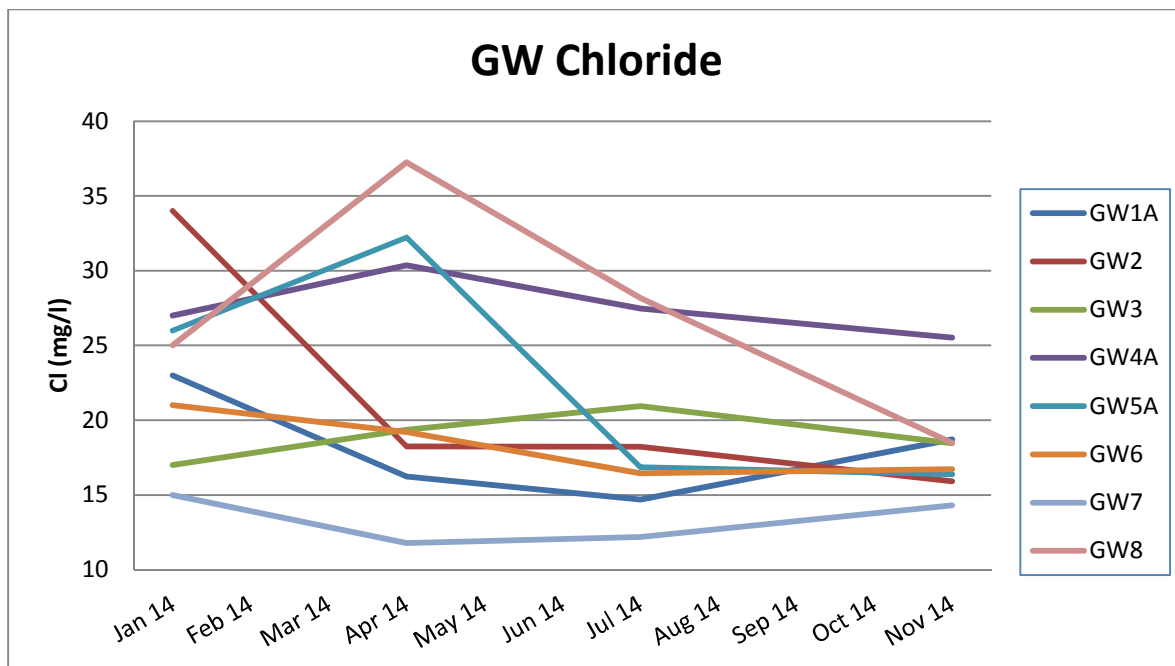


Figure 4.9 Groundwater Chloride Results– 2014

Table 4.11 Groundwater Chloride Results– 2014

Chloride (mg/l)	Trigger Values	January	April	July	November
GW 1 – A	20.4	23	16.24	14.70	18.72
GW 2	46.8	34	18.24	18.23	15.92
GW 3	24.0	17	19.36	20.94	18.45
GW 4 – A	39.6	27	30.37	27.48	25.53
GW 5 – A	32.4	26	32.22	16.86	16.39
GW 6	24.0	21	19.21	16.44	16.72
GW 7	18.0	15	11.79	12.18	14.31
GW 8	37.2	25	37.26	28.18	18.49

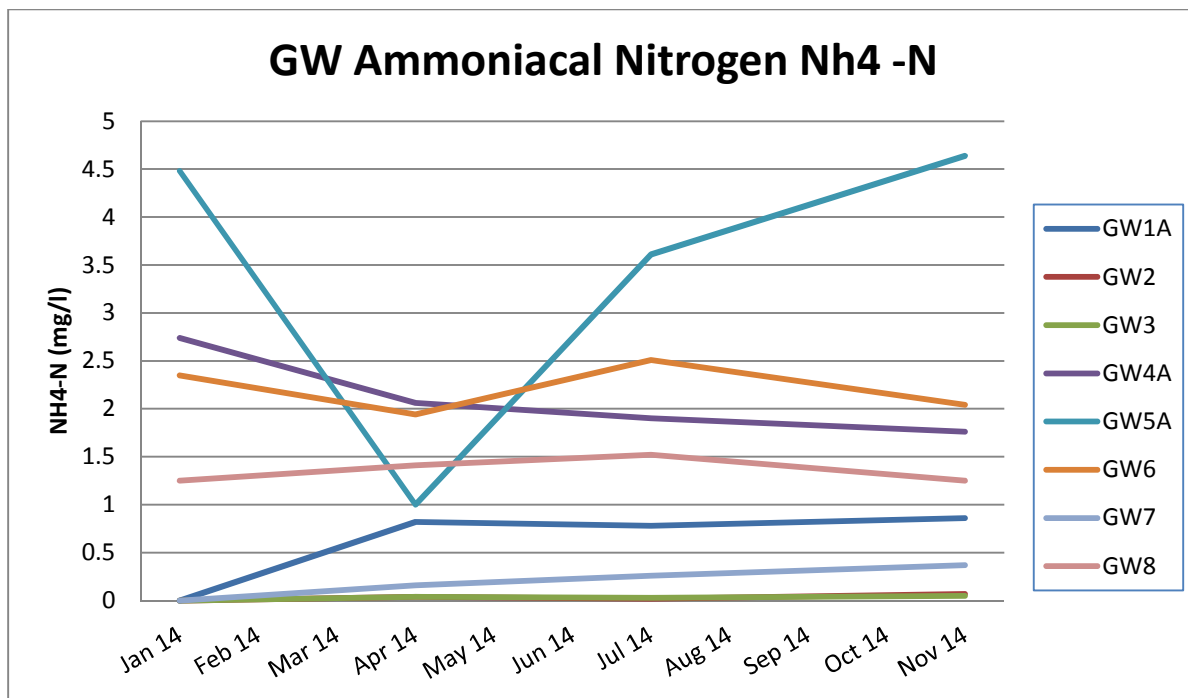


Figure 4.10 Groundwater Ammoniacal Nitrogen Results– 2014

Table 4.12 Groundwater Ammoniacal Nitrogen Results– 2014

Ammoniacal Nitrogen (mg/l)	Trigger Values	January	April	July	November
GW 1 – A	1.92	<1	0.82	0.78	0.86
GW 2	6.36	0.0	0.04	0.02	0.07
GW 3	5.40	<1	0.04	0.03	0.05
GW 4 – A	3.60	2.74	2.06	1.90	1.76
GW 5 – A	8.52	4.48	1.00	3.61	4.64
GW 6	7.44	2.35	1.94	2.51	2.04
GW 7	2.40	<1	0.16	0.26	0.37
GW 8	3.72	1.25	1.41	1.52	1.25

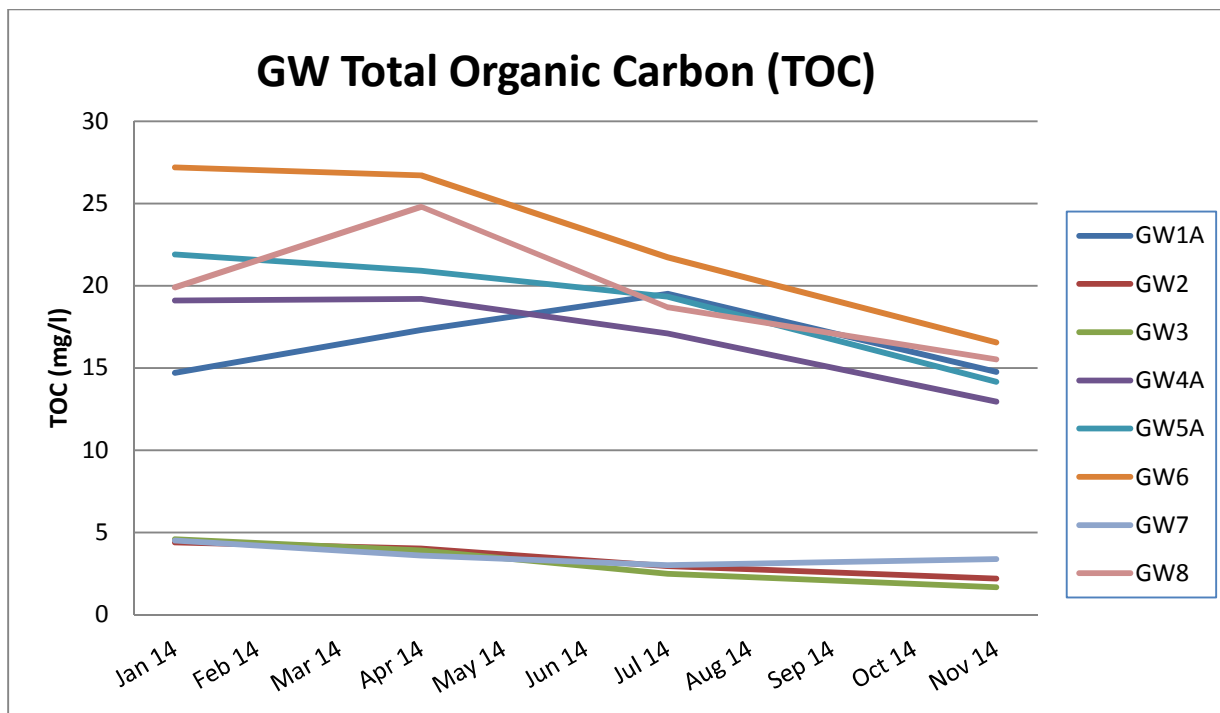


Figure 4.11 Groundwater TOC Results– 2014

Table 4.13 Groundwater TOC Results– 2014

TOC (mg/l)	Trigger Values	January	April	July	November
GW 1 – A	60.00	14.70	17.30	19.50	14.76
GW 2	55.20	4.38	4.01	2.94	2.19
GW 3	27.60	4.59	3.90	2.48	1.67
GW 4 – A	60.00	19.10	19.20	17.10	12.94
GW 5 – A	74.40	21.90	20.90	19.34	14.15
GW 6	48.00	27.20	26.70	21.72	16.54
GW 7	21.60	4.50	3.59	3.00	3.38
GW 8	39.60	19.90	24.80	18.68	15.52

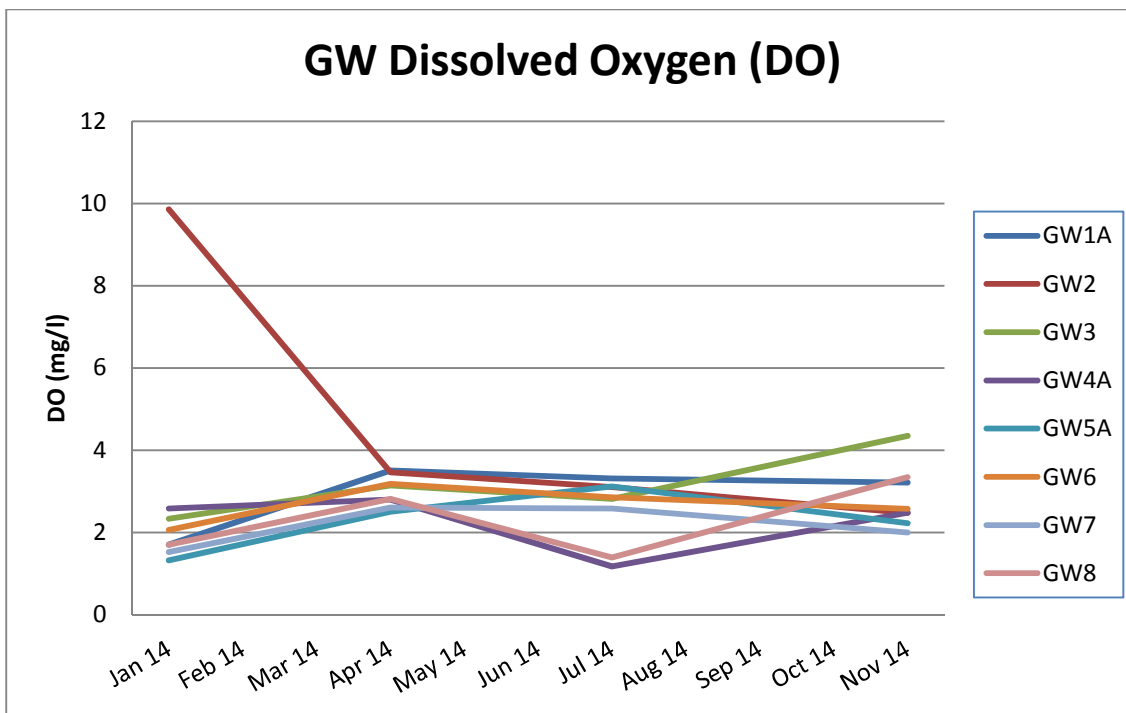


Figure 4.12 Groundwater Dissolved Oxygen Results– 2014

Table 4.14 Groundwater Dissolved Oxygen Results– 2014

DO (mg/l)	Trigger Values (Note 1)	January	April	July	November
GW 1 – A	-	1.70	3.51	3.31	3.21
GW 2	-	9.86	3.46	3.10	2.47
GW 3	-	2.33	3.14	2.81	4.35
GW 4 – A	-	2.58	2.80	1.17	2.48
GW 5 – A	-	1.32	2.50	3.12	2.22
GW 6	-	2.06	3.18	2.85	2.57
GW 7	-	1.52	2.60	2.58	2.00
GW 8	-	1.70	2.81	1.39	3.34

Note 1: No Set limit for dissolved oxygen in groundwater trigger values.

4.3.1 GROUNDWATER RESULTS SUMMARY

PH, Ammoniacal Nitrogen and Total Organic Carbon concentrations were below their respective trigger values at all monitoring locations during 2014.

Chloride concentrations were below their respective trigger values for 30 no. of the total 32 no. samples collected and analysed during 2014. Two mild exceedences above their respective trigger values were recorded from monitoring locations GW-1A and GW8 during Q1 & Q2 of 2014 respectively.

Conductivity measurements were typical of natural uncontaminated groundwater. Conductivity ranged from 312uS/cm to 871uS/cm during 2014.

Dissolved Oxygen concentrations ranged from 1.32mg/l to 9.86mg/l during 2014 and were consistent with previous recordings at the site.

4.4 DUST AND PM₁₀ MONITORING

4.4.1 DUST MONITORING

As discussed in Section 3.1 above dust monitoring was undertaken at 5 (no.) locations (D1, D2, D3, D4, D5) in accordance with Schedule D.1 and D.3 of Waste Licence 178-02. All dust concentrations recorded were below the required ELV of 350mg/m²/day during all monitoring events in 2014. Dust results from 2014 are summarised in Table 4.15 below.

Table 4.15 Dust Monitoring Results 2014

Date out	Date in	D 1 (mg/m ² /day)	D 2 (mg/m ² /day)	D 3 (mg/m ² /day)	D 4 (mg/m ² /day)	D 5 (mg/m ² /day)
04/02/14	04/03/14	14.0	23.3	31.9	14.4	17.1
01/05/14	29/05/14	7.2	12.0	125.8	7.9	19.7
10/07/14	08/08/14	22.4	15.8	106.3	21.3	36.9
05/11/14	03/12/14	33.5	29.8	5.7	8.2	66.4

4.4.2 PM₁₀ MONITORING

PM₁₀ monitoring was conducted quarterly at the facility in accordance with Schedule D of Waste Licence 178-02. The PM₁₀ monitoring locations are shown on Drawing 3588-1604, Appendix A. All of the PM₁₀ results were below the required limit level of 50ug/m³ during 2014. The PM₁₀ results for 2014 are summarised in Table 4.16 below.

Table 4.16 PM10 ($\mu\text{g}/\text{m}^3$) Monitoring Results for 2014

Monitoring Location	Q1 2014	Q2 2014	Q3 2014	Q4 2014
	Average concentration value ($\mu\text{g}/\text{m}^3$)			
Limit Value	50	50	50	50
D1	12	13	15	14
D2	6	5	4	5
D3	8	9	11	10
D4	10	11	10	10
D5	9	8	9	8

4.5 LEACHATE MONITORING

As per Schedule D.5 of Waste Licence 178-02 temperature readings from each of the leachate cells and the leachate holding tank (LHT) are required to be taken on a quarterly basis. Chemical analysis of the leachate was undertaken in July 2014 and submitted to the Agency as part of the Q3 environmental monitoring report.

4.5.1 LEACHATE RESULTS

Leachate temperature readings and annual chemical analysis results are summarised in Table 4.17 and Table 4.18 below.

Table 4.17 Leachate Temperatures– 2014

Monitoring Location	Q1 2014 Temperature ($^{\circ}\text{C}$)	Q2 2014 Temperature ($^{\circ}\text{C}$)	Q3 2014 Temperature ($^{\circ}\text{C}$)	Q4 2014 Temperature ($^{\circ}\text{C}$)
Cell 1	6.7	12.8	18.0	14.2
Cell 2	15.7	18.9	20.7	21.0
Cell 3	21.8	21.8	23.4	24.6
Cell 4	15.0	18.4	19.8	18.7
Cell 5	10.6	16.4	20.0	16.9
Cell 6	20.1	25.6	23.9	20.6
Cell 7	17.7	22.8	24.7	22.6
Leachate Holding Tank (LHT)	7.5	14.4	18.7	10.8

Table 4.18 Annual Chemical Analysis of Leachate– 2014

Parameter	Unit	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6	Cell 7	LHT
Ammonia as N	mg/l	1247.42	1191.94	870.4	7089.32	1383.21	1024.7	970.29	1245.6
BOD	mg/l	168	114	98	265	425	89	103	117
Boron	µg/l	4840	6140	3590	6360	6760	5720	5840	4760
Cadmium	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Calcium	mg/l	90.6	90.8	103	53.8	82.6	136	144	104
Chloride	mg/l	1586	1634	1252	1999	2036	1712	2069	1560
Total Chromium	mg/l	<0.2	<0.2	<0.2	0.2	0.4	0.3	<0.2	0.2
COD	mg/l	2540	2470	1770	3680	4380	2680	3300	2600
Electrical Conductivity	us/cm	15730	15030	11170	16590	17380	13760	14980	13300
Copper	mg/l	0.36	0.23	0.16	0.39	0.43	0.41	0.13	0.06
Total cyanide	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoride	mg/l	0.5	0.5	0.4	0.8	1.2	0.8	0.8	0.6
Iron	mg/l	1.13	1.96	<1	2.22	5.23	3.98	4.76	2.41
Lead	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Magnesium	mg/l	81.9	82	60.3	71.3	81.7	83	72.9	69.1
Mercury	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/l	0.2	0.2	<0.2	0.2	0.2	0.2	0.3	0.2
Ortho-phosphate as P	mg/l	9.402	11.876	8.199	15.813	15.355	11.6	13.457	10.206
pH	pH Units	7.41	7.588	7.433	7.617	7.715	7.57	7.838	7.756
Potassium	mg/l	610	652	477	538	667	543	764	468
Sodium	mg/l	1080	1180	783	1170	1410	1180	1550	1020
Sulphate	mg/l	780.3	334.1	78.7	269	190.7	145.9	280.8	132.7
TON as N	mg/l	<5	<5	<5	<5	<5	<5	<5	<5
Zinc	mg/l	0.43	<0.2	<0.2	0.47	0.45	0.37	<0.2	<0.2

4.6 NOISE MONITORING

During 2014, noise monitoring was carried out on a quarterly basis at 5 no. monitoring locations, as indicated on Drawing No. 3588 – 1604 (see Appendix A). All noise monitoring results were submitted to the Agency as part of the quarterly environmental monitoring reports for 2014. Results for noise monitoring conducted at the facility on a quarterly basis during 2014 are summarised in Table 4.19 below. All noise monitoring locations had LAeq values less than the required ELV of 55dB LAeq during 2014, with the exception of N5 during Q1 and Q4 and N3 during Q1. However these exceedance were attributable to farming activities and passing traffic on the R348 and not attributable to facility operations.

Table 4.19 Noise Monitoring Results– 2014

Location	Q1 2014 (21/03/14)				Q2 2014 (07/04/14)				Q3 2014 (28/09/14)				Q4 2014 (03/12/14)			
	Time	LAeq dB(A)	LA10 dB(A)	LA90 dB(A)	Time	LAeq dB(A)	LA10 dB(A)	LA90 dB(A)	Time	LAeq dB(A)	LA10 dB(A)	LA90 dB(A)	Time	LAeq dB(A)	LA10 dB(A)	LA90 dB(A)
N1*	10:10	39.4	40.58	31.97	10:10	36.6	35.77	31.01	11:30	31.7	31.96	31.11	12:30	31.6	31.93	31.10
N2	09:35	35.1	36.87	32.21	09:35	36.8	38.78	32.33	12:05	32.2	32.74	31.15	13:14	31.4	31.92	31.10
N3*	11:20	58.2	60.94	46.73	11:20	52	55.10	36.18	01:20	36.2	37.09	31.20	14:45	34.9	33.86	31.13
N4	09:00	38.4	40.58	31.62	09:00	54.4	36.82	30.47	10:50	31.8	32.36	31.08	11:55	31.7	31.98	31.11
N5*	10:45	59.6	60.33	36.39	10:45	58.4	56.57	32.37	12:45	51.7	44.34	31.21	14:06	53.2	51.73	31.24

*Noise Sensitive Receptor

5 Resource and Energy Consumption Summary

The main resources consumed at the facility during the reporting period were electricity, water for potable supply & vehicle wheel cleaning and diesel. The details are listed in Table 5.1 below.

Electricity consumed from the national grid for 2014 was 34,136kWhr. This is due largely to the operation of a gas utilisation plant (engine) on site which generated a substantial percentage of the sites electrical demand for 2014. It represents an increase of 27.45% on the amount consumed in 2013.

Total water consumption decreased by 76% from 2013. This is largely as a result of significant site works to identify and fix any leaks on the supply line within the site. Water for dust suppression is obtained from the surface water lagoon and drains back into the surface water lagoon. It is therefore being reused and is not consumed. Water used in the wheel wash was significantly reduced as waste was not being accepted.

Total diesel consumption decreased by 94% from 2013. This is due to the fact that a diesel operated Groundwater pump operating in phase 3 was replaced with an electrical pump in late 2013.

No Terram, imported aggregates or soil materials from site stockpiles were used during the reporting period as waste was not being accepted.

Table 5.1: Energy and Resource Use 2014

Resource	2013 Consumption	2014 Consumption
Electricity(kWhr)	26,784	34,136
Water, Potable Supply (Litres)	370,919	83,000
Water, Dust suppression (Litres)	0.0	0.0
Water, Wheelwash (Litres)	10,000	10,000
Total Water (Litres)	380,919	93,000
Diesel (Including Contractor Plant) (Litres)	11,555	674
Hydraulic & Engine Oils (Litres)	0	0
Petrol (Litres)	184	85
Grease (kg)	0	0
Terram for road base (m2)	0	0
Imported Aggregates (Tonnes)	0	0
Soil materials from site stockpiles (Tonnes)	0	0

6 Development and Restoration Works

6.1 DEVELOPMENT WORKS UNDERTAKEN IN 2014

The following development works were carried out during 2014:

- The Installation of approximately 5,500m² of temporary impermeable gas barrier in cells 5, 6 & 7.
- Completion of installation of a temporary Groundwater pump in the Phase 3 area of the landfill.

6.2 DEVELOPMENT WORKS TO BE UNDERTAKEN IN 2015

Potential development works for 2015 are currently being considered.

6.3 RESTORATION OF COMPLETED CELLS/PHASES

The Landfill facility has accepted waste from December 2005 until March 2013 at a rate of 100,000 tonnes per annum for disposal and up to 27,320 tonnes of engineering materials per annum for recovery purposes. To date approximately 820,000 tonnes of waste has been placed into 7 of the 9 constructed cells. Cell 1 and a portion of Cell 2 has been permanently capped with LLDPE liner and a drainage/protective geotextile. The majority of Cells 2 to 7 have been capped with a temporary impermeable membrane while Cells 8 & 9 have been constructed but have not accepted waste. The table below summarises the capping status of the landfill at the end of the reporting period:

Table 6.1 Capping Status of the Landfill

Landfill Capping Status	Area m ²
Permanent capping with LLDPE and drainage/protective geotextile	22,000
Temporary Impermeable membrane	55,000
Total Landfill Plan Area (Cells 1 to 7)	77,000

7 Volume of Leachate Transported/Discharged Off Site

Volumes of leachate tankered off site on a monthly basis are summarised in Table 7.1 below.

Table 7.1 Volume of Leachate Transported Off Site

2014 (Month)	Leachate Consigned Off Site (m ³)
January	3,123.78
February	4,946.28
March	4,564.24
April	2,926.18
May	2,078.19
June	1,597.84
July	1,241.28
August	831.08
September	1,272.38
October	1,201.52
November	3,075.74
December	1,415.42
Total	28,273.93

8 Landfill Gas

Tables 8.1 to 8.3 below present the annual cumulative quantity of landfill gas captured, flared and utilised at the facility during 2014.

Table 8.1 Landfill Gas collected in 2014 – 2000 Haase Flare

Flare No. 1 Connaught 1							
Model: Haase		Type: HTN 2000 Enclosed			Commisioned: Apr-08		
2014 Monthly	Average Flow	Average CH ₄	Average CO ₂	Average O ₂	Combustion	Total CH ₄	Total CH ₄
	Rate (m ³ /hr)	%v/v	%v/v	%v/v	Efficiency (%)	m ³	kgs
January	284	38.40	25.80	1.70	99.9	80,970	52,320
February	257	35.50	34.30	2.50	99.9	61,271	39,758
March	324	37.20	35.00	1.60	99.9	89,518	57,904
April	364	36.10	36.30	1.60	99.9	94,505	61,129
May	324	40.50	38.10	1.00	99.9	28,315	18,412
June	681	40.50	35.00	1.00	99.9	33,064	21,522
July	719	38.50	26.20	1.00	99.9	13,550	8,811
August	670	37.80	20.50	1.40	99.9	34,156	22,233
September	680	36.80	20.60	1.20	99.9	5,250	3,364
October	679	36.30	17.80	1.70	99.9	19,698	12,701
November	668	35.10	15.60	1.60	99.9	20,027	13,063
December	654	35.40	15.40	2.00	99.9	19,775	13,020
Total						500,099	324,236

Table 8.2 Landfill Gas collected in 2014 – HTN 2000 Enclosed

Flare No. 2 Connaught 2							
Model: Haase	Type: HTN 2000 Enclosed				Commisioned: Jan-09		
2014 Monthly	Average Flow	Average CH ₄	Average CO ₂	Average O ₂	Combustion	Total CH ₄	Total CH ₄
	Rate (m ³ /hr)	%v/v	%v/v	%v/v	Efficiency (%)	m ³	kgs
January	892	25.40	20.10	8.30	99.9	168,398	109,959
February	914	22.10	19.20	8.80	99.9	135,604	88,546
March	810	22.80	19.30	8.10	99.9	137,265	89,630
April	869	22.30	19.20	8.30	99.9	139,387	91,016
May	775	23.50	20.80	7.00	99.9	135,365	88,390
June	722	25.70	22.20	6.20	99.9	133,465	87,058
July	676	26.00	22.40	6.40	99.9	130,635	85,212
August	660	25.70	22.00	6.50	99.9	126,071	82,235
September	660	22.60	21.40	5.80	99.9	107,288	70,056
October	496	23.50	21.10	6.90	99.9	86,634	56,569
November	465	24.50	20.50	7.80	99.9	81,944	53,507
December	479	20.90	17.30	10.10	99.9	74,408	48,586
Total						1,456,464	950,764

Table 8.3 Landfill Gas collected in 2014 – Engine No. 1

Flare No. 3 Connaught 3							
Model: Deutz	Type: : TGB 620 V16				Commisioned: Oct-10		
2014 Monthly	Average Flow	Average CH ₄	Average CO ₂	Average O ₂	Combustion	Total CH ₄	Total CH ₄
	Rate (m ³ /hr)	%v/v	%v/v	%v/v	Efficiency (%)	m ³	kgs
January	585	38.40	25.80	1.70	99.5	161,686	104,475
February	513	35.50	34.30	2.50	99.5	109,246	70,888
March	465	37.20	35.00	1.60	99.5	120,370	77,860
April	469	36.10	36.30	1.60	99.5	112,375	72,689
May	591	40.50	38.10	1.00	99.5	174,549	113,500
June	681	40.50	35.00	1.00	99.5	164,656	107,179
July	719	38.50	26.20	1.00	99.5	191,424	124,473
August	670	37.80	20.50	1.40	99.5	153,464	99,894
September	680	36.80	20.60	1.20	99.5	174,043	111,510
October	679	36.30	17.80	1.70	99.5	163,088	105,158
November	668	35.10	15.60	1.60	99.5	147,676	96,328
December	654	35.40	15.40	2.00	99.5	151,576	99,801
Total						1,824,153	1,183,753

9 Indirect Emissions to Groundwater

The East Galway Landfill is a fully engineered and contained landfill and there are no indirect emissions to groundwater from the facility.

The potential sources of indirect emissions to groundwater from the facility are:

Landfill Base:	The landfill site has a composite base lining system comprising a HDPE geomembrane and a 0.5 m thick layer of compacted Bentonite Enhanced Soil. A leak detection survey of the HDPE geomembrane after placement of the drainage stone layer was completed and defects to the HDPE liner were repaired in accordance with industry standards. A CQA report was then completed and submitted to the agency.
Surface Water Collection and Treatment System:	Surface water from the paved access roads and landfill cell swale drain is collected and discharged into the surface water lagoon along with groundwater collected at the interceptor sump located below the landfill cells. Water from the lagoon is then piped to a reed bed, which further filters the water before it is finally discharged into the nearby stream.
Treated Sewage Effluent:	There is a BioCycle wastewater treatment plant located adjacent to the weighbridge which treats the canteen and office wastewater prior to being pumped to the leachate holding tank via the foul water sump. Leachate (containing foul water) is tankered off-site to a waste water treatment plant via a vacuum tanker.

In accordance with Technical Amendment B, Condition 8.15 of the Waste Licence, a risk screening and Tier 3 assessment was carried out at the facility by TOBIN Consulting Engineers in March 2015. The assessment was completed to assess compliance with the Groundwater regulations SI 122 of 2010. This report was submitted to the EPA via the EDEN web portal in March 2015 and is summarised herein.

In general, downgradient water quality was found to be similar to, or slightly improved, in comparison with upgradient wells. The average results indicate good consistency across the site and the monitoring results have been generally consistent over the previous 10 years.

A review of the data plots suggest that the COPCs show a relatively stable to downward trend for almost all parameters and all monitoring points except GW1A located upgradient of the Landfill.

No significant upward trends in downgradient wells were observed since the commencement of landfill operations. Concentrations of chloride and ammonia have significantly decreased since the commencement of activities at the landfill. Concentrations downgradient are generally lower than the background concentrations and the upgradient at the facility, with the reduction of

agricultural activities at the site and removal of peat from the footprint of the landfill cited as one possible reason for this observation.

Based on the extensive groundwater data, most parameters appear to be decreasing or stable since 2004 with the exception of the upgradient well GW1A. Statistical analysis of the main quarterly parameters using the Mann-Kendall statistical trend analysis ($p=0.05$) indicated a stable or a statistically significant decreasing trend. In conclusion, based on the site data, the groundwater body is not at risk. No contaminated groundwater plume exists as a result of the engineered landfill.

10 Annual Water Balance

10.1 ESTIMATED LIQUID IN-WASTE LIQUID VOLUME

The estimated liquid in-waste liquid volume for 2014 was assessed using rainfall figures obtained from the on-site meteorological station, potential in-waste liquid volume and the assumed absorption capacity of the waste mass (see Table 10.1 below).

Table 10.1 Estimated Liquid In-Waste Liquid Volume

2014	Total uncapped area (Note 1)	Rainfall (Note 2)	Potential in waste liquid volume	Absorption capacity of Waste (assumed to be 2%)	Balance	Leachate Tankered off site (Note 3)
	(m ²)	(m)	(m ³)	(m ³)	(m ³)	(m ³)
Jan	20100	0.1796	3609.76	72.20	3537.56	3,123.78
Feb	20100	0.1986	3991.86	79.84	3912.02	4,946.28
Mar	20100	0.1086	2182.86	43.66	2139.20	4,564.24
Apr	7500	0.0576	432.00	8.64	423.36	2,926.18
May	7500	0.1054	790.50	15.81	774.69	2,078.19
Jun	7500	0.0546	409.50	8.19	401.31	1,597.84
Jul	7500	0.0986	739.50	14.79	724.71	1,241.28
Aug	7500	0.1014	760.50	15.21	745.29	831.08
Sept	7500	0.0210	157.50	3.15	154.35	1,272.38
Oct	7500	0.1566	1174.50	23.49	1151.01	1,201.52
Nov	7500	0.1542	1156.50	23.13	1133.37	3,075.74
Dec	0	0.1602	0.00	0.00	0.00	1,415.42
		1.3964	15404.98	308.10	15096.88	28273.93

Note 1: For the purposes of water balance calculation 'Uncapped Area' = area of landfill which is not under an intermediate cap of impermeable synthetic material preventing ingress of rainfall.

Note 2: Rainfall values obtained from on-site meteorological station.

Note 3: The total volume of leachate tankered off site also includes:

- *Office and weighbridge foulwater;*
- *Run-off from within bunded areas and wheelwash;*
- *Condensate/leachate removed from the landfill gas collection system;*
- *Moisture content held in waste received and cover materials used.*

11 Facility Management

11.1 NEW PROCEDURES DEVELOPED DURING 2014

There were no new operating procedures developed for the facility during the reporting period.

11.2 SITE TESTING AND INSPECTION REPORTS

As per Schedule E of the waste licence, the integrity of the bunds and tanks are carried out every three years. This was carried out in February 2015. The integrity and water-tightness of the Leachate Holding Tank, the Wheelwash, the Diesel Bunded Area, the Generator Storage Tray and all Storage Trays (No.1 to No.7) was confirmed. The results are summarised in Appendix C of this report.

11.3 TOPOGRAPHICAL SURVEY

As per condition 8.7 of the waste licence, a survey showing the topography of the facility at the end of the reporting period is included in Appendix D.

11.4 REPORTED INCIDENTS AND COMPLAINTS SUMMARY

11.4.1 REPORTED INCIDENTS

As was the case in 2013, the majority of incidents reported to the Agency during 2014 were in relation to methane and carbon dioxide detected in the gas migration monitoring boreholes. Concentrations of these gases exceeded the limits set out in Waste Licence 178-02.

Previous monitoring at the East Galway Landfill was carried out by White Young & Green (WYG) on the 6th and 13th of December 2005, prior to the facility accepting waste. These two rounds of landfill gas monitoring identified elevated CH₄ gas levels at LG14, LG16 and LG18 and elevated CO₂ levels at monitoring locations LG6, LG6-A, LG9, LG10, LG14, LG16 and LG18.

The report on LFG monitoring carried out by WYG in December 2005 concluded the slightly high levels of CH₄ and CO₂ could be attributed to the large quantities of peat deposited in the area where the monitoring wells are located. A literature search carried out for that report demonstrated that the levels of carbon dioxide and methane measured in the landfill gas monitoring wells could be attributed to the natural background levels from the continuous decay of organic peat. A summary of the reported incidents is presented in Table 11.1 below.

Table 11.1 Summary of Incidents at the East Galway Landfill – 2014

Incident Reference No.	Date	Description	Action
I14/01	28/01/2014	Elevated CH ₄ & CO ₂ level in landfill gas monitoring boreholes	Incident Report Submitted. Previous monitoring carried out by White Young Green on the 6 th and 13 th December 2005 prior to facility accepting waste. These two monitoring events identified elevated methane gas levels at LG14, LG16 & LG18. Elevated CO ₂ at locations LG6, LG6a, LG9, LG10, LG14, LG16 & LG18. The Report concluded that elevated levels of Methane and Carbon Dioxide could be attributed to large quantities of peat deposited in the area of the monitoring wells.
I14/02	05/02/2014	Exceedence of VOC surface emission trigger level.	Incident Report Submitted. Remedial measures implemented.
I14/03	31/01/2014	Elevated Potassium in Groundwater monitoring boreholes	Incident Report Submitted. Elevation not deemed to be landfill related.
I14/04	26/02/2014	Elevated CH ₄ & CO ₂ level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/05	21/03/2014	Exceedence of Daytime Noise Limit at N3 & N5 Noise Monitoring Points (Off site locations)	Incident Report Submitted. Exceedence at N3 attributed to farming activity. Exceedence at N5 attributed to passing traffic on public road (R348). Neither exceedence is related to landfill site activity.
I14/06	25/03/2014	Elevated CH ₄ & CO ₂ level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/07	08/04/2014	Exceedence of Daytime Noise Limit at N5 Noise Monitoring Point (Off site location)	Incident Report Submitted. Exceedence at N5 attributed to passing traffic on public road (R348).
I14/08	07/04/2014	Elevated Chloride in Groundwater monitoring borehole	Incident Report Submitted. Elevation not deemed to be landfill related.
I14/09	29/04/2014	Elevated CH ₄ & CO ₂ level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/10	26/05/2014	Elevated CH ₄ & CO ₂ level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.

Incident Reference No.	Date	Description	Action
I14/11	26/06/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/12	16/07/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/13	06/08/2014	Exceedence of VOC surface emission trigger level	Incident Report Submitted. Remedial measures implemented.
I14/14	27/08/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/15	17/09/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/16	29/10/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/17	27/11/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.
I14/18	17/12/2014	Elevated CH4 & CO2 level in landfill gas monitoring boreholes	Incident Report Submitted. See Action comment for I-14/01 above.

11.4.2 COMPLAINTS SUMMARY

No complaints were received relating to the East Galway Landfill Facility in 2014.

11.5 NUISANCE CONTROL

In order to control potential sources of nuisance at the landfill best available techniques are used to minimise impacts on the environment and local neighbours and all reasonable and practical measures will be implemented to eliminate or minimise any issues or nuisances.

11.5.1 BIRD CONTROL

As the facility has not accepted waste since Quarter 1 2013 there has been no requirement to employ the services of a specialised Bird Control contractor to control potential nuisance caused by birds. At times when the facility is actively accepting waste an integrated approach to bird control is implemented involving the use of kites, heli-kites, distress calls and various birds of prey including falcons. This method is preferred as it is non-destructive to the birds and by varying the timing and use of bird control measures it is a very effective method of control.

11.5.2 VERMIN CONTROL

Pestguard were employed throughout the duration of the reporting period in order to control potential nuisance caused by rodents. Continuous baiting was carried out by Pestguard and adjusted as necessary to prevent any infestation of vermin at the facility.

11.5.3 DUST AND MUD CONTROL

Dust and mud control measures have been implemented at the facility since the start of the construction phase and continue to be implemented as required. These measures include the use of a wheel wash, road sweeper and the use of a water bowser to dampen access roads and stockpiles during periods of dry weather.

11.5.4 LITTER CONTROL

The facility did not accept any waste in 2014 and therefore litter control was not required.

When the facility is actively accepting waste litter is controlled by fencing installed around the landfill footprint as specified in the waste licence. Portable litter fencing is also used at the working face, which can be moved to various points around the working face depending on the wind direction. As part of the operational controls, all litter is collected at the end of the working day when the facility is actively accepting waste. All waste deposited must be covered by the end of the working day. Adequate daily cover reduces the risk of odour, windblown litter, vermin, flies and birds.

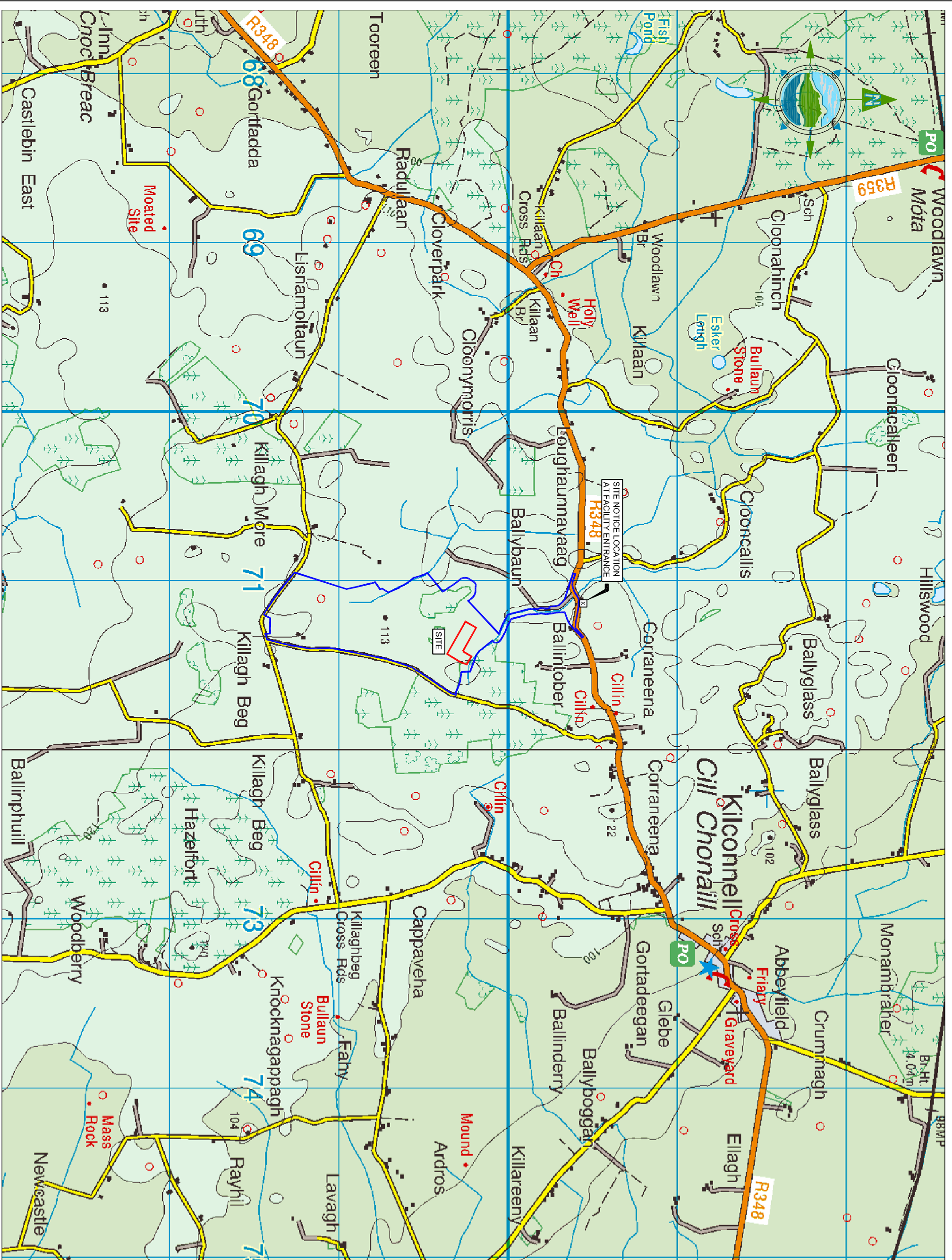
Good operational practices on site are the main controls to avoid nuisances.

11.6 MANAGEMENT AND STAFFING STRUCTURE

The Environmental Protection Agency has exercised powers to enter the site under S.I. No. 547 of 2008 – European Communities (Environmental Liability) Regulations 2008 and have appointed Galway County Council and TOBIN as Agents and Authorised officers on an emergency basis for the ongoing management of liabilities at the site. This decision arose from the decision of the receiver of the Greenstar group of companies to cease operating the facility with effect from May 2013.

APPENDIX A

**Site Location Map
Environmental Monitoring Locations**



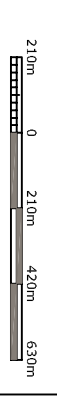
GENERAL LEGEND

LANDS UNDER CONTROL OF DEVELOPER — ACTIVITY BOUNDARY —

SITE NOTICE LOCATION

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. DISCOVERY MAPPING SHEET NO: M-1622



Date	Description	By	CHKD
001 13-07-07	ISSUED FOR REVIEW	JAN	MC

Client: **greenstar**
Energy Services

Project: EAST GALWAY LANDFILL PLANNING APPLICATION 2007

Title: REGIONAL SITE LOCATION MAP

Scale @ A1: 1:10,560

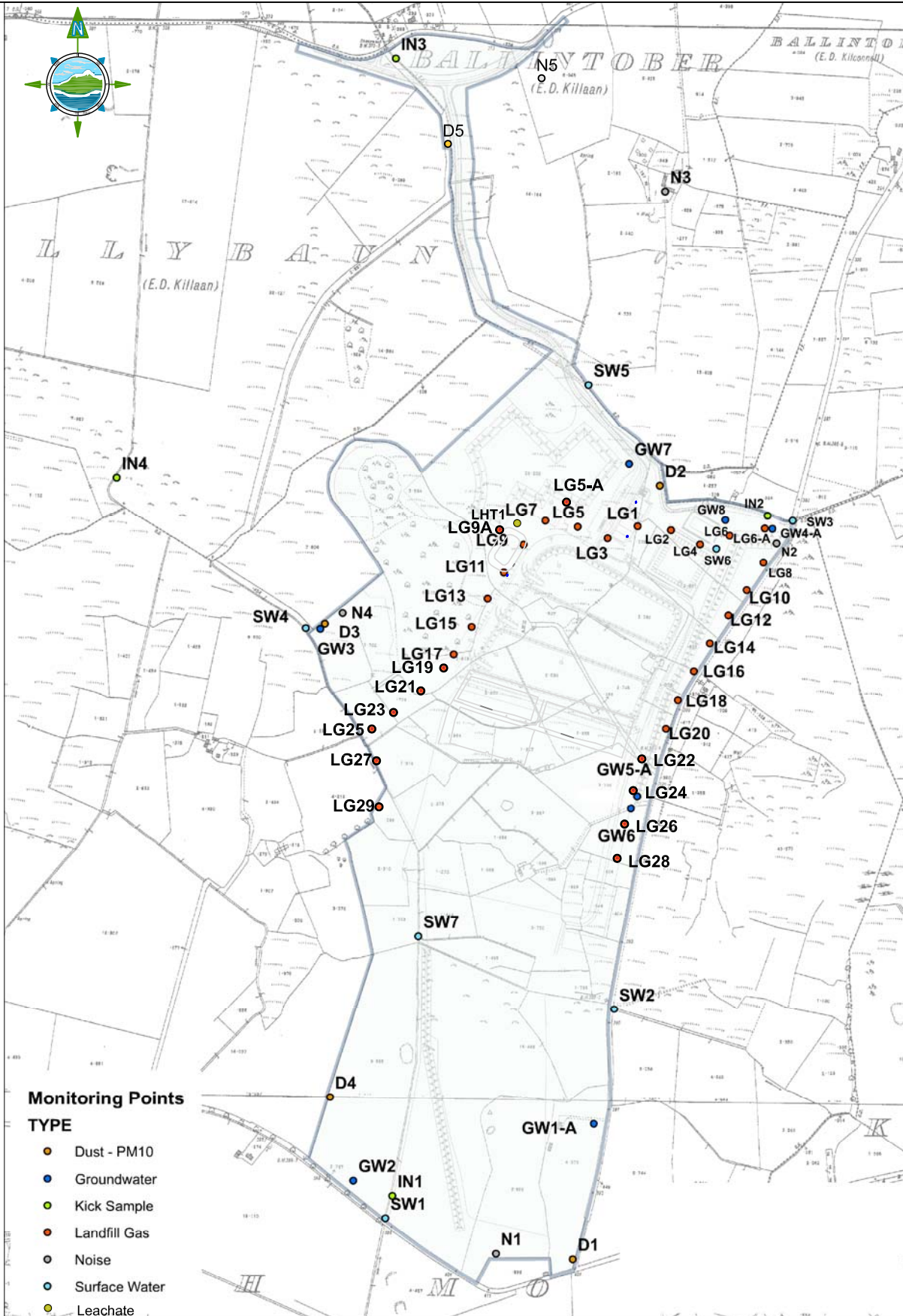
Prepared by: M. Nolan	Checked: M. Conroy	Date: July 2007
Project Director: D. Glehan		

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Drawing No.: 2228-2200 Issue: D01

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Client GREENSTAR LTD
Project CONNAUGHT REGIONAL RESIDUAL LANDFILL
Title LANDFILL ENVIRONMENTAL MONITORING LOCATIONS

Prepared by: R.K.
Checked: D.O'S.
Date: 24.09.09
Project Director: M.F.G.
Drawing Status: LG29 ADDED
Scale @ A4: N.T.S.

TOBIN
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Revision:
A

Drawing No. **3588-1604**

APPENDIX B

E-PRTR



| PRTR# : W0178 | Facility Name : East Galway Residual Landfill Site | Filename : W0178_2014.xls | Return Year : 2014 |

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2014
-----------------------	------

1. FACILITY IDENTIFICATION

Parent Company Name	Greenstar Holdings
Facility Name	East Galway Residual Landfill Site
PRTR Identification Number	W0178
Licence Number	W0178-02

Classes of Activity

No.	class name
-	Refer to PRTR class activities below

Address 1	Killagh More
Address 2	Ballybaun (E.D. Killaan)
Address 3	Ballintober (E.D. Killaan)
Address 4	Ballinasloe
	Galway
Country	Ireland
Coordinates of Location	-8.43099 53.31318
River Basin District	IEWE
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Colin Ryder (W0178)
AER Returns Contact Email Address	colin.ryder@tobin.ie
AER Returns Contact Position	Landfill Manager
AER Returns Contact Telephone Number	090-9686014
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	090-9686026
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	3
User Feedback/Comments	The accuracy of the Net Methane Emission as shown on 'Releases to Air' tab of 1,652,911kg/yr is questionable. GASSIM appears to over estimate the volumes produced which gives a 60%/40% split of gas collected/fugitive gas emission. A high collection efficiency is expected due to high well density and the existence of a combination of temporary and permanent capping over all of the waste mass and evidenced by the results of biannual Surface Emissions monitoring surveys.
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
-----------------	---------------

5(d)	Landfills
5(c)	Installations for the disposal of non-hazardous waste
5(d)	Landfills
50.1	General

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

Is it applicable?	No
Have you been granted an exemption ?	No
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	N/A
Is the reduction scheme compliance route being used ?	N/A

4. WASTE IMPORTED/ACCEPTED ONTO SITE

[Guidance on waste imported/accepted onto site](#)

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

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR#: W0178 | Facility Name : East Galway Residual Landfill Site | Filename : W0178_2014.xls | Return Year : 2014 |

27/03/2015 12:23

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KGs			QUANTITY		
No. Annex II	POLLUTANT Name	M/C/E	Method Used		Emission Point 1	Emission Point 2	Emission Point 3	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description						
01	Methane (CH4)	M	ALT	TOC analyser in accordance with EN12619:2002	6.59	35.93	2233.88	2276.4	0.0	0.0
03	Carbon dioxide (CO2)	M	OTH	Horbia PG250	283764.45	1023084.37	1024946.8	2331795.62	0.0	0.0
02	Carbon monoxide (CO)	M	ALT	CO EN15058:2006	3.8	15.96	4382.42	4402.18	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M	ALT	Oxides of Nitrogen (EN14792:2006)	199.3	420.28	1771.49	2391.07	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

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KGs			QUANTITY		
No. Annex II	POLLUTANT Name	M/C/E	Method Used		Emission Point 1	Emission Point 2	Emission Point 3	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description						
80	Chlorine and inorganic compounds (as HCl)	M	ALT	Impinger train containing deionised water solution in accordance with EN1911:2010	1.43	6.7	4.52	12.65	0.0	0.0
84	Fluorine and inorganic compounds (as HF)	M	ALT	Impinger train containing 0.1 Molar sodium hydroxide in accordance with EN15713:2006	1.29	1.32	0.93	3.54	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)

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KGs			QUANTITY	
Pollutant No.	POLLUTANT Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	0.0
			Method Code	Designation or Description					
					0.0	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: Please enter summary data on the quantities of methane flared and / or utilised	East Galway Residual Landfill Site		Method Used		Facility Total Capacity m3 per hour
	T (Total) kg/Year	M/C/E	Method Code	Designation or Description	
Total estimated methane generation (as per site model)	4111664.0	C	Gas Sim	CRA Report 2014	N/A
Methane flared	1275000.0	M	Landfill Gas Survey 201	Landfill Gas Survey 2014	10000.0 (Total Flaring Capacity)
Methane utilised in engine/s	1183753.0	M	Landfill Gas Survey 201	Landfill Gas Survey 2014	650.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	1652911.0	C			N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0178 | Facility Name : East Galway Residual Landfill Site | Filename : W0178_2014.xls | Return Year : 2014 |

27/03/2015 12:23

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		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	19 07 03	No	17831.77	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Enva,W0041-01	Smithstown Industrial Estate, Shannon, County Clare, Ireland Block 402, Grants Drive Greenhouse Business Park, Rathcoole, County Dublin, Ireland JFK Road, JFK Industrial Estate, Naas Road, Dublin 12, Ireland		
Within the Country	19 07 03	No	9048.68	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Rilita Environmental Ltd,W0192-02			
Within the Country	19 07 03	No	1393.48	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Enva,W0196-01			

* 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](#)

[Link to Waste Guidance](#)

APPENDIX C

Bund Tank and Container Integrity Assessment – February 2015

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CAB International,
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Oxfordshire, OX10 8DE, United Kingdom.
Tel: +44 1491 829327
Fax: +44 1491 833508

Our Ref: 7256 BM

10th March 2015

Michelle McKim
Inspector
Environmental Protection Agency
Regional Inspectorate,
John Moore Road,
Castlebar
Co Mayo

Re.: **East Galway Landfill, Kilconnell, Ballinasloe, Co. Galway**
Waste Licence No. W0178-02

Dear Ms McKim,

In accordance with the requirement of Waste Licence W0178-02 Schedule E - "Bund, Tank and Container Integrity Assessment" and as agreed at Steering meeting No 19 on 19th December 2014, TOBIN has completed integrity and water-tightness assessments of the bunds, leachate tank and storage trays at the East Galway Landfill.

1. Tank and Drum Storage Areas

Condition 3.11.5 of the Licence states

".....The integrity and water tightness of all the bunds and their resistance to penetration by water or other materials stored therein shall be confirmed by the licensee and shall be reported to the Agency following its installation and prior to its use as a storage area.

The confirmation shall be repeated at least once every three years thereafter and reported to the Agency on each occasion."

The following structures were assessed for integrity and water-tightness by TOBIN Consulting Engineers in accordance with Appendix A-Storage Bunds of the Environmental Protection Agency publication "Landfill Manuals – Landfill Site Design" on the dates below:

Directors: L.E. Waldron (Chairman) R.F. Tobin (Managing Director) B.J. Downes M.F. Garrick J.P. Kelly
D. Grehan E. Connaughton (Company Secretary)
M. McDonnell C. McGovern B. Mulligan

Associates: T. Cannon P. Cloonan D. Conneran B. Gallagher B. Heaney E. McPartlin A. O'Brien S. Tinnelly

• Leachate Holding Tank	06/02/2015 to 09/02/2015
• Wheelwash	06/02/2015 to 09/02/2015
• Diesel Bunded Area	05/02/2015 to 11/02/2015
• Generator Tray	05/02/2015 to 11/02/2015
• Storage Tray No. 1	05/02/2015 to 11/02/2015
• Storage Tray No. 2	05/02/2015 to 11/02/2015
• Storage Tray No. 3	05/02/2015 to 11/02/2015
• Storage Tray No. 4	05/02/2015 to 11/02/2015
• Storage Tray No. 5	05/02/2015 to 11/02/2015
• Storage Tray No. 6	05/02/2015 to 11/02/2015
• Storage Tray No. 7	05/02/2015 to 11/02/2015

Based on our assessments, we can confirm the following:

- The integrity and water-tightness of the Leachate Holding Tank and its resistance to penetration by water or other materials stored therein was confirmed by our assessment;
- The integrity and water-tightness of the Wheelwash and its resistance to penetration by water or other materials stored therein was confirmed by our assessment;
- The integrity and water-tightness of the Diesel Bunded Area and its resistance to penetration by water or other materials stored therein was confirmed by our assessment;
- The integrity and water-tightness of the Generator Storage Tray and its resistance to penetration by water or other materials stored therein was confirmed by our assessment;
- The integrity and water-tightness of all Storage Trays (No. 1 to No. 7) and their resistance to penetration by water or other materials stored therein was confirmed by our assessment;

2. **Surface Water Lagoon**

Condition 5.15.2 of the Licence states

“The surface water lagoon shall be inspected and certified fit for purpose every three years by an independent and appropriately qualified chartered engineer.”

We confirm that we carried out a visual inspection of the surface water lagoon on 10th March 2015. We can confirm that this visual assessment did not give rise to any observations to suggest that the integrity of the surface water lagoon has been compromised.

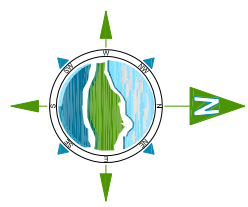
Yours sincerely,



Brendan Mulligan BE. MSc. CEng.
For and on behalf of
TOBIN Consulting Engineers

APPENDIX D

Topographical Site Survey – January 2014



- NOTES:**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
 2. ALL DRAWINGS TO BE CHECKED BY THE ENGINEER/PLUMBERS REPRESENTATIVE AS APPROPRIATE. TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES.
 3. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES.
 4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD.

Rev	Date	Description	By	CHK.
B	18.01.16	SURVEY UPDATED	R.K.	C.R.
A	13.02.14	FIRST ISSUE	R.K.	C.R.

Client:
EPA

Project:
EAST GALWAY LANDFILL

Title:
TOPOGRAPHICAL
SITE SURVEY

Scale @ A1:
1 : 750

Prepared by: C.McG. **Date:** JAN '15

Checked: R.K. **Date:** JAN '15

Project Director: CIARAN MCGOVERN

Drawing Status: REPORT

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Drawing No.: 7256-1111 **Revision:** B