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ANNUAL ENVIRONMENTAL REPORT
FOR
BALLYNAGRAN LANDFILL LIMITED
LICENCE NO. W0165-02
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1. INTRODUCTION

This is the 2015 Annual Environmental Report (AER) for Ballynagran Landfill Limited's (BLL) non-hazardous residual landfill at Coolbeg & Kilcandra, Ballynagran, County Wicklow. It covers the period from the 1st January 2015 to the 31st December 2015.

In March 2014 the Waste Licence was transferred from Greenstar Holdings Limited to Ballynagran Landfill Limited.

The content of this report is based on Schedule B of the Waste Licence (Reg. No. W0165-02) and the report format follows guidelines set in the "Guidance Note for Annual Environmental Report" issued by the Environmental Protection Agency (Agency)¹. Account is also taken of the AER Draft Guidance Document and AER Information Templates issued by the Agency in January 2013².

¹ EPA (Environmental Protection Agency) 1999 Waste Licensing – Draft Guidance on Environmental Management Systems and Reporting to the Agency

² EPA (Environmental Protection Agency) 2013 Draft AER Guidance Document

2. SITE DESCRIPTION

2.1 Site Location & Layout

The site, which encompasses approximately 128 ha, is located on the eastern side of the Wicklow Mountains in the townlands of Ballynagran, Coolbeg and Kilcandra. It is approximately 5 km to the south west of Wicklow Town and 3.5 km to the south east of Glenealy. It is on the southern side of an east-west ridge at an elevation between 52 and 147m Ordnance Datum (OD).

The site layout is shown on the topographical survey drawing included in Appendix 1 and includes: -

- Waste Reception Area;
- Weighbridges (2 No.);
- Wheel Wash;
- Waste Quarantine & Inspection Areas;
- Landfill Cells;
- Leachate Storage lagoon;
- Surface Water Pond;
- Administration Block (offices, stores, canteen, toilets and showers);
- Oil Storage Tank & Bund;
- Security Fencing.
- Landscaped Areas
- Landfill gas utilisation compound

2.2 Site History

The facility was granted a Waste Licence (W0165-01) by the Agency on 5th September 2003 which was reviewed with a revised licence (W0165-02) issued on the 23rd March 2010.

The facility will be developed in five phases. The initial phase involved the provision of five (5) landfill cells (1, 2, 3, 4 and 5A/B), and the entire supporting infrastructure. In 2007 the Agency approved the development of two additional cells (Cells 6 and 7), which were constructed in 2008 and became active in 2009. An active gas abstraction and flaring system was commissioned in April 2007. Cells 9 and 10 were constructed in 2009 and 2010 respectively and despite being EPA approved for waste placement; they did not receive any

waste until 2012 when waste placement commenced in cell 9. In 2014 waste placement commenced in sections of cell 10. In 2015 waste placement continued in cell 10 on a phased bases and, as the waste height increased in cell 10, waste placement recommenced in cell 7 and cell 9 adjacent to cell 10.

In March of 2015 a new haul road was installed to gain access for filling of higher waste lifts, this also enabled the backfilling of the internal haul road space reducing internal landfill surface area.

A landfill gas utilisation plant was commissioned and began operating in January 2011. In 2015 gas infrastructure installation consisting of horizontal and vertical wells were installed in conjunction with placement activities. In addition the development of the gas utilization facility was expanded with the installation of three new engines, which were commissioned in January 2015. Since the installation of the engines all gas is now used for electricity production with flares in stand by back up mode.

The placement of final capping commenced when cells were filled to final profile heights. The first phase of capping took place in 2011 with the placement of 16,000m² of complete capping to topsoil and grass seeding. This was followed by 6,000m² in late 2012 and 27,000m² placement of liner in 2013. The following cells are completely covered cells 1, 2, 3, 4, 5a/b with cell 6 and 6 partially covered.

In the summer of 2015 significant works were undertaken to complete the final capping in of the previously capped area. This involved removal of litter netting, the incorporation of the gas ring main and the gas pipe network into the final cap profile. Some re-profiling of the final subsoils layer followed by the placement of topsoil and grass seeding over the majority of the area. A small area still requires topsoil and seeding which will be done in spring/summer of 2016.

2.3 Waste Activities Carried Out at the Facility

The facility is a full containment landfill, which is designed to accept treated waste for final disposal. The licensed waste activities are summarised in Tables 2.1 and 2.2.

Table 2.1 Licensed Waste Disposal Activities, in accordance with the Third Schedule of the Waste Management Act 1996 as amended

Class 1	Deposit on, in or under land (including landfill).
Class 4	Surface impoundment, including placement of liquids or sludge discards into pits, ponds or lagoons: This activity is limited to the storage and management of leachate and surface water at the facility.
Class 5	Specially engineered landfill, including placement into lines discrete cells which are capped and isolated from one another and the environment: This is the principal activity. This activity is limited to the construction of the landfill in distinct phases consisting of specially engineered lined cells, the

	deposit of non-hazardous waste into these lined cells and the collection of leachate and landfill gas.
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 the treatment of leachate at the facility.
Class 13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced. This activity is limited to the storage of unacceptable waste prior to its transport off-site to another facility.

Table 2.2 Licensed Waste Recovery Activities, in accordance with the Fourth Schedule of the Waste Management Act 1996 as amended

Class 4	Recycling or reclamation of other inorganic materials. This activity is limited to the use of recycled construction and demolition waste as cover and/or construction material at the facility.
Class 9	Use of any waste principally as a fuel or other means to generate energy: This activity is limited to the utilisation of landfill gas at the facility.
Class 11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule: This activity is limited to the use of recycled construction and demolition waste at the facility.
Class 13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced: This activity is limited to the storage of recycled construction and demolition waste prior to reuse.

2.4 Waste Types & Volumes

Only non-hazardous, solid, residual waste is accepted for disposal. Hazardous and liquid wastes are not accepted. All wastes delivered to the facility are subject to Waste Acceptance Procedures that have been approved by the Agency, as specified in Condition 5.3 of the Waste Licence.

The facility is licensed to accept 175,000 tonnes of waste per annum for disposal. The following waste types and volumes, as specified in Schedule A of the Waste Licence, can be accepted: -

- Household (62,500 tonnes),
- Commercial (67,500 tonnes),
- Industrial (45,000 tonnes),

2.5 Waste Received & Consigned

A breakdown of the different types and quantities of wastes received, consigned & recovered at the facility in 2015 are shown in Tables 2.3, 2.4 and 2.5.

Table 2.3 Waste Received 2015

Description	Tonnes
MSW Mixed	57,629.69
C&D Inert Mixed	1,695.74
C&I Inert Mixed	25,494.57
Dredge Spoil	37,141.79
Fines (C&D, C&I)	37,299.72
Knotweed	1.66
CLOR Stabilised MSW fines	2,92.74
Bulky Waste	2,450.82
Filter Cake	7,067.38
Grits and screenings	2,174.22
Stone	8,275.20
Woodchip	9,690.35
Soil and stone	19,179.34
Total	208,393.21

Table 2.4 Waste Consigned 2015

Description	Tonnes	Destination
Leachate	1,821.32	EPS Drogheda
Leachate	10,073.89	Rilta Rathcoole
Leachate	10,976.68	Ringsend WWTP
Leachate	921.94	Kilcullen Landfill Ltd
Total waste consigned	23,795.84	

Table 2.5 Waste Recovered 2015

Description	Tonnes
Fines (C&D, C&I)	37,299.72
Filter Cake	7,067.38
Stone	8,275.20
Woodchip	9,690.35
Soil and stone	18,664.88
Total Recovered	81,290.27

In addition to the waste recovered 184,429.82 tonnes of green field soils were received for future restoration works.

2.6 Landfill Capacity

The most recent topographic survey for the landfill cell footprint is included in Appendix 1. The facility has a design capacity of approximately 2,770,000 m³. It is estimated that the remaining constructed void space as of December 2015 is 90,000 m³.

2.7 Method of Deposition of Wastes

2.7.1 Waste Acceptance

The waste accepted for disposal is residual waste from County Wicklow and adjoining counties from household, commercial and industrial sources. Waste contractors have systems in place whereby the recyclable fraction is either collected separately, or else separation is carried out mechanically at their facilities.

All waste is delivered to the site in Heavy Goods Vehicles (HGV) and small refuse trucks provided with the appropriate covers to prevent loss of load. Each vehicle first proceeds to the incoming weighbridge where it is weighed and documentation checked and logged. The weighbridge operator and/or the facility manager may at their own discretion request the load to be tipped in the Waste Inspection Area.

The vehicles then proceed to the active waste disposal area where waste is deposited under the direction of a banks man. The vehicles weigh out at the outgoing weighbridge and receive an individual weighbridge docket before exiting the site. Each landfill cell is divided into a number of grids, which are used to identify the areas where waste is deposited. Each load is assigned the relevant grid number.

2.7.2 Working Face

Waste is deposited close to and above the advancing tipping face. In accordance with Condition 5.6.1 the active face is confined to a height of 2.5 metres after compaction, a width of 25 metres and a slope no greater than 1 in 3. Deposited waste is spread in shallow layers on the inclined surface and compacted. Steel-wheeled compactors operate on the gradient of the more shallow face, pushing thin layers of waste and applying compaction pressure to them.

The site operatives inspect the deposited waste for items that are not acceptable under the Waste Licence, such as tyres, gas bottles, batteries etc. These are removed and stored in

appropriate areas for later removal from the facility to appropriately licenced facilities. Each day waste is deposited to form a block, which is compacted and covered as described above. The following day a new block of waste is deposited adjacent to the existing block. The waste is covered at the end of each day with a covering of fines and woodchip. This ordered method of waste deposition enables areas, which have been filled and are to be left for a period to be progressively restored over the site life, minimising the areas of active waste deposition.

2.8 Report on Development and Restoration at the Site

In 2015 waste placement continued in cell 10 on a phased bases and as the waste height increased in cell 10 waste placement continued in cell 7 and cell 9 adjacent to cell 10. Gas infrastructure installation consisted of horizontal and vertical wells installed in conjunction with placement activities. In addition the development of the gas utilization facility was progressed with the installation of three new engines, which were commissioned in January 2015. Since the installation of the engines all gas is now used for electricity production with flares in stand by back up mode.

In the summer of 2015 significant works were undertaken to complete the final capping in of the previously capped area. This involved removal of litter netting, the incorporation of the gas ring main and the gas pipe network into the final cap profile. Some re-profiling of the final subsoils layer followed by the placement of topsoil and grass seeding over the majority of the area. A small area still requires topsoil and seeding which will be done in spring/summer of 2016.

2.9 Progress and Implementation of Landscaping Programme

There was no additional tree planting at the facility during the reporting period. There was maintenance carried out on all existing trees planted, in terms of weeding and pruning.

2.10 Programme for Public Information

During 2015 the site accommodated all requests for site visits and tours. Ballynagran liaison community sat several times during the year and monies from the fund were distributed to various organisations and persons under the community and local schemes.

3. ENVIRONMENTAL MONITORING

There is a comprehensive environmental monitoring programme to assess the significance of emissions from site activities. The programme includes groundwater, surface water, leachate, landfill gas, noise, dust and particulate monitoring and a biological assessment of the three streams (Ballynagran, Ford and Killandra) as well as the Three Mile Water River, Ballynagran Co. Wicklow. The monitoring locations are shown in Appendix 2.

The monitoring results, including the full laboratory reports, were submitted to the Agency at quarterly intervals in the reporting period. This section presents a summary of the monitoring with summary graphs showing trends. A summary of all monitoring data for 2015 is included in Appendix 3.

3.1 Groundwater Monitoring

3.1.1 Groundwater Levels

Up until June 2011 groundwater levels were measured monthly in the sixteen (16 No.) groundwater wells on site. Following approval by the Agency on the 1st June 2011, the monitoring frequency was reduced from monthly to quarterly (Ref Agency Letter W0165-02/AP26DM). There are eight groundwater monitoring locations with one deep and one shallow well at each location. The monitoring confirms that the direction of groundwater flow in the bedrock aquifer is from the northwest to the south east.

3.1.2 Groundwater Quality

During 2015, twenty three (23 No.) private groundwater well samples were collected and analysed. These sampling events took place in Q-3 and Q-4 2015. The results of the analysis were reported in the Q-3 and Q-4 quarterly reports. All residents received copies of the results from their respective wells. Groundwater quality in the private wells was generally good and consistent with previous rounds. There were two wells with elevated concentrations of ammonia in Q3. The ammonia concentration in PW-3 (0.16mg/l) slightly exceeded the IGV (0.15mg/l) but did not exceed the GTV (0.175mg/l) or the Drinking Water Value (0.3mg/l). The ammonia concentration in PW-25 exceeded the IGV, GTV and drinking water value in Q3 (0.36mg/l) but was below these screening values in Q4 (0.02mg/l).

Groundwater quality was monitored in the on-site monitoring wells and reported to the Agency at quarterly intervals. The sampling was carried out in accordance with

internationally accepted techniques and control procedures and the analyses were completed by a laboratory using standard and internationally accepted procedures.

The groundwater analysis is compared to the licence specific trigger levels as well as the Interim Guideline Values (IGVs) for groundwater published by the Agency and the Groundwater Regulations Threshold Value (GTV) which were introduced in 2010 (S.I. 9 of 2010).

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

The 2015 quarterly results were generally consistent with those obtained during the monitoring completed before the start of site development works. The monitoring programme confirms that the site activities are not impacting on groundwater quality. The monitoring detected elevated pH levels in groundwater well MW1d in Q1 and Q4. There were elevated levels of ammonia that exceeded the trigger level of 0.15mg/l in MW-2s in Q1 and Q3, in MW-2d in Q2, in MW-3s in Q1, Q3 and Q4, in MW-4s in Q1 and Q3, in MW-7s in Q2 and Q3 and in MW-7d in Q3.

As part of the annual monitoring orthophosphate was detected in a large number of wells upgradient, side-gradient and downgradient of the site. Coliforms were detected in MW-4s, MW-4d, MW-7s and MW-7d. These levels of orthophosphate and coliforms are related to local agricultural practices. Elevated levels of manganese were detected in a large number of wells upgradient, side-gradient and downgradient of the site. Manganese has been sporadically detected in wells across the site. Elevated levels of iron was detected in MW-3s and MW-7s. These levels of manganese and iron are believed to be naturally occurring and not related to the site.

The trend of key indicator parameters analysed between 2011 and 2015 including pH, EC, chloride and ammonia are presented in Figures 3.1 to 3.4 below. These graphs were included in the AER following a request by the Agency.

Figure 3.1 Groundwater pH trend data

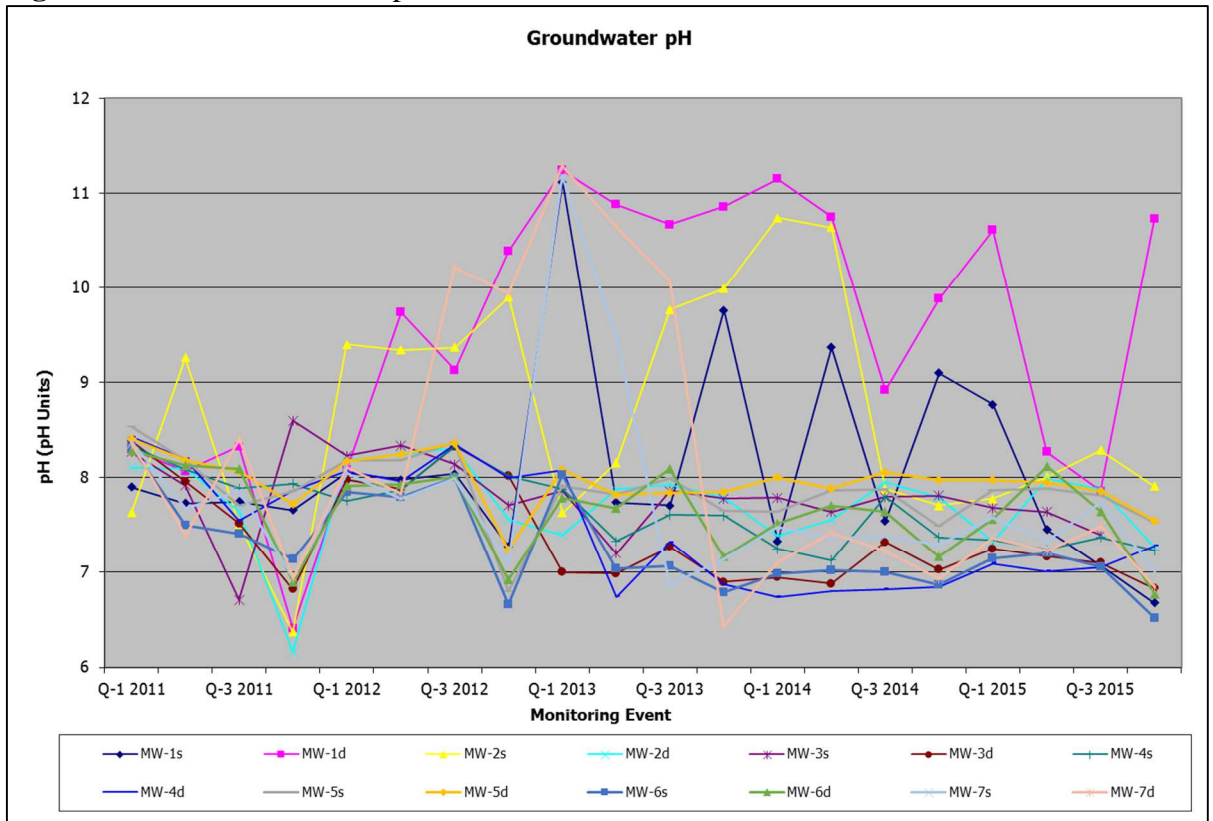


Figure 3.2 Groundwater Electrical Conductivity trend data

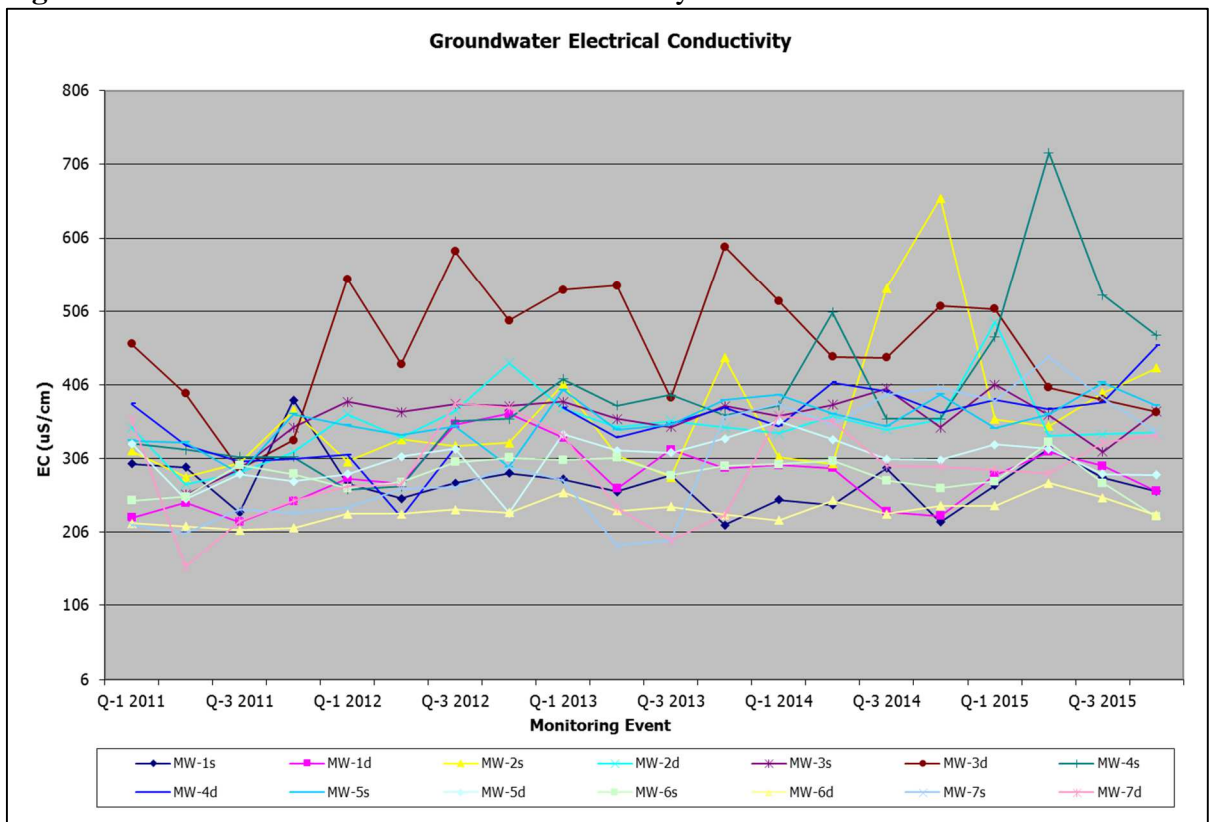


Figure 3.3 Groundwater Chloride trend data

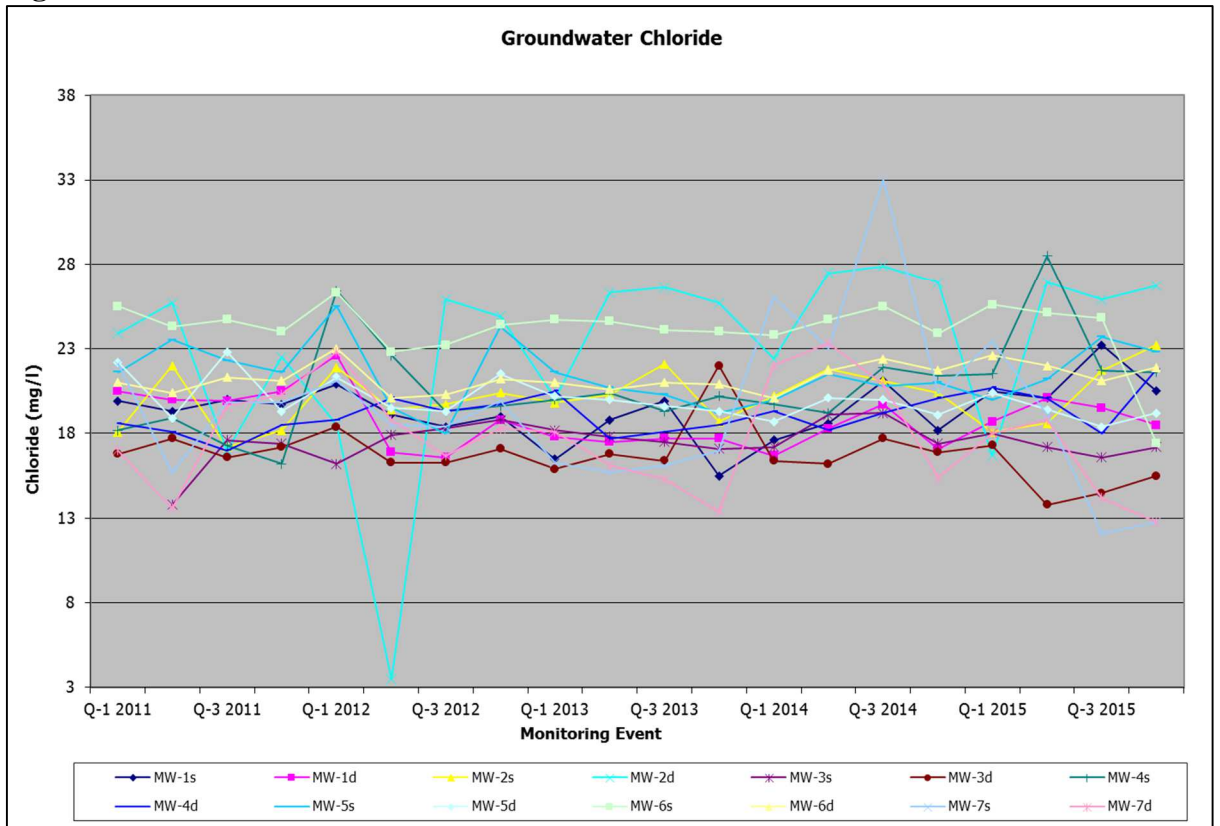
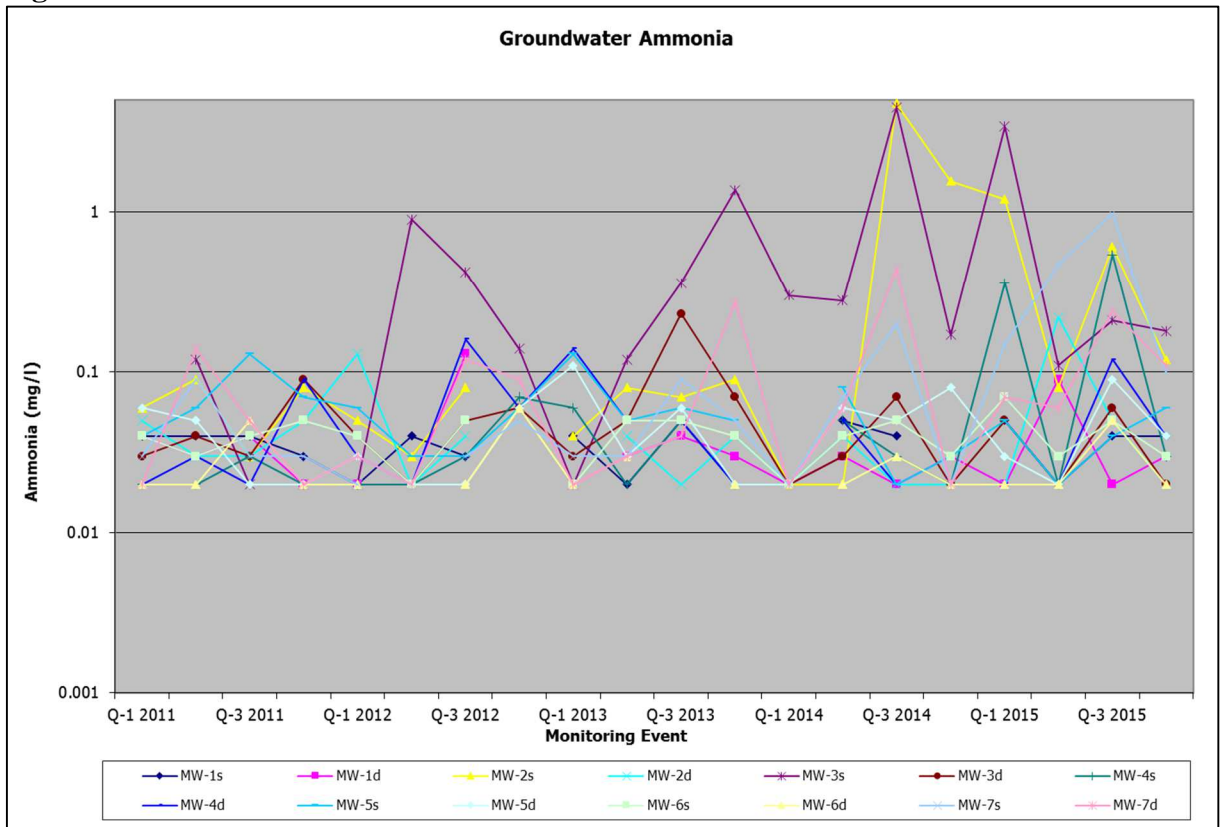


Figure 3.4 Groundwater Ammonia trend data



3.2 Surface Water Monitoring

The site is within the catchment of three streams (Ballynagran, Ford and Killandra) as well as the Three Mile Water River. The catchments are characterised by sudden high flows coinciding with high rainfall periods and particularly low flows in the drier summer months.

3.2.1 Visual Assessment

Greenstar carried out weekly inspections of the surface water drainage system. The inspections did not identify the presence of any impact on the drainage system associated with site activities.

3.2.2 Chemical Assessment

The surface water monitoring was conducted quarterly at the ten monitoring locations specified in the Licence and reported to the Agency on a quarterly basis. The sampling was carried out in accordance with internationally accepted techniques and control procedures, the analyses were completed by a laboratory using standard and internationally accepted procedures.

In Q4 the level of total suspended solids detected in SW-10 (79mg/l) exceeded the ELV of 35mg/l. BNG landfill asked for the lab to recheck the results, whom subsequently reported the results for SW-9 and SW-10 as 119mg/l and 123mg/l respectively. Due to the disparity in the initial and rechecked results Ballynagran landfill had new samples taken. SW-10 was resampled, along with the upstream sample SW-8, downstream sample SW-5 and SW-9 which is the surface water run-off prior to entry to the surface water storage lagoon and reed bed. The levels detected in SW-10 in the second sample was 19mg/l and at SW9 the second sample was 27mg/l. This indicates that the reed bed is attenuating the suspended solids prior to discharge.

In Q1 2015 ammonia concentrations was detected in all surface water sampling locations at elevated levels with the exception of SW-1. The ammonia levels were below the EQS in all locations during Q2 and Q3. There were increased concentrations of ammonia in SW-3, SW-5, SW-6 and SW-9 in Q4.

There were elevated BOD concentrations in SW-8 and SW-10 in Q2 2015 and in SW-2, SW-5, SW-6, SW-7, SW-8 and SW-10 in Q4 2015.

Orthophosphate concentrations exceeded the SW EQS in all SW locations with the exception of SW-1 and SW-4 in Q4 2015.

Iron was detected in Q4 at SW-10 at a level greater than the EQS. The levels of iron detected in SW-5 which is downstream of SW-10 was below the EQS of 1,000µg/l. The level of iron detected in SW-5 (~15m downstream of SW-10) was lower than detected at SW-8 (~50m upstream of WS-10).

The sampling indicates that the surface water quality is good with no evidence that the facility is impacting on surface water. Elevated levels of ammonia and BOD detected are thought to be related to local agricultural practices in conjunction with high levels of rainfall and associated surface water runoff to streams. Based on the surface water sampling to date, the landfill is not having a negative environmental impact on the surface water system surrounding and downstream of the site.

3.2.3 Biological Assessment

Biological assessment of the surface water system is an annual requirement as per Condition 8.9.2. The most recent biological assessment of the three streams (Ballynagran, Ford and Killandra) as well as the Three Mile Water River, Ballynagran Co. Wicklow was carried out in October 2015. The assessment indicates that the surface water quality is consistent with the previous years and that the site is not impacting on the surface water quality.

3.3 Leachate

The monitoring programme involves the collection and testing of leachate samples from the collection sumps and the storage lagoon. The 2015 results indicate that the leachate strength has remained somewhat steady throughout 2015. Leachate is removed off site to Waste Water Treatment plants (WWPT), as agreed with the Agency.

3.4 Landfill Gas (LFG)

Landfill gas is monitored on a monthly basis in wells located outside the waste body. Ballynagran staff members conducted landfill gas monitoring throughout the reporting period. In total 27 no. landfill gas monitoring wells were monitored monthly at Ballynagran during 2015.

3.4.1 Landfill Gas Migration Assessment 2015

Monitoring conducted by BLL personnel in June, July and August 2014 identified exceedances of the methane and carbon dioxide levels in a number of wells MG5, MG10, MG11, MG17, MG18, MG20 and MG46. BLL notified the Agency of the exceedances.

The Agency instructed BLL to have the exceedances assessed independently, with particular focus on MG47 (subsequently re-identified as MG46), as there had been five exceedances of the trigger levels in the well between April and December 2014 and this was of concern to the Agency, given that no exceedances had been recorded before that date.

In May 2015 OCM completed a desk study, carried out a site inspection and conducted landfill gas monitoring. OCM also reviewed the landfill gas monitoring data from November 2012. OCM concluded that there was no evidence of any damage to the landfill cell lining system or any defect in the gas collection network that could have resulted in the migration of gas from the cells.

OCM considered that the elevated methane levels and generally consistent carbon dioxide detected in MG5, MG10, MG11, MG18 and MG20 between 2012 and 2013 is probably due to field measurement error. However the cause of the persistent elevated methane levels in MG46 to the west of the waste deposition area and in MG16 and MG17 to the east could not be determined, although reclamation works in the vicinity of the MG46 was a potential source at this location.

OCM recommended that additional landfill gas monitoring wells be installed between the perimeter bund and MG46, MG16 and MG17, that the new wells should be incorporated into the gas monitoring programme and the results used to complete the investigation of the cause of the elevated levels detected at MG46, MG16 and MG 17.

BLL arranged for the installation of two new wells (MG16A and MG46A) in June 2015. MG16A was located between the landfill cells and MG16, while MG46A was between the landfill cells and MG46. The locations of the wells are shown on the Drawing in Attachment 1.

Following the installation of the new wells BLL conducted landfill gas monitoring in MG15, MG16, MG16A, MG17, MG46, MG46A and MG47 on 42 occasions between 1st July and 16th December 2015.

Elevated methane and carbon dioxide levels persist in MG16 and MG17. Methane levels in the new well (MW16A) exceeded the trigger levels; however the concentrations were lower than recorded in MG16 and MG17. The carbon dioxide levels were generally below the trigger levels, with only three exceedances over the monitoring period. The methane and carbon levels in MG47 were generally lower than the trigger levels, with occasional spikes. At MG46 the methane trigger level was exceeded on one occasion; however the carbon dioxide levels were persistently above the trigger level. At MG46A both the methane and carbon dioxide levels regularly exceeded the trigger levels.

BLL provided copies of reports on landfill gas monitoring carried out by Fehily Timoney & Company in Q4 2006 and Q1 of 2007 that had not been considered in OCM's previous assessment. Elevated methane levels were recorded in MG16 and MG18 in all six monitoring events carried out with the highest levels recorded in the wells being 37% and 12.5% respectively.

The reports state that elevated methane and carbon dioxide were detected in the wells before the start of waste deposition. The ground around the wells is described as very wet and large areas of soil had been disturbed and moved during construction works.

BLL also provided a copy of a report on a landfill gas characterisation assessment carried at the landfill by Odour Monitoring Ireland (OMI) in 2009 to identify the source of the landfill gas detected in perimeter monitoring wells MG16, MG10 and MG17. OMI concluded that the profile of the gas in the monitoring wells (types and concentrations of volatile organic compound and the concentration of hydrogen sulphide in MG16, MG10 and MG17 were markedly different from that in the gas abstraction well and were not consistent with the migration of significant volumes of landfill gas.

The recent monitoring results confirm the persistent presence of elevated methane and carbon dioxide in the original monitoring wells MG16 and MG17 to the east of the deposition area. While elevated methane and levels have been detected in MG16A, which is between the landfill and MG16, the levels are significantly lower than those recorded in MG16 and MG17.

The gas levels recorded in MG16A are not consistent with gas migration from the waste deposition area, as if this is the case the levels would be expected to be higher than those recorded at MG16 and MG17. Elevated levels of methane and carbon dioxide were detected in MG16 and MG17 prior to the start of waste deposition in the landfill. A gas characterisation assessment determined there were significant differences in the profiles of the gas in MW16 and MW17 and that in the body of the landfill.

OCM considers the historical and current data indicates that the gas detected in MG16 and MG17 is naturally occurring and is not associated with the landfill.

Elevated methane and carbon dioxide levels persist in the new well MG46A to the west of the deposition area; however both the methane and carbon dioxide levels in MG47 are generally lower than the trigger levels, while in MG46 the carbon dioxide level exceeds the trigger level, but there was only one exceedance of the methane trigger level.

While migration from the landfill cannot be discounted the results are not consistent with any significant movement of gas, where methane and elevated carbon dioxide should be persistently detected in MG46 and MG47 and other nearby perimeter wells. The raising of the ground levels and backfilling of the borrow pit in 2014 and 2015 may be a contributing factor.

3.4.2 2015 Landfill Gas monitoring summary (Licence Parameters)

In all landfill gas wells monitored as part of the conditions of the licence, elevated levels of carbon dioxide (CO₂) were detected in concentrations above the trigger level of 1.5% v/v in all monitoring wells bar MG3, MG6, MG21 and MG19 on at least one occasion in 2015. The highest level detected was in MG46 (13.1%) in March 2015. The next highest level detected was in MG5 (10.5%) in September 2015. The level of carbon dioxide detected in 2015 remains similar to the levels detected during 2014.

Elevated levels of methane (CH₄) were detected in concentrations above the trigger level of 1% v/v in MG16, MG17 and MG46 on at least one occasion in 2015. Only MG16 had elevated levels in each monthly sample in 2015. The highest level detected was in MG16 (77.2%) in November 2015. The next highest level detected was also in MG16 (63.4%) in April 2015. The level of methane detected in 2015 remains similar to the levels detected during 2014.

3.5 Noise Surveys

Noise surveys were conducted on four occasions at the locations specified in Table D.1.1 of the Waste Licence. The surveys were carried out in accordance with International Standards Organisation 1996: Acoustics-description and Measurement of Environmental Noise (Parts 1, 2 and 3). The results at the noise sensitive locations indicate that noise from the site complied with the licence limits.

3.6 Dust Monitoring

Dust deposition monitoring is carried out at seven dust gauges (AD6, AD7, AD8, AD9, AD10, AD11 and AD12) at the locations shown on Drawing 05 in Appendix 1. Since March of 2014 dust jars from monitoring location AD 10 and AD12 were removed as both were located in lands subject to the N11 Motorway extension which commenced in early 2014. This was advised to the agency. AD-7 is located in lands which are not in the ownership of the landfill and it was not possible to access the location undertake sampling in 2015. Negotiations are ongoing with the landowner to secure access.

In May and June elevated levels of dust were detected at AD6 and AD9 respectively. The cause of the exceedances is not known as there was no visual evidence of elevated levels of dust in each sample during collection. The high level of organic dust measured in each sample may indicate that the samples were impacted by leaf debris or droppings. These exceedances were advised to the agency.

3.7 PM₁₀

PM₁₀ levels were monitored on four occasions at the locations specified in Table D.1.1 in March, May, September and December 2015. All measurements were below the trigger level of 50 µ/m³.

3.8 Meteorological Monitoring

Climate data for 2015 was collected from the synoptic stations at Casement Aerodrome and Ashford Climatological Station which is located 16 km to the north of the facility. The rainfall data was taken from the Ashford station as it is closer to the landfill site than Casement.

4. SITE DEVELOPMENT WORKS

4.1 Summary of Resource & Energy Consumption

The principal energy resources consumed at the site are electricity, water for potable supply, vehicle wheel cleaning and dust suppression, diesel fuel and hydraulic oils. All site vehicles are fuelled by diesel. Table 4.1 presents an estimate of the resources used on-site in 2015 and 2014 for comparison. All water used for dust suppression comes from the surface water lagoon on site and the potable water from an onsite well.

Table 4.1 Resources Used On-Site

Resource	Units	Total Consumption in 2014	Total Consumption in 2015
Electricity	kWh	146,066.67	122,000
Diesel Oil	Litres	183,776	191,784
Water, potable supply	Litres	52,000*	52,000*
Water, dust suppression	Litres	500,000*	500,000*
Water, wheelwash	Litres	100,000*	100,000*
Hydraulic Oils	Litres	1,000	1,000
Engine oils	Litres	7,700	

*estimate

4.2 Proposed Site Development Works 2016

BLL propose to undertake the construction of new cell development in 2016 to increase cell capacity on the site.

5. EMISSIONS

5.1 Leachate

There are no direct emissions from leachate generated on-site as it is collected in the main leachate storage lagoon prior to removal off-site for treatment. The total volume of leachate tankered off-site during the reporting period January 2015 – December 2015 was 23,795.84m³. Detailed figures are presented in Table 5.1 below.

Table 5.1 Leachate taken off site in 2015.

Month 2015	Volume (m³)
January	2,912.56
February	2,011.34
March	1,806.81
April	1,544.19
May	1,754.96
June	1,839.15
July	904.62
August	2,287.50
September	2,389.06
October	1,178.58
November	2,136.36
December	3,030.71
Total	23,795.84

Water balance calculations were prepared using guidance in the Agency's Landfill Manual-Landfill Site Design and are based on total rainfall data from the Casement and Ashford Met stations and the volumes of waste deposited at the site during the reporting period. The calculations are presented in Table 5.2.

It was assumed that all of the incident rainfall on the active cells had the potential to generate leachate. An absorptive capacity of 0.025 m³/tonne was used based on a waste density of 0.8 tonnes/m³.

The calculations indicate that approximately 26,405m³ of leachate would have been generated in 2015. The calculations take into account the placement of intermediate and final capping on 37,000m² of the landfill. The estimated leachate volumes are higher than the 23,795.84 m³ of leachate that was removed during the reporting period. This may be a result of lower rainfall levels at the site location compared to the weather stations.

5.2 Landfill Gas

A Landfill Utilisation Compound was constructed in late 2010 and one Landfill Gas Engine commissioned. Preparation works for the expansion of the gas utilisation plant commenced in late 2014 with the installation of two engines and a third engine was installed in January 2015 making four in total on site. The engines were commissioned in January 2015 following completion of an upgrade of the power line to the existing grid.

Ballynagran Landfill exported 18,231 MWh of electricity to the national grid and imported 13MWh. Ballynagran used 122 MWh of electricity in 2015.

There is a 2,500m³ enclosed flare used as back-up to the engines, an additional 2500m³ open flare used as a back –up site flare only located in the compound and there is also a 500m³ open flare on the landfill which was not used in 2015.

Landfill gas is extracted from the cells through a series of constructed wells, vertically drilled wells, installed horizontal wells and extraction on leachate upslope risers. Landfill gas infrastructure is installed progressively as the waste is placed and the different gas extraction types are chosen to meet the specific needs of that particular landfill area.

5.3 Estimated Annual and Cumulative Quantity of Indirect Emissions to Groundwater

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

- **Landfill Base** – The landfill has a composite base lining system comprising a HDPE geomembrane and a half metre thick layer of 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.
- **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 discharges to the reed bed which further filters the water before it is finally discharged to the Ford Stream.
- **Treated Sewage Effluent** – There is a bio-cycle wastewater treatment plant located adjacent to the weighbridge which treats the canteen and office waste water 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 summary, as the landfill is fully contained, there are no indirect emissions to groundwater.

5.4 Surface Water

Rainfall run-off on the undeveloped parts of the site discharges directly to the surface water drainage system. Rainfall on active fill areas is collected in the leachate collection system. The surface drainage from all roads is directed to the surface water retention pond via an oil interceptor. Drainage from the waste inspection and quarantine bays is directed to the leachate lagoon. The retention pond design and capacity meets the requirements of the Waste Licence. The inlet to the pond is fitted with a Class 1 Full Oil interceptor.

Table 5.2 Annual Leachate Volume 2015

Yr.	Active Cell No.	Active Area	Waste Input	Active Infiltration	Intermediate Restoration	Intermediate Restored Area	Intermediate Infiltration	Final Restoration	Restored Area	Restored Infiltration	Liquid Waste	Total Leachate	Absorptive Capacity	Annual Leachate
		Uncapped (m ²)	(t)	(m ³)	Cell No.	(m ²)	(m ³)	Cell No.	(m ²)	(m ³)	(m ³)	(m ³)	(m ³)	Generation
2015	6,7,9,10	23,000	208,393	24,279	cell 6,9,7 10 side slopes	17,000	7,178	1, 2, 3 & part of 5 & 6	20,000	158.34	0	31,615	5,210	26,405
Cell area (m ²)						-	Estimated maximum waste input (t/year)						200,000	
Total rainfall (m/year)						1.0556	Liquid waste input (t/year)						0	
Effective Rainfall post vegetation (m/year)						0.07917	Final Infiltration						0.007917	10% of Effective Rainfall per annum
Density of <i>in-situ</i> waste (t/m ³)						0.08	Intermediate Infiltration						0.42224	40% of Total Rainfall per annum
Absorptive capacity (m ³ /t)						0.025								
Effective Rainfall before vegetation assumed to be (m)						0.45								

6. NUISANCE CONTROL

In accordance with Condition 7 of the waste licence, the licensee is committed to ensuring that the facility does not give rise to nuisance at the facility or in the immediate area of the facility. The potential sources of nuisance at a landfill facility are odour, vermin, birds, flies, mud, dust and litter. A procedure, (F09j - Completion of Daily Site Condition Reports) has been drawn up to comply with Condition 7 and is being carried out at the facility.

6.1 Odour

In accordance with Condition 8.12.2 of the waste licence, the licensee had submitted a programme to the Agency for the monitoring and assessment of odours emissions arising from the facility. An odour control and monitoring procedure (F 09 r) has been drawn up and carried out.

Good operational practices on site are the main controls to avoid odour nuisances. These include procedures relating to the Operation Start-Up and Shut-Down (F 09 001) and Waste Acceptance (F 09 a (IV)) (dealing with the handling, depositing and covering of waste at the facility). These procedures have been written in accordance with the Landfill Manual *Landfill Operational Practices*, published by the Agency and are incorporated into the odour control and monitoring procedure onsite.

A landfill gas extraction system with four engines an enclosed landfill gas flare and back up flares connected to the national grid were in operation in 2015. Landfill gas horizontal wells and constructed wells were installed during the year and well drilling was carried out in December 2015 with twelve (12 No.) wells drilled. This active gas extraction system allows for the long term control of any potential odours. An external consultant (Odour Monitoring Ireland) conducted quarterly VOC survey emissions surveys in 2015. The PID/FID survey highlighted areas where there could be potential for VOC escape, by measuring VOC levels around the landfill area. Recommendations from their study of the site have been implemented.

In accordance with site condition reports, odour inspections are carried out on a daily basis by site staff at the facility and also in response to any odour complaints. In the monitoring period there have been complaints in relation to odours and these are dealt more specifically in Reported Incidents and Complaints (Section 7).

6.2 Vermin and Birds

Inspections for vermin are carried out on a weekly basis for rodents and on a daily basis for birds, in particular crows. BNG employs a number of measures and also specialist contractors to control vermin at the facility. Vermin control measures; used as part of this programme, include internal and external bait boxes, rodenticides and insect control measures. The specialist contractor visits the site at regular intervals throughout the year to inspect the control measures and assess their effectiveness. BNG manages bird control internally with a series of control measures used including kits, visual and audible deterrents. These control measures have been found to be successful.

6.3 Flies

Particularly during the warmer months, attention is paid to observations of flies. Any observations are recorded on the Site Condition Report (F09(j)(i)). The Facility Manager or the Site Supervisor is notified immediately in order to take measures to eliminate any significant fly populations from establishing.

6.4 Dust and Mud

The site roads are inspected on a daily basis for mud or dust and any observations recorded on the Site Condition Report ((F09(j)(i)). Special attention is paid to dust during the dry months and mud during the wet months and the Site Supervisor or the Facility Manager is notified immediately in order to take measures to minimise or eliminate any potential nuisances arising from mud or dust accumulating on site roads. Some measures include the use of a wheelwash, road sweeper and the use of a water bowser to dampen access roads and stockpiles during periods of dry weather.

6.5 Litter

Litter is controlled by fencing which was 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. Litter inspections are carried out and recorded as part of the daily inspection, which is outlined in the Completion of the Site Condition Reports (F09j (i)) and the Procedure for Litter Prevention & Assembly/Disassembly of Nets (F 09 g). The presence of litter is noted on the Inspection Form and removed immediately if practicable. Any litter noted at or outside the boundary fence, which appears to be illegally dumped, is inspected for any indications of identity if possible and reported to the Facility Manager.

7. ENVIRONMENTAL INCIDENTS AND COMPLAINTS

7.1 Incidents

There were twenty one minor incidents reported via alder during the reporting period. Seventeen of these related to breaches of trigger levels or ELVs. Three incidents related to transducer failure in leachate level monitors. There was one incident in relation to a fire on site. All incidents were reported to the agency as soon as the licensee was aware of them and did not cause any environmental impacts.

7.2 Non – Compliances

Ballynagran Landfill received eight non compliances of Licence W0165-02 in 2015. These related to odours (1), ELV exceedances (5), and waste management (2).

7.3 Register of Complaints

The licensee maintained a register of complaints in compliance with Condition 10.4. The site received one hundred and thirteen complaints during 2015 (See Table 7.1 below). One hundred and seven were received via the EPA Alder system and the remaining six complaints were received directly to the site by phone. A register recording the date, the issue, the corrective action taken and date the complaint was closed is maintained and available at the facility. Complaints were responded to via the complaints procedure.

Table 7.1 Complaints Received 2015

Month (2015)	No of Complaints Received
January	5
February	9
March	12
April	17
May	12
June	8
July	3
August	8
September	12
October	13
November	8
December	6
Total	113

8. ENVIRONMENTAL MANAGEMENT SYSTEM

8.1 Management Structure

The Management Structure as required by Condition 2.2.1 of the waste licence for the year 2015 is presented below. Ballynagran Landfill Ltd is the Licence Holder.

8.1.1 Site Management Structure

The day to day management of the facility and supervision of waste activities are the responsibility of the Facility Manager, Site Foreman and the site operatives. The positions and names of the persons who provide management and supervision are set out below: -

- License Holder Ballynagran Landfill Ltd April 2014 onwards
- Directors Alan Cousins and Nigel Hodnett
- Facility Manager, Tomas Fingleton
- Site Foreman, Michael Macleod
- Site Clerk, Claire Stevenson
- Weigh bridge and General Operatives, Michael Noone, Joseph Donohue, Joseph Moore, Mathew Powell and John Kinsella

8.1.2 Responsibilities

On the 4th of March 2014 Licence No.W0165-02 was transferred from Greenstar Holding Ltd to Ballynagran Landfill Ltd. The licence holder, was responsible for ensuring that the requisite resources are provided to operate the facility in accordance with the objective of the EMP and the Waste Licence conditions. The Facility Manager or nominated Deputy is responsible for ensuring that the day to day operation of the facility is carried out in accordance with the EMP, the Waste Licence conditions and the Operating Procedures.

The Facility Manager or nominated Deputy is responsible for ensuring that the environmental monitoring programme is carried out and reports submitted to the Agency in accordance with the schedule in the EMP and the Waste Licence conditions.

The Facility Manager or nominated Deputy is responsible for arranging that the specified engineering works, the leachate and landfill gas management programmes and the restoration programmes are properly implemented.

The Facility Manager or nominated Deputy is responsible for ensuring that the Corrective Action Procedures, Emergency Response Procedures and Contingency Arrangements specified in the EMP and the Waste Licence are implemented.

The Facility Manager or nominated Deputy is responsible for arranging appropriate training programmes for all facility personnel and for maintaining training records.

The Facility Manager, nominated Deputy and designated staff are responsible for implementing the waste acceptance procedures, including the assessment of suitability of the waste for disposal and recording the data specified in the Waste Licence. They are responsible for receiving and recording complaints from members of the public at the facility and informing the General Manager or nominated Deputy of the complaints.

The Facility Manager, nominated Deputy, Site Foreman and designated staff are responsible for ensuring compliance with conditions relating to waste inspection, placement and nuisance control (e.g. daily cover, litter, dust, vermin, birds).

8.1.3 Staff Training

All training was carried out as scheduled in the training plan for 2015. A record of all training to date is maintained on site for inspection.

Any facility staff who performs duties which involve interpretation of monitoring results or site inspections, will receive the appropriate training by the General Manager or nominated deputy, prior to carrying out such duties.

All facility staff will receive further training in their individual areas of activity. This training will comprise theoretical sessions as well as practical training. All such training will be recorded and documented in individual training files.

8.2 Environmental Management Programme

Ballynagran Landfill Limited have implemented an Integrated Management System (IMS) in accordance with the requirements of Occupational Health and Safety Assessment Series (OHSAS) 18001:2007 and International Standard Organisation (ISO) 14001:2004 in order to manage the Health, Safety and Environmental performance of their business and to control health and safety risk and to minimise their environmental aspects and impacts. The facility was last certified for ISO14001 and OHSAS 18001 in 2013. However surveillance audits lapsed in 2014 prior to licence changeover and recertification of the facility in conjunction with the overall company is planned in 2016-17.

The IMS was developed for the achievement of continual improvement taking into the requirements of the Waste Licence Conditions. The IMS was prepared and effectively implemented in accordance with the requirements of both the OHSAS 18001:2007 and ISO 14001:2004.

As part of this IMS the licence had developed a list of environmental, management, operating and maintenance procedures. The schedule of Objectives and Targets, including their status for 2015 (Table 8.1), as well as the proposed Objectives and Targets for 2016 (Table 8.2) are presented below.

8.2.1 Schedule of Objectives 2015

Table 8.1 describes the implementation of the objectives and targets in the reporting period.

8.2.2 Schedule of Objectives 2016

Ballynagran Landfill Ltd has set a schedule of targets and objectives for 2016. These are presented in Table 8.2.

8.3 Communications Programme

The Communications Programme required by Condition 2.4 of the waste licence, was established three months before the start of waste activities and has been submitted to the Agency.

Ballynagran Landfill pursues an active programme of disseminating information on its operations to all interested parties. This is undertaken through a variety of means including site tours, the company website, presentations and open days. During 2008, a short film was produced detailing how the facility was constructed and is operated. The film is shown to those visiting the facility.

The overall communications programme contains the following objectives:

- To promote public awareness of the site activities and environmental policies;
- To maintain an ongoing dialogue with authorities that have direct involvement with waste;
- To make available Environmental Performance Data to all interested parties;
- To disseminate information relating to the operation and management of the site;
- To encourage liaison between the site and local residents and those who may be affected by the site operations,
- To provide general information on waste management issues;

- To ensure all users and customers of the site are conversant with the requirements of the site waste licence;
- To ensure that all objectives are, where possible, measurable and quantifiable;

The objectives of the programme are met through the following elements as appropriate:

- Personal contact;
- Residents meetings/Liaison groups;
- Information displays;
- Information packs;
- Site visits;
- Web page;
- Educational links; and
- Published information

Table 8.1 Progress Report on Schedule of Objectives and Targets for 2015

Objective	Target including timescale	Progress Report
Develop landfill gas collection infrastructure and gas utilisation plant.	Ensure delivery of high gas quality above 39% methane suitable for use engine.	In February 2015 all landfill gas diverted to gas utilisation system, balancing of gas to maintain quality for engine continuous run
	Target 95% Gas utilisation of all landfill gas generated by the facility, 5% flaring.	Achieved 90% utilisation landfill gas for utilisation
	Install additional drilled wells when final heights achieved in cell locations	Installed 10 wells in December 2015
	Development of constructed well from the cell floor in cell 10 phase 3.	Built up two wells from floor up in concrete rings and stone surround
	Install the permanent gas infrastructure in the phase 2/3 capping area.	Completed permeant gas infrastructure in phase 1/2/3 capping area.(ring main and feeder lines)
	Maintain FID surveys on quarterly.	VOC survey completed Quarterly
Minimise risk of potential water pollution from generation of leachate	Maintain the buffer capacity within the leachate lagoon level aim for below 2.3m level.	Apart from Late November and December 2015 sufficient capacity was maintained in the lagoon during the year, (substantial frequent continuous rain events in Nov/Dec)
	Review hardstand area for leachate filling and improve where necessary.	Review indicated importance of regular cleaning of hard stand drainage to ensure any spill returns to lagoon directly
	Progress intermediate cap for areas above liner height in cell 7 and 10.	Soil intermediate cap completed on cell 7 and cell 6 in non-trafficable areas
Reduce dust nuisance on environment and surrounding neighbours	Complete grass seeding of cap by end of September 2015,	90% of topsoil and grass seeding on permeant cap
	Complete grass seeding of soil deposit area above borrow source levelled by Sept 2015	Following levelling natural regeneration occurred.
	Investigate automatic water spray for newly constructed road May 2015	Not completed
Avoid contamination of groundwater after a spillage or emergency situation	Continue to carry out spillage and emergency response training	completed ongoing training during the year

Objective (Cont'd)	Target including timescale	Progress Report
Reduce risk of wind-blown litter when the site is operating in adverse weather conditions	Install new litter fence across capped area to reduce open area for wind blow April 2015	Temporary litter netting installed between active and capped area across site
	Repair existing netting on side of cells June 2015	Removal of litter netting around capped area and repairs to existing netting completed
	Review procedure for operating in windy conditions	Closed on a number of occasions during 2015 due to high winds
To reduce the risk of site personnel being hit by a vehicle	To significantly reduce this type of incident on site.	No incidents or near miss occurred in relation to plant and personnel
	Improve the separation of plant and personnel and entry and control of personnel	Completed training on banksman operations, plant and personnel etc.
Review and assess the effectiveness of nuisance control procedures including bird, rats and mice	Continually review and assess all nuisance control procedures to ensure minimal impact on surrounding area.	Ongoing
	Improve use of bird scaring devices and update internal bird control plan and implement measures August 2015.	Plan still need to be reviewed but additional balloons purchased for site.
Minimise nuisance from vehicle movements and uploading / tipping	Ensure noise, dust, odour from vehicle movements are minimised by correct implementation of relevant operational protocols	Ongoing
	Ensure new signage and front gate road access installed	Following the completion of front road changes, new gates, fencing lighting etc. were installed in 2015, signage to be completed in 2016.
Continue to improve relationships with neighbouring communities / reduce environmental complaints	Achieve a reduced level in the number and source complaints from previous.	Odour complaints increased in 2015 from 77 in 2014 to 113
	Aim to visit all complainants after complaint lodgement and respond to queries as quickly as reasonably practicable, ensuring that any complaints are followed up in writing as soon as possible after receipt of complaint within 5 working days.	Some complainants were visited during the year more than once, in follow up to odour complaints, but not after every complaint. All complainants were responded to.

Objective (Cont'd)	Target including timescale	Progress Report
Environmental monitoring	Ensure monitoring results comply with Licence limits and investigate any exceedances of emission limit value (for timescale see project sheet).	All incidents and exceedances were reported to the agency and reviewed
	Complete perimeter gas monitoring investigation May 2015	Perimeter Gas report completed and lodged with the Agency
Promotion of H&S amongst all employees and the generation of an ethos of continual improvement	Improvement driven Safety Observation Audit Reports are to be undertaken bi-monthly focussing on swiftly resolving problems as they occur.	To be reviewed in 2016
Diligent management of operations by employing control mechanisms, procedures and processes that are technologically proven and economically feasible	Develop H&S training giving more focus on empowering employees to become safety representatives, one employee to be Safety rep by June 2015	Site operator undertook safety rep training in 2015
Promotion of continual improvement, good health and safety work practices through continual review of O&Ts	Develop an additional health and safety trained personnel onsite.	To be completed
Fostering of openness, dialogue, enhanced communication and discussion with employees, clients, neighbours, suppliers, contractors and all interested parties regarding our H&S and our O&Ts	Look to develop staff interaction enabling keen spotting of potential problem or hazards through training and communication.	Open toolbox discussions and forum for workers
Publication and communication of our policy internally and ensuring its availability to the public and interested parties on request so that it is understood implemented and maintained	Ensure toolbox talks are conducted on a monthly bases minimum.	Toolbox talks undertook throughout the year

Objective (Cont'd)	Target including timescale	Progress Report
Measurement of performance by conducting regular audits and assessment of compliance with the OHSAS 18001:2007 standards, EHS policy, relevant legislation and regulatory requirements	Prepare system and procedures for the new OH&S system due in 2016	Not commenced proposed 2016
	Encourage feedback on equipment and resources including adequacy of PPE in protective properties, wear ability and durability and look at alternatives, where appropriate.	Ongoing part of toolbox forum
	Continue to engage with all stakeholder and operate the site in an open and inclusive manner, feeding information into the Community fund community visiting neighbours meeting local groups and operating an open door policy.	Ongoing

Table 8.2 Schedule of Objectives and Targets for 2016

Objectives 2016	Target including timescale
Develop landfill gas collection infrastructure and gas utilisation plant.	Ensure delivery of high gas quality above 39% methane suitable for use engine.
	Target 95% Gas utilisation of all landfill gas generated by the facility, 5% flaring.
	Install additional drilled wells when final heights achieved in cell locations
	Install additional built wells in new phase of cell back wall
	Maintain FID surveys on quarterly.
Minimise risk of potential water pollution from generation of leachate	Maintain the buffer capacity within the leachate lagoon level aim for below 2.3m level.
	Review hardstand area for leachate filling and improve where necessary.
	Progress intermediate cap for areas above liner height in cell 6, 7 and 10
Reduce dust nuisance on environment and surrounding neighbours	Complete topsoil and grass seeding of bowl cap may 2016,
	Minimise dust from construction and minimise areas of soil disturbance
	Investigate automatic water spray for newly constructed road
Avoid contamination of groundwater after a spillage or emergency situation	Continue to carry out spillage and emergency response training
Reduce risk of windblown litter when the site is operating in adverse weather conditions	Install new litter netting outside of cell back wall area when completed
	Repair existing netting on cell 9 side of site pre entering back wall area with waste
To reduce the risk of site personnel being hit by a vehicle	To significantly reduce this type of incident on site.
	To maintain separation of landfill operations from construction activities
	Improve the separation of plant and personnel and entry and control of personnel
Review and assess the effectiveness of nuisance control procedures including bird, rats and mice	Continually review and assess all nuisance control procedures to ensure minimal impact on surrounding area.
	Improve use of bird scaring devices and update internal bird control plan and implement June 2016.
Minimise nuisance from vehicle movements and uploading / tipping	Ensure noise, dust, odour from vehicle movements are minimised by correct implementation of relevant operational protocols
	Ensure new signage and front gate road access installed to

Objectives 2016 (Cont'd)	Target including timescale
Continue to improve relationships with neighbouring communities / reduce environmental complaints	Achieve a reduced level in the number and source complaints from previous.
	Continue to promote and facilitate the community develop group meeting and contribution
	In addition to responding by letter, aim to visit or verbally communicate all complainants during the year. In addition after complaint lodgement, respond to queries as quickly as reasonably practicable, ensuring that any complaints are followed up in writing as soon as possible after receipt of complaint within 5 working days.
Environmental monitoring	Ensure monitoring results comply with Licence limits and investigate any exceedances of emission limit value.
	Continue to maintain & improve access to monitoring locations

Health and Safety	
Promotion of H&S amongst all employees and the generation of an ethos of continual improvement	Adoption of Improvement driven Safety Observation system for continual improvement. Audit Reports are to be undertaken bi-monthly focussing on swiftly resolving problems as they occur.
Diligent management of operations by employing control mechanisms, procedures and processes that are technologically proven and economically feasible	Continue to Develop H&S - develop the trained safety representative on site.
Promotion of continual improvement, good health and safety work practices through continual review of O&Ts	Develop an additional health and safety trained personnel onsite.
Fostering of openness, dialogue, enhanced communication and discussion with employees, clients, neighbours, suppliers, contractors and all interested parties regarding our H&S and our O&Ts	Look to develop staff interaction enabling keen spotting of potential problem or hazards through training and communication.
Publication and communication of our policy internally and ensuring its availability to the public and interested parties on request so that it is understood implemented and maintained	Ensure toolbox talks are conducted on a monthly bases minimum.

Objectives 2016 (Cont'd)	Target including timescale
Measurement of performance by conducting regular audits and assessment of compliance with the OHSAS 18001:2007 standards, EHS policy, relevant legislation and regulatory requirements	Prepare system and procedures for the new OH&S system due in 2016
	Encourage feedback on equipment and resources including adequacy of PPE in protective properties, wear ability and durability and look at alternatives, where appropriate.
	Continue to engage with all stakeholder and operate the site in an open and inclusive manner, feeding information into the Community fund community visiting neighbours meeting local groups and operating an open door policy.

9. OTHER REPORTS

9.1 Financial Provision

The licensee will submit the required financial information to the Agency in Quarter 2 of 2016.

9.2 Landscape Programme

There were no changes in the landscaping programme, however the development of the N11 motorway and new link road required the movement of the existing main gate and access roadway. This new entrance including installation of new security fencing field fencing and relocation of the security system and landscaping was completed in 2015.

9.3 Surface Water and Leachate Management System Inspection and Slope Stability Assessment Report

A surface water and leachate management system inspection and slope stability assessment report was prepared by Fehily Timoney in December 2015 and filed on site for review as and when required by the Agency. The survey did not highlight any major issues of concern.

9.4 European Pollutant Release and Transfer Register

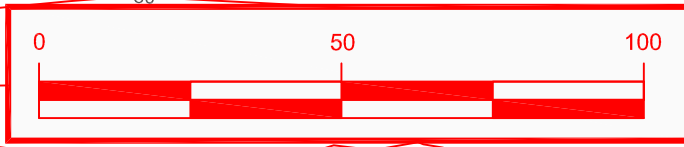
Under the European Pollutant Release and Transfer Register Regulation (EC) No. 166/2006 Ballynagran Landfill Ltd. are required to submit information annually to the Agency. A copy of the information submitted to the Agency via the web-based data reporting system is included in Appendix 4.

9.5 Tank, drum, pipeline and bund testing and inspection report

Integrity testing was not undertaken in 2015. A leachate infrastructure inspection was conducted by Fehily Timoney & Co in 2015. The system was found to be in good condition.

APPENDIX 1

Topographic Survey



LEGEND

- TOPO CONTOUR (SURVEYED 20/01/16)
- EXISTING CAPPED AREA

VOID SPACE REMAINING = 76,536m³
TOTAL LANDFILL VOID SPACE CONSUMED UP TO 20th JANUARY 2016 = 1,582,805 m³

Client BALLYNAGRAN LANDFILL LTD		
Project BALLYNAGRAN RESIDUAL LANDFILL SITE		
Location BALLYNAGRAN, Co. WICKLOW		
Title TOPOGRAPHICAL CONTOUR HEIGHTS OF WASTE BASED ON WASTE SURVEY 20th JANUARY 2016		
Project No.	Checked by	Drawing No.
File No.	Reviewed by	W-S49/01
Created by I McC		
TO CLIENT		10/02/16 A
Description	Date	Version
Scale 1:1,250 A3	Date	January 2016

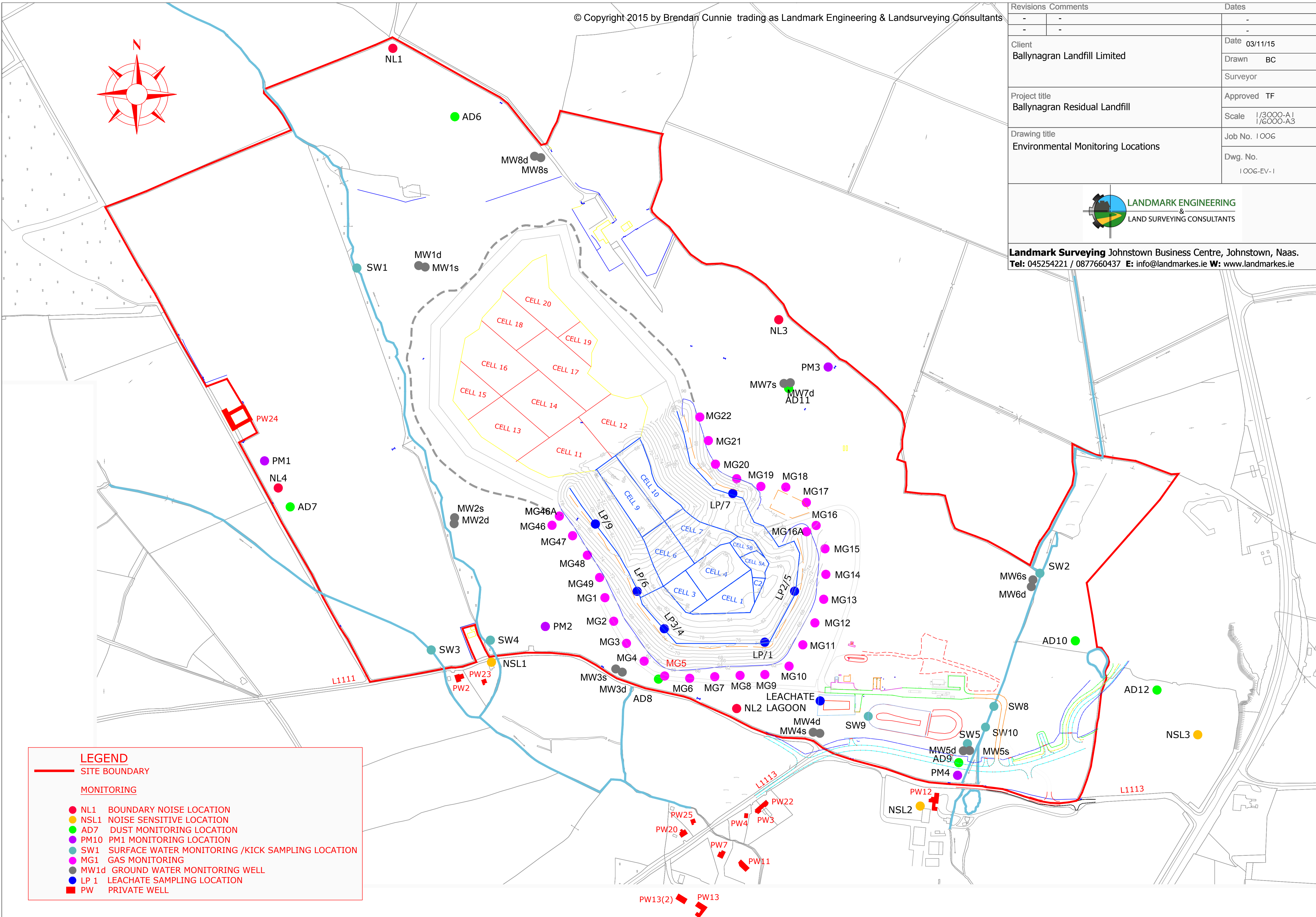
APPENDIX 2

Monitoring Locations

Revisions	Comments	Dates
-	-	-
-	-	-
Client Ballynagran Landfill Limited		Date 03/11/15
		Drawn BC
		Surveyor
Project title Ballynagran Residual Landfill		Approved TF
		Scale 1/3000-A1 1/6000-A3
Drawing title Environmental Monitoring Locations		Job No. 1006
		Dwg. No. 1006-EV-1



Landmark Surveying Johnstown Business Centre, Johnstown, Naas.
Tel: 045254221 / 0877660437 E: info@landmarkes.ie W: www.landmarkes.ie



LEGEND	
	SITE BOUNDARY
MONITORING	
	NL1 BOUNDARY NOISE LOCATION
	NSL1 NOISE SENSITIVE LOCATION
	AD7 DUST MONITORING LOCATION
	PM10 PM1 MONITORING LOCATION
	SW1 SURFACE WATER MONITORING /KICK SAMPLING LOCATION
	MG1 GAS MONITORING
	MW1d GROUND WATER MONITORING WELL
	LP 1 LEACHATE SAMPLING LOCATION
	PW PRIVATE WELL

APPENDIX 3

Monitoring Results 2015

Groundwater Data 2015

Groundwater Monitoring 2015

Parameter	MW-1S				MW-1D				MW-2S				MW-2D				Trigger Level	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH	8.77	7.45	7.07	6.68	10.61	8.27	7.86	10.73	7.78	8.01	8.29	7.91	7.32	7.99	7.88	7.27	-	> 6.5 & <9.5	-
Electrical Conductivity	270	320	280	262	284	315	296	262	359	350	395	429	491	337	339	342	-	1,000	800 - 1,875
Chloride	20.5	20.1	23.2	20.5	18.7	20.1	19.5	18.5	18.1	18.6	21.7	23.2	16.7	26.9	25.9	26.7	>40	30	24 - 187.5
Ammonia	0.05	0.02	0.04	0.04	0.02	0.09	0.02	0.03	1.2	0.08	0.61	0.12	0.02	0.22	0.05	0.02	>0.15	0.15	0.065 - 0.175
Potassium	1	0.7	0.7	1	1.2	0.7	0.6	1.2	2	1.2	2	1.8	1.5	0.7	0.7	0.9	>12	5	-
Dissolved Oxygen	11	10	10	10	11	9	9	6	10	7	4	8	11	8	8	8	-	NAC	-
Total Chromium				<1.5				<1.5				<1.5				<1.5	-	30	37.5
TOC	<2	<2	<2	<2	<2	<2	<2	<2	3	<2	<2	<2	4	<2	<2	<2	>50	NAC	-
Boron				<12				<12				235				<12	-	1,000	750
Cadmium				<0.5				<0.5				<0.5				<0.5	-	5	3.75
Calcium				24.6				31.6				39.6				30.7	-	200	-
Copper				<7				<7				<7				<7	-	30	1,500
Iron				<20				<20				<20				<20	-	200	-
Lead				<5				7				<5				<5	-	10	18.75
Magnesium				4.6				0.3				15				11.1	-	50	-
Manganese				<2				<2				97				<2	-	50	-
Mercury				<1				<1				<1				<1	-	1	0.75
Nickel				<2				<2				<2				<2	-	20	15
Sodium				17.6				21.6				34.4				18.9	-	150	150
Zinc				<3				<3				<3				<3	-	100	-
Fluoride				<0.3				<0.3				<0.3				<0.3	-	1	-
Sulphate				12.16				37.05				23.26				9.35	-	200	187.5
Ortho Phosphate				<0.06				<0.06				0.07				<0.06	-	0.03	0.035
TON				8.2				2.6				<0.2				10.5	-	NAC	-
Total Cyanide				<0.01				<0.01				<0.01				<0.01	-	0.01	0.0375
Alkalinity				68				68				210				102	-	NAC	-
Total Solids				120				148				233				182	-	-	-
VOCs				ND				ND				ND				ND	-	-	-
sVOCs				ND				ND				ND				ND	-	-	-
Pesticides				ND				ND				ND				ND	-	-	0.375
Total Coliforms				<1				<1				<1				<1	-	0	-
Faecal Coliforms				<1				<1				<1				<1	-	0	-

Parameter	MW-3S				MW-3D				MW-4S				MW-4D				Trigger Level	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH	7.81	7.68	7.64	7.4	7.25	7.17	7.1	6.83	7.34	7.24	7.37	7.23	7.09	7.01	7.05	7.28	-	> 6.5 & <9.5	-
Electrical Conductivity	406	365	315	370	509	402	386	369	471	722	528	473	386	373	382	459	-	1,000	800 - 1,875
Chloride	18	17.2	16.6	17.2	17.3	13.8	14.5	15.5	21.5	28.5	21.7	21.6	20.7	20.1	18	21.8	>40	30	24 - 187.5
Ammonia	3.41	0.11	0.21	0.18	0.05	0.02	0.06	0.02	0.36	0.02	0.54	0.03	0.02	0.02	0.12	0.04	>0.15	0.15	0.065 - 0.175
Potassium	2	2.4	1.8	1.9	1.9	2.1	1.6	1.7	1.5	1.7	1.3	1.5	1.3	1.2	1.3	1.5	>12	5	-
Dissolved Oxygen	9	4	7	5	11	6	7	6	9	5	4	4	11	6	8	6	-	NAC	-
Total Chromium				<1.5				<1.5				<1.5				<1.5	-	30	37.5
TOC	3	<2	<2	<2	4	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	>50	NAC	-
Boron				230				43				22				20	-	1,000	750
Cadmium				<0.5				<0.5				1				0.6	-	5	3.75
Calcium				25.3				48.5				66.9				70.9	-	200	-
Copper				<7				<7				<7				<7	-	30	1,500
Iron				596				<20				<20				<20	-	200	-
Lead				<5				<5				<5				<5	-	10	18.75
Magnesium				9.5				9.8				10.8				11.3	-	50	-
Manganese				324				125				180				223	-	50	-
Mercury				<1				<1				<1				<1	-	1	0.75
Nickel				<2				<2				<2				<2	-	20	15
Sodium				41.3				17.7				16.6				17	-	150	150
Zinc				<3				<3				4				<3	-	100	-
Fluoride				<0.3				<0.3				<0.3				<0.3	-	1	-
Sulphate				2.51				20.62				28.71				30.76	-	200	187.5
Ortho Phosphate				0.19				<0.06				0.21				0.18	-	0.03	0.035
TON				<0.2				0.7				2.5				3.5	-	NAC	-
Total Cyanide				<0.01				<0.01				<0.01				<0.01	-	0.01	0.0375
Alkalinity				222				168				192				200	-	NAC	-
Total Solids				174				204				249				253	-	-	-
VOCs				ND				ND				ND				ND	-	-	-
sVOCs				ND				ND				ND				ND	-	-	-
Pesticides				ND				ND				ND				ND	-	-	0.375
Total Coliforms				<1				<1				>100				31	-	0	-
Faecal Coliforms				<1				<1				>100				31	-	0	-

Parameter	MW-5S				MW-5D				MW-6S				MW-6D				Trigger Level	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH	7.87	7.89	7.81	7.53	7.98	7.95	7.86	7.54	7.15	7.2	7.06	6.52	7.56	8.12	7.64	6.77	-	> 6.5 & <9.5	-
Electrical Conductivity	347	366	409	378	325	319	285	284	275	328	273	227	242	273	253	229	-	1,000	800 - 1,875
Chloride	20	21.2	23.7	22.8	20.4	19.4	18.4	19.2	25.6	25.1	24.8	17.4	22.6	22	21.1	21.9	>40	30	24 - 187.5
Ammonia	0.05	0.02	0.04	0.06	0.03	0.02	0.09	0.04	0.07	0.03	0.05	0.03	0.02	0.02	0.05	0.02	>0.15	0.15	0.065 - 0.175
Potassium	1.5	1.2	1	1.4	1.4	1.2	1	1.2	0.8	0.7	0.8	1	0.7	0.7	0.6	0.7	>12	5	-
Dissolved Oxygen	9	5	5	7	9	6	4	5	10	8	7	7	11	8	8	7	-	NAC	-
Total Chromium				<1.5				<1.5				5.3				<1.5	-	30	37.5
TOC	2	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	>50	NAC	-
Boron				25				33				21				<12	-	1,000	750
Cadmium				<0.5				<0.5				<0.5				<0.5	-	5	3.75
Calcium				50				31.7				23.9				16.8	-	200	-
Copper				<7				<7				<7				<7	-	30	1,500
Iron				83				36				<20				<20	-	200	-
Lead				<5				<5				<5				<5	-	10	18.75
Magnesium				10.5				8.7				6.7				7	-	50	-
Manganese				46				65				39				<2	-	50	-
Mercury				<1				<1				<1				<1	-	1	0.75
Nickel				<2				<2				<2				<2	-	20	15
Sodium				18.2				16.6				12.4				19.4	-	150	150
Zinc				<3				<3				5				<3	-	100	-
Fluoride				<0.3				<0.3				<0.3				<0.3	-	1	-
Sulphate				19.04				10.2				12.7				8.59	-	200	187.5
Ortho Phosphate				0.08				0.37				<0.06				0.07	-	0.03	0.035
TON				2.4				0.7				1.6				4.8	-	NAC	-
Total Cyanide				<0.01				<0.01				<0.01				<0.01	-	0.01	0.0375
Alkalinity				166				132				90				72	-	NAC	-
Total Solids				211				151				107				122	-	-	-
VOCs				ND				ND				ND				ND	-	-	-
sVOCs				ND				ND				ND				ND	-	-	-
Pesticides				ND				ND				ND				ND	-	-	0.375
Total Coliforms				<1				<1				<1				<1	-	0	-
Faecal Coliforms				<1				<1				<1				<1	-	0	-

Parameter	MW-7S				MW-7D				MW-8S				MW-8D				Trigger Level	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH	7.58	7.34	7.74	7.01	7.36	7.23	7.49	6.84	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	-	> 6.5 & <9.5	-
Electrical Conductivity	384	444	388	342	291	286	328	338	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	-	1,000	800 - 1,875
Chloride	23.4	19.1	12.1	12.8	18	18.8	14.2	12.8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	>40	30	24 - 187.5
Ammonia	0.15	0.47	0.98	0.1	0.07	0.06	0.24	0.11	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	>0.15	0.15	0.065 - 0.175
Potassium	0.6	0.9	1.1	0.6	0.6	0.8	0.7	0.7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	>12	5	-
Dissolved Oxygen	10	8	7	9	10	7	9	7	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	-	NAC	-
Total Chromium				<1.5				<1.5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	-	30	37.5
TOC	4	<2	4	3	2	<2	<2	3	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	>50	NAC	-
Boron				<12				<12	Dry							Dry	-	1,000	750
Cadmium				<0.5				<0.5				Dry				Dry	-	5	3.75
Calcium				38.1				36.6				Dry				Dry	-	200	-
Copper				<7				<7				Dry				Dry	-	30	1,500
Iron				706				105				Dry				Dry	-	200	-
Lead				5				<5				Dry				Dry	-	10	18.75
Magnesium				10.7				10.5				Dry				Dry	-	50	-
Manganese				97				13				Dry				Dry	-	50	-
Mercury				<1				<1				Dry				Dry	-	1	0.75
Nickel				6				<2				Dry				Dry	-	20	15
Sodium				18.8				18.4				Dry				Dry	-	150	150
Zinc				12				3				Dry				Dry	-	100	-
Fluoride				<0.3				<0.3				Dry				Dry	-	1	-
Sulphate				37.16				34.71				Dry				Dry	-	200	187.5
Ortho Phosphate				0.13				0.11				Dry				Dry	-	0.03	0.035
TON				5.7				5				Dry				Dry	-	NAC	-
Total Cyanide				<0.01				<0.01				Dry				Dry	-	0.01	0.0375
Alkalinity				122				122				Dry				Dry	-	NAC	-
Total Solids				197				201				Dry				Dry	-	-	-
VOCs				ND				ND				Dry				Dry	-	-	-
sVOCs				ND				ND				Dry				Dry	-	-	-
Pesticides				ND				ND				Dry				Dry	-	-	0.375
Total Coliforms				>100				>100				Dry				Dry	-	0	-
Faecal Coliforms				>100				>100				Dry				Dry	-	0	-

Private Wells 2015

Parameter	PW-2				PW-3				PW-6				PW-7				S.I. 122 of 2014	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH			7.76	7.83			8.18	7.87			7.86	7.82			7.99	7.93	-	> 6.5 & <9.5	-
Electrical Conductivity			226	223			260	262			278	279			381	417	2,500	1,000	800 - 1,875
Chloride			20.1	21.4			15.9	16.9			20.4	21.8			18	14	250	30	24 - 187.5
Ammonia			0.06	0.02			0.16	0.02			0.1	0.03			0.1	0.02	0.3	0.15	0.065 - 0.175
Potassium			0.7	0.8			0.6	0.6			0.7	0.7			0.8	0.8	-	5	-
Dissolved Oxygen			8	8			6	7			6	6			7	6	-	NAC	-
TOC			<2	<2			<2	<2			<2	<2			<2	<2	NAC	NAC	-

Parameter	PW-11				PW-12				PW-13				PW-13(2)				S.I. 122 of 2014	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH			7.86	8.21			7.87	7.95			8.17	7.93			8.01	8.11	-	> 6.5 & <9.5	-
Electrical Conductivity			470	432			333	322			412	475			426	390	2,500	1,000	800 - 1,875
Chloride			17	30.4			18.7	19.8			28	18.1			13.1	18.4	250	30	24 - 187.5
Ammonia			0.09	0.02			0.08	0.02			0.07	0.02			0.08	0.02	0.3	0.15	0.065 - 0.175
Potassium			0.9	0.4			0.9	1.1			0.5	1			0.7	0.9	-	5	-
Dissolved Oxygen			4	6			7	6			6	5			4	6	-	NAC	-
TOC			<2	<2			<2	<2			<2	<2			<2	<2	NAC	NAC	-

Parameter	PW-20				PW-23				PW-25				PW-40				S.I. 122 of 2014	IGV	GTV
	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4	Q-1	Q-2	Q-3	Q-4			
pH			8.53	8.55			7.96	8.02			8.12	8.14				8.05	-	> 6.5 & <9.5	-
Electrical Conductivity			261	257			210	206			296	304				251	2,500	1,000	800 - 1,875
Chloride			23.5	25.3			17.8	19.1			19.6	21.3				25.5	250	30	24 - 187.5
Ammonia			0.05	0.03			0.02	0.02			0.36	0.02				0.04	0.3	0.15	0.065 - 0.175
Potassium			0.8	1			0.7	0.8			0.6	0.6				1	-	5	-
Dissolved Oxygen			7	5			9	7			5	5				6	-	NAC	-
TOC			<2	<2			<2	<2			<2	<2				<2	NAC	NAC	-

Surface Water Data 2015

SW-1					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	6.78	6.24	7.47	7.02	6 - 9
Electrical Conductivity	152	207	159	215	1000
Chloride	18.3	19.7	17.9	18	250
Ammoniacal Nitrogen	0.13	0.11	0.02	0.08	0.14
Total Suspended Solids	10	<10	<10	<10	
Dissolved Oxygen	8	9	10	10	
BOD	<1	<1	<1	<1	2.6
COD	62	<7	8	<7	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				5.2	250
Copper				22	30
Iron				96	1000
Lead				<5	10
Magnesium				1.2	
Manganese				60	300
Mercury				<1	1
Nickel				<2	50
Potassium				0.3	
Sodium				10.4	
Zinc				47	100
Sulphate				2.83	200
Ortho Phosphate				<0.06	0.075
Total Oxidised Nitrogen				<0.2	
Total Alkalinity				20	

SW-2					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.02	6.91	7.62	7.44	6 - 9
Electrical Conductivity	213	266	237	206	1000
Chloride	29.1	28.8	25.7	16.4	250
Ammonia	0.29	0.05	0.03	0.13	0.14
Total Suspended Solids	213	<10	<10	10	
Dissolved Oxygen	6	10	10	10	
BOD	<1	<1	<1	6	2.6
COD	40	<7	<7	72	
Total Chromium		<1	<1	<1.5	30
Boron		13	<7	<12	2000
Cadmium				<0.5	5
Calcium				16	250
Copper				<7	30
Iron				397	1000
Lead				<5	10
Magnesium				4.4	
Manganese				43	300
Mercury				<1	1
Nickel				<2	50
Potassium				6.3	
Sodium				10.1	
Zinc				7	100
Sulphate				11.74	200
Ortho Phosphate				0.6	0.075
Total Oxidised Nitrogen				1.3	
Total Alkalinity				60	

SW-3					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	6.99	7.92	7.58	7.5	6 - 9
Electrical Conductivity	203	212	179	218	1000
Chloride	30.8	19.1	17.2	16	250
Ammonia	0.44	0.09	0.09	0.15	0.14
Total Suspended Solids	70	<10	<10	14	
Dissolved Oxygen	8	10	10	10	
BOD	<1	<1	<1	1	2.6
COD	46	<7	<7	69	
Total Chromium		<1	1	<1.5	30
Boron		16	<7	<12	2000
Cadmium				<0.5	5
Calcium				15.2	250
Copper				<7	30
Iron				312	1000
Lead				<5	10
Magnesium				7	
Manganese				62	300
Mercury				<1	1
Nickel				<2	50
Potassium				7.6	
Sodium				8.7	
Zinc				5	100
Sulphate				7.01	200
Ortho Phosphate				0.39	0.075
Total Oxidised Nitrogen				1.4	
Total Alkalinity				72	

SW-4					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.16	7.65	7.88	7.55	6 - 9
Electrical Conductivity	215	187	160	337	1000
Chloride	28.8	16.7	17.2	14	250
Ammonia	0.47	0.03	0.02	0.05	0.14
Total Suspended Solids	69	<10	<10	15	
Dissolved Oxygen	8	10	10	10	
BOD	<1	<1	<1	2	2.6
COD	48	<7	31	46	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				20.8	250
Copper				<7	30
Iron				258	1000
Lead				<5	10
Magnesium				5.2	
Manganese				70	300
Mercury				<1	1
Nickel				<2	50
Potassium				2.7	
Sodium				8.9	
Zinc				<3	100
Sulphate				22.9	200
Ortho Phosphate				0.07	0.075
Total Oxidised Nitrogen				1	
Total Alkalinity				60	

SW-5					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.26	7.6	7.6	7.57	6 - 9
Electrical Conductivity	226	322	324	220	1000
Chloride	27.3	23.4	24.4	16.7	250
Ammonia	0.4	0.05	0.04	0.16	0.14
Total Suspended Solids	352	<10	<10	16	
Additional Q4 TSS Sampling	-	-	-	<2	
Dissolved Oxygen	6	9	10	10	2.6
BOD	<1	<1	1	5	2.6
COD	45	9	9	70	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				20.9	250
Copper				<7	30
Iron				369	1000
Lead				<5	10
Magnesium				5.1	
Manganese				33	300
Mercury				<1	1
Nickel				<2	50
Potassium				6.4	
Sodium				10.8	
Zinc				8	100
Sulphate				15.72	200
Ortho Phosphate				0.5	0.075
Total Oxidised Nitrogen				1.5	
Total Alkalinity				76	

SW-6					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.35	7.7	7.77	6.6	6 - 9
Electrical Conductivity	231	314	249	276	1000
Chloride	20.9	23.2	21.9	17.6	250
Ammonia	0.35	0.04	0.03	0.15	0.14
Total Suspended Solids	113	<10	<10	14	
Dissolved Oxygen	8	10	10	10	
BOD	<1	<1	1	4	2.6
COD	36	<7	8	49	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				29.3	250
Copper				<7	30
Iron				236	1000
Lead				<5	10
Magnesium				7.1	
Manganese				25	300
Mercury				<1	1
Nickel				<2	50
Potassium				5.2	
Sodium				11.7	
Zinc				3	100
Sulphate				23.15	200
Ortho Phosphate				0.23	0.075
Total Oxidised Nitrogen				2.2	
Total Alkalinity				86	

SW-7					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.01	7.63	7.55	6.69	6 - 9
Electrical Conductivity	236	391	330	225	1000
Chloride	20.3	25.9	23.1	17.9	250
Ammonia	0.34	0.07	0.04	0.08	0.14
Total Suspended Solids	109	<10	61	<10	
Dissolved Oxygen	8	10	10	10	
BOD	<1	<1	<1	3	2.6
COD	42	<7	10	58	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				29.3	250
Copper				<7	30
Iron				236	1000
Lead				<5	10
Magnesium				7.1	
Manganese				25	300
Mercury				<1	1
Nickel				<2	50
Potassium				5.4	
Sodium				11.7	
Zinc				5	100
Sulphate				23.07	200
Ortho Phosphate				0.37	0.075
Total Oxidised Nitrogen				2.2	
Total Alkalinity				86	

SW-8					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.3	7.25	7.66	7.67	6 - 9
Electrical Conductivity	231	262	236	204	1000
Chloride	28	28.8	25.7	16.3	250
Ammonia	0.28	0.02	0.02	0.12	0.14
Total Suspended Solids	422	<10	<10	<10	
Additional Q4 TSS Sampling	-	-	-	<2	
Dissolved Oxygen	7	10	10	9	
BOD	6	<1	<1	5	2.6
COD	43	<7	9	73	
Total Chromium				<1.5	30
Boron				<12	2000
Cadmium				<0.5	5
Calcium				17.3	250
Copper				<7	30
Iron				396	1000
Lead				<5	10
Magnesium				4.7	
Manganese				36	300
Mercury				<1	1
Nickel				<2	50
Potassium				6.7	
Sodium				10.9	
Zinc				5	100
Sulphate				12.33	200
Ortho Phosphate				0.58	0.075
Total Oxidised Nitrogen				1.4	
Total Alkalinity				60	

SW-9					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.79	7.83	7.35	7.78	6 - 9
Electrical Conductivity	389	447	568	542	1000
Chloride	14.6	16.6	25.6	24	250
Ammonia	0.16	0.08	0.07	0.28	0.14
Total Suspended Solids	678	<10	<10	13	
Additional Q4 TSS Sampling	-	-	-	27	
Dissolved Oxygen	8	10	9	9	
BOD	<1	<1	<1	2	2.6
COD	112	<7	22	28	
Total Chromium				<1.5	30
Boron				27	2000
Cadmium				<0.5	5
Calcium				77	250
Copper				<7	30
Iron				25	1000
Lead				<5	10
Magnesium				11.8	
Manganese				15	300
Mercury				<1	1
Nickel				<2	50
Potassium				6	
Sodium				14.5	
Zinc				<3	100
Sulphate				91.78	200
Ortho Phosphate				0.1	0.075
Total Oxidised Nitrogen				4.9	
Total Alkalinity				130	

SW-10					SW EQS
Parameter	Q1	Q2	Q3	Q4	
pH	7.56	7.54	7.42	7.3	6 - 9
Electrical Conductivity	412	404	446	467	1000
Chloride	23.8	15.9	21.9	21	250
Ammonia	0.39	0.1	0.1	0.09	0.14
Total Suspended Solids	201	<10	<10	79	
Additional Q4 TSS Sampling	-	-	-	19	
Dissolved Oxygen	8	9	9	9	
BOD	<1	3	1	3	2.6
COD	53	13	27	28	
Total Chromium				3.7	30
Boron				27	2000
Cadmium				<0.5	5
Calcium				66	250
Copper				<7	30
Iron				1147	1000
Lead				<5	10
Magnesium				10.1	
Manganese				101	300
Mercury				<1	1
Nickel				2	50
Potassium				6.8	
Sodium				13.6	
Zinc				21	100
Sulphate				76.62	200
Ortho Phosphate				0.08	0.075
Total Oxidised Nitrogen				2	
Total Alkalinity				136	

Leachate Data 2015

LP-1

Parameter	Units	Q-1	Q-2	Q-3	Q-4
pH	pH Units	-	7.94	7.9	7.98
Electrical Conductivity	µS/cm	-	26033	29924	27,335
Chloride	mg/l	-	1961.7	2536.3	2,031.5
Ammoniacal Nitrogen	mg/l	-	2741.95	3042.67	2,794.86
BOD	mg/l	-	455	615	ND
COD	mg/l	-	4470	5780	4,630
Boron	ug/l				8,688
Cadmium	ug/l				<2.5
Calcium	mg/l				40.6
Copper	ug/l				336
Iron	ug/l				4,008
Lead	ug/l				<25
Magnesium	mg/l				66
Manganese	ug/l				481
Mercury	ug/l				<5
Nickel	ug/l				196
Potassium	mg/l				848.1
Sodium	mg/l				1,760
Zinc	ug/l				216
Total Chromium	ug/l				528.4
Fluoride	mg/l				1.1
Sulphate	mg/l				40.64
Orthophosphate	mg/l				68.61
Total Oxidised Nitrogen	mg/l				<0.2
Total Cyanide	mg/l				0.25

LP-2/5					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	8.31	8.43	8.12	-
Electrical Conductivity	µS/cm	40233	39262	38097	-
Chloride	mg/l	3537.2	3442.4	3361	-
Ammoniacal Nitrogen	mg/l	55.99	54.38	4093.48	-
BOD	mg/l	24820	24950	11260	-
COD	mg/l	39920	39920	25080	-
Boron	ug/l				-
Cadmium	ug/l				-
Calcium	mg/l				-
Copper	ug/l				-
Iron	ug/l				-
Lead	ug/l				-
Magnesium	mg/l				-
Manganese	ug/l				-
Mercury	ug/l				-
Nickel	ug/l				-
Potassium	mg/l				-
Sodium	mg/l				-
Zinc	ug/l				-
Total Chromium	ug/l				-
Fluoride	mg/l				-
Sulphate	mg/l				-
Orthophosphate	mg/l				-
Total Oxidised Nitrogen	mg/l				-
Total Cyanide	mg/l				-

LP-3					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	7.95	7.99	-	-
Electrical Conductivity	µS/cm	28864	28974	-	-
Chloride	mg/l	2765.7	2831.7	-	-
Ammoniacal Nitrogen	mg/l	2662.14	3169.98	-	-
BOD	mg/l	544	390	-	-
COD	mg/l	7120	6380	-	-
Boron	ug/l				-
Cadmium	ug/l				-
Calcium	mg/l				-
Copper	ug/l				-
Iron	ug/l				-
Lead	ug/l				-
Magnesium	mg/l				-
Manganese	ug/l				-
Mercury	ug/l				-
Nickel	ug/l				-
Potassium	mg/l				-
Sodium	mg/l				-
Zinc	ug/l				-
Total Chromium	ug/l				-
Fluoride	mg/l				-
Sulphate	mg/l				-
Orthophosphate	mg/l				-
Total Oxidised Nitrogen	mg/l				-
Total Cyanide	mg/l				-

LP-6					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	8.03	8.04	7.95	-
Electrical Conductivity	µS/cm	35112	34127	34076	-
Chloride	mg/l	3392	3313.5	3197.8	-
Ammoniacal Nitrogen	mg/l	3619.39	3632.3	3543.98	-
BOD	mg/l	3360	1045	3920	-
COD	mg/l	15880	14540	14080	-
Boron	ug/l				-
Cadmium	ug/l				-
Calcium	mg/l				-
Copper	ug/l				-
Iron	ug/l				-
Lead	ug/l				-
Magnesium	mg/l				-
Manganese	ug/l				-
Mercury	ug/l				-
Nickel	ug/l				-
Potassium	mg/l				-
Sodium	mg/l				-
Zinc	ug/l				-
Total Chromium	ug/l				-
Fluoride	mg/l				-
Sulphate	mg/l				-
Orthophosphate	mg/l				-
Total Oxidised Nitrogen	mg/l				-
Total Cyanide	mg/l				-

LP-7					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	7.82	7.76	7.71	7.81
Electrical Conductivity	µS/cm	31830	32172	32890	36,361
Chloride	mg/l	3284	3362.2	3396.1	3,547.3
Ammoniacal Nitrogen	mg/l	3040.84	3228.95	3055.86	3,498.95
BOD	mg/l	758	640	690	ND
COD	mg/l	6560	7060	7220	7,660
Boron	ug/l				12,000
Cadmium	ug/l				<2.5
Calcium	mg/l				77.4
Copper	ug/l				260
Iron	ug/l				4,799
Lead	ug/l				<25
Magnesium	mg/l				101
Manganese	ug/l				1,258
Mercury	ug/l				<5
Nickel	ug/l				332
Potassium	mg/l				1,300
Sodium	mg/l				2,765
Zinc	ug/l				316
Total Chromium	ug/l				987.3
Fluoride	mg/l				1.4
Sulphate	mg/l				132.84
Orthophosphate	mg/l				95.63
Total Oxidised Nitrogen	mg/l				<0.2
Total Cyanide	mg/l				0.14

LP-9					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	7.79	7.91	7.82	7.93
Electrical Conductivity	µS/cm	20498	25077	22482	23,087
Chloride	mg/l	1962	2682.7	2329	2,299.2
Ammoniacal Nitrogen	mg/l	1766.06	2192.13	1942.22	1,904.37
BOD	mg/l	446	130	320	ND
COD	mg/l	3544	5100	4540	4,030
Boron	ug/l				90,430
Cadmium	ug/l				21.1
Calcium	mg/l				144.8
Copper	ug/l				285
Iron	ug/l				18,900
Lead	ug/l				256
Magnesium	mg/l				125.5
Manganese	ug/l				6,816
Mercury	ug/l				<5
Nickel	ug/l				2,511
Potassium	mg/l				1,178
Sodium	mg/l				2,325
Zinc	ug/l				1,279
Total Chromium	ug/l				5,065
Fluoride	mg/l				1
Sulphate	mg/l				61.36
Orthophosphate	mg/l				42.55
Total Oxidised Nitrogen	mg/l				<0.2
Total Cyanide	mg/l				0.15

LP-10					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	7.81	8.09	7.97	7.97
Electrical Conductivity	µS/cm	21382	26927	25351	27,930
Chloride	mg/l	2884.8	3820.6	3144.6	2,073.7
Ammoniacal Nitrogen	mg/l	1651.52	2194.38	2230.07	2,751.7
BOD	mg/l	622	690	320	ND
COD	mg/l	3720	6240	6400	4,460
Boron	ug/l				8,616
Cadmium	ug/l				<2.5
Calcium	mg/l				50.1
Copper	ug/l				2,424
Iron	ug/l				3,183
Lead	ug/l				161
Magnesium	mg/l				81.2
Manganese	ug/l				472
Mercury	ug/l				<5
Nickel	ug/l				206
Potassium	mg/l				1,135
Sodium	mg/l				2,344
Zinc	ug/l				2,474
Total Chromium	ug/l				516.1
Fluoride	mg/l				1.3
Sulphate	mg/l				52.21
Orthophosphate	mg/l				64.82
Total Oxidised Nitrogen	mg/l				<0.2
Total Cyanide	mg/l				0.15

Lagoon					
Parameter	Units	Q1	Q2	Q3	Q4
pH	pH Units	7.93	7.94	7.89	8.02
Electrical Conductivity	µS/cm	25083	24936	22663	27,157
Chloride	mg/l	2592.1	2739.1	2487.2	2,905.4
Ammoniacal Nitrogen	mg/l	2238.98	2435.97	1932.69	2,475.57
BOD	mg/l	702	960	965	ND
COD	mg/l	5660	6200	5500	6,150
Boron	ug/l				13,750
Cadmium	ug/l				<2.5
Calcium	mg/l				141.9
Copper	ug/l				<35
Iron	ug/l				2,420
Lead	ug/l				34
Magnesium	mg/l				143.5
Manganese	ug/l				761
Mercury	ug/l				<5
Nickel	ug/l				297
Potassium	mg/l				1,651
Sodium	mg/l				3,618
Zinc	ug/l				195
Total Chromium	ug/l				793.6
Fluoride	mg/l				3
Sulphate	mg/l				107.1
Orthophosphate	mg/l				55.53
Total Oxidised Nitrogen	mg/l				<0.2
Total Cyanide	mg/l				0.13

Landfill Gas Data 2015

Landfill Gas Results 2015 Ballynagran W0165-02

Sample Station Number	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂
	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)
MG000001	3.9	1.4	1	0.2	0.4	0	0.3	0	0.3	1.1	0.4	0.5
MG000002	0.8	3.6	2.7	3.7	0.5	2.7	2.9	3.4	4.1	1.5	0.3	4.3
MG000003	0.4	1.5	1.2	0.1	0.6	0	0.1	0.2	0.1	0.1	0.2	0.4
MG000004	2.7	2.2	0.7	2.5	0.8	0.2	2.6	na	na	2.8	2.6	3
MG000005	0.6	8.5	2.1	8.2	0.9	4.6	10.2	9.4	10.5	8.5	8.8	9.3
MG000006	Flooded	0.9	0.2	0.6	0.9	0.1	0.5	0.5	0.4	0.9	1	1.1
MG000007	Flooded	1.5	Flooded	1	0.9	0	0.6	0.1	0.4	1.3	1.4	2.1
MG000008	4	0.8	3.9	0.8	0.7	0.1	1	1.7	0.2	3.1	0.1	1.4
MG000009	4.9	3.7	3.1	0.3	0.5	0.1	0.8	4	4.3	0.1	0.1	1.8
MG000010	3.2	0.1	2.8	0.1	0.2	0.4	3.5	3.7	0.2	0.1	4.2	4.4
MG000011	0.2	0.7	2	3.1	0.2	0.1	3.1	0.3	3.3	4.3	3.5	3.7
MG000012	0.1	0.9	1.1	0.7	0.8	0.1	0.5	3.1	0.4	1.6	1.4	1.8
MG000013	0.8	0.9	1.3	0.1	1	0.1	0.1	0.3	0.3	1.8	0.9	1.2
MG000014	0.4	1.6	1.7	0.8	1.3	1.8	1.5	2.1	2.2	2.6	2.3	2.4
MG000015	0.5	1.2	1	0.4	1.9	0.1	0.2	0.2	0.2	0.5	0.3	2.1
MG000016	0.1	4.4	6.1	5.8	4	6.5	7.3	7	7.5	7	6.4	5.5
MG000017	2.4	0.4	0.2	0.5	1	4.3	8.7	10.2	10.4	8.1	3.1	0.7
MG000018	0.6	0.5	0.8	0.4	1.6	0.6	0.6	0.1	0.1	0.1	1.4	1.6
MG000019	Flooded	1.4	0.7	0.4	1.8	0.1	1.9	0.7	0.1	0.1	1.1	1.6
MG000020	Flooded	4.7	Flooded	5.5	2.8	3	5.1	Flooded	Flooded	5.1	5.5	5
MG000021	-	-	1.3	0.1	0.8	0.1	0.6	0.1	0.2	0.1	1.1	2
MG000022	-	-	-	0.1	0	0.1	0.9	0.1	0.1	0.1	0.3	2.4
MG000023	-	-	-	0.1	2.4	0.1	1	0.1	0.1	3.3	0.1	1.5
MG000046	1	11.5	13.1	10.6	1.4	3.5	8.6	3.8	2.1	3.7	1.4	0.6
MG000047	0.8	1.6	1.8	0.7	0.6	0	1.8	1.2	0.4	2.9	2.2	1
MG000048	0.2	1.7	0	0.1	0.3	0	0.1	0	0.1	0.1	0.5	0.3
MG000049	-	-	1.4	0.5	0.4	0	0.1	0.1	0.1	0.4	0.3	1.2

Noise Data 2015

Noise Results 2015 Ballynagran W0165-02 Q1

Location	Time	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)				Comments
		L _{Aeq}	L _{A10}	L _{A90}	Specific level*	
NL1	1051-1106	51	54	47	<47	Site: Plant reversing alarms audible at low level on breeze – compactor flat spectrum alarm, and also conventional alarms (although unclear if latter from landfill plant or M11 works plant near landfill entrance). Ejector trailer in cell 1056-58 also audible at low level on breeze. Extraneous: Rustling trees dominant due to exposed position. Distant N11 traffic audible during breeze lulls. Local birdsong.
NL2	0935-0950	49	50	43	47	Site: Sporadic truck and crew vehicles on adjacent haul road dominant when present. Plant in cell area faintly audible, screened by embankment and breeze direction. Extraneous: N11 traffic continuously clearly. M11 works plant reversing alarms also audible at low level. Sporadic road traffic outside site boundary clearly audible when present. Birdsong and crows. Aircraft. Rustling vegetation significant at times.
NL3	1011-1026	57	61	51	<51	interval. No other sources audible due to masking by rustling vegetation. Extraneous: Rustling vegetation significant at this location, masking most other sources other than N11 traffic and M11 works plant audible at low level in distance. Local birdsong.
NL4	0906-0921	45	47	38	<38	Site: Plant reversing alarms on mound faintly audible on occasion. Extraneous: Distant M11 works plant and N11 traffic audible at low level in background, generally masked by breeze through nearby trees. Bird song/calls, aircraft. Slurry vacuum tanker or similar slightly audible in distance to SW for several minutes.
NSL1	0842-0857	49	48	40	<40	Site: Truck movements on nearest point of haul road slightly audible on occasion, generally masked by lightly rustling trees. Dozer near site SW corner also slightly audible at times. Extraneous: Lightly rustling trees in nearby hedgerows generally masking most sources, although N11 traffic almost continuously audible at low level in background. Trucks and reversing alarms associated with M11 works audible in distance. Bird song/calls. Distant dog barking. Sporadic local road traffic dominant when present.
NSL2	0823-0838	60	58	46	<46	Site: Truck movements on site access road and nearest haul road occasionally slightly audible. Extraneous: M11 works in vicinity of site entrance continuously clearly audible from various plant and frequent trucks, with occasional use of road sweeper truck dominant when present. Distant M11 works plant, particularly reversing alarms, also audible at low level. Occasional passing local road traffic dominant when present. Birdsong and crows. Aircraft. N11 traffic continuously clearly audible in background. Rustling vegetation of minor significance.
NSL3	1133-1148	60	63	55	<55	Site: No site emissions audible. Extraneous: N11 traffic continuously dominant. Intermittent traffic on local road to S also significant, particularly truck movements associated with M11 works. M11 works plant in nearby work zone continuously significant, with continuously running engine or generator at approx. 100 m codominant with N11 traffic. No other noise audible apart from local birdsong.

*Specific level: L_{Aeq} level considered attributable to facility during interval, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, spectral statistics and near field correction if applicable.

Noise Results 2015 Ballynagran W0165-02 Q2

Location	Time	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)				Comments
		L _{Aeq}	L _{A10}	L _{A90}	Specific level*	
NL1	1559 - 1614	41	41	37	<<37	Site: No site emissions audible. Extraneous: Breeze through nearby trees continuously audible at low level, partially masking distant N11 traffic to NE and E. Bird song/calls. Reversing alarms on M11 works plant to E regularly slightly audible. Low altitude aircraft pass at start of interval significance.
NL2	1512 - 1527	51	52	41	49	Site: Sporadic truck and crew vehicles on adjacent haul road dominant when present. Wheeled compactor flat spectrum reversing alarm on mound slightly audible, partially masked by lightly rustling vegetation and screened by embankment. Extraneous: Lightly rustling trees nearby significant. N11 traffic to NE continuously audible at low level. Sporadic road traffic outside site boundary clearly audible when present, Birdsong and crows. Light aircraft at low altitude throughout interval significant.
NL3	1538 - 1553	49	52	44	<44	Site: Wheeled compactor flat spectrum reversing alarm slightly audible throughout most of interval. Excavator and dozer emissions screened by intervening berm. Extraneous: N11 traffic continuously audible at low level in distance, partially masked by rustling trees nearby. Crows locally significant. Birdsong.
NL4	1435 - 1450	47	49	40	<40	Site: Wheeled compactor on mound and excavator and/or dozer onsite audible at low level on breeze. Extraneous: Distant N11 traffic faintly audible, almost entirely masked by rustling trees nearby. Crow calls continuously significant. Birdsong. Low altitude aircraft pass at start of interval significance.
NSL1	1414 - 1429	48	51	42	45	Site: Excavator operating near W boundary clearly audible continuously, in addition to wheeled compactor on mound, with LAF typically ranging 44 - 51dB. No other site emissions audible apart from occasional ejector trailer donkey engines audible at low level. Extraneous: Light rustling trees nearby masking distant road noise. Bird song/calls. Sporadic local road traffic dominant when present. Light aircraft at low altitude continuously significant from 1423.
NSL2	1354 - 1409	55	56	48	44	Site: Vacuum tanker operating near S boundary continuously audible at low level. Truck movements on site access road and nearest haul road occasionally slightly audible. Extraneous: Intermittent passing local traffic dominant when present, and audible on new alignment approaches. N11 traffic also audible continuously at low level, with N-bound traffic using new road. Birdsong and crows. Aircraft. Light rustling trees nearby continuously audible at low level.
NSL3	1333 - 1348	55	58	49	<<55	Site: No site emissions audible. Extraneous: Traffic noise continuously dominant, from N11, adjacent local road and nearby new interchange (busy, as south bound N11 traffic currently routed through it). No other noise apart from local birdsong and occasional dog barking at dwelling 200m to N.

*Specific level: LAeq level considered attributable to facility during interval, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, spectral statistics and near field correction if applicable.

Noise Results 2015 Ballynagran W0165-02 Q3

Location	Time	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)				Comments
		L _{Aeq}	L _{A10}	L _{A90}	Specific level*	
NL1	0854-0909	40	41	36	<36	Site: No emissions audible, apart from faintly audible ejector trailer on 2 occasions. Extraneous: M11 traffic to NE continuously audible at low level. Bird song/calls, aircraft and lightly rustling trees. LFN heard during interval, with energy detected in 25 Hz band. Source unidentified.
NL2	0806-0821	58	62	46	58	Site: Regular stream of trucks passing on adjacent haul road dominant, in addition to plant (tracked excavator, tractor, 6x6 dump truck) and crew vehicles heading to cell area. Wheeled compactor flat spectrum alarm in cell and tracked excavators on mound audible at low level on occasion. Extraneous: Sporadic road traffic audible at low level outside boundary. Distant traffic also audible. Bird song/calls and aircraft. Lightly rustling vegetation.
NL3	0831-0846	55	51	44	55	Site: Plant operating in active cell and on mound continuously audible at low level. Sporadic truck movements on nearby haul road, recently relocated onsite, clearly audible when present, with ejector trailer on one dominant for 1 min at 0845. Extraneous: M11 traffic to NE continuously clearly audible. Lightly rustling trees nearby continuously clearly audible. Bird song and crow calls. Aircraft.
NL4	1003-1018	61	54	43	40	Site: Flat spectrum alarm and excavator buckets slightly audible on mound, in addition to ejector trailer donkey engine to 1010. Site emissions partially masked by local rustling trees. Extraneous: Distant traffic slightly audible continuously. Tractor passing measurement position 1008 dominant. Bird song/calls and aircraft. Rustling trees continuously significant.
NSL1	0942-0957	52	49	40	45	Site: Ejector trailer operation x1 on mound clearly audible on breeze until 0944. Wheeled compactor white spectrum alarm and excavator buckets also clearly audible on occasion. Sporadic truck movements on nearest haul road audible at low level. Extraneous: Distant road traffic continuously audible at low level. Sporadic passing traffic dominant when present. Lightly rustling vegetation, and bird song/calls and aircraft.
NSL2	0923-0938	54	54	44	<44	Site: Excavator bucket on nearside of mound audible at low level from time to time. Occasional truck movements through weighbridge area clearly audible. Extraneous: Wheeled excavator operating at 150 m on road project continuously clearly audible. Contractors talking adjacent to measurement position 0935-0937. Sporadic passing road traffic dominant when present. Distant M11 traffic to E and NE continuously clearly audible. Bird song/calls, aircraft and lightly rustling vegetation.
NSL3	1027-1042	54	48	44	<44	Site: No site emissions audible, apart from ejector trailer donkey engine slightly audible during last 10 min. Extraneous: M11 road traffic continuously clearly audible. Intermittent passing traffic dominant when present. Bird song/calls, aircraft, and rustling palm tree leaves at 100 m.

*Specific level: L_{Aeq} level considered attributable to facility during interval, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, spectral statistics and near field correction if applicable.

Noise Results 2014 Ballynagran W0165-02 Q4

Location	Time	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)				Comments
		L _{Aeq}	L _{A10}	L _{A90}	Specific level*	
NL1	0847-0902	46	48	43	<43	Facility: Plant emissions on mound area continuously slightly audible on breeze. Ejector trailer donkey engine audible at low level until 0853. Extraneous: Distant road traffic continuously slightly audible in background. Bird song/calls, aircraft and lightly rustling trees.
NL2	0802-0817	51	52	42	51	Facility: Sporadic vehicle movements passing on adjacent haul road dominant when present. No other emissions audible. Extraneous: M11 road traffic continuously audible at low level, dominating background noise environment. Intermittent traffic on local roads to S also clearly audible. Bird song/calls and aircraft.
NL3	0826-0841	50	53	46	50	Facility: Tracked excavators and compactor in active cell area continuously audible at low level. Occasional truck movements on nearest haul road more clearly audible. L _{Aeq} representative of site emissions. Extraneous: M11 traffic audible at low level continuously in background. Bird song/calls, aircraft and lightly rustling vegetation.
NL4	1639-1654	43	44	41	<41	Facility: Compactor engine on mound slightly audible on breeze. Reversing alarm also audible at low level. Extraneous: Distant M11 traffic continuously audible at low level to NE, E, SE and S. Aircraft. Bird song/calls absent.
NSL1	1617-1632	56	51	47	<47	Facility: No emissions audible apart from faintly audible compactor reversing alarm on occasion. Extraneous: Sporadic passing local traffic dominant when present. Continuous emissions audible from M11 traffic and nearby watercourse in spate. Bird song/calls and aircraft.
NSL2	1559-1614	59	61	48	<48	Facility: Truck or plant idling near maintenance garage until 1603 slightly audible. Sporadic vehicle movements on site access road also slightly audible. Extraneous: Intermittent passing road traffic dominant when present. M11 traffic continuously clearly audible and dominating noise environment. Bird song/calls and aircraft.
NSL3	1702-1717	61	65	51	<<51	Facility: No emissions audible. Extraneous: Intermittent passing local traffic dominant when present, and audible on approaches and through nearby interchange. M11 traffic consistently clearly audible, dominating ambient environment and masking all other noise.

*Specific level: L_{Aeq} level considered attributable to facility during interval, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, spectral statistics and near field correction if applicable.

Dust Data 2015

Dust Results 2015 Ballynagran W0165-02													Emission Limit (mg/m ² /day)
	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	
AD6	80	40	36	183	10	407	93	32	113	15.71	3.14	2.52	350
AD7	*	*	*	*	*	*	*	*	*	*	*	*	350
AD8	26	69	225	20	64	191	***	30	67	4.32	5.67	3.53	350
AD9	100	75	88	40	568	204	54	50	***	8.86	18.46	3.53	350
AD10	**	**	**	**	**	**	**	***	***	**	**	**	350
AD11	162	***	135	240	24	***	***	55	4	19.86	10.21	13.13	350
AD12	**	**	**	**	**	**	**	**	**	**	**	**	350

* - no access to lands

** - dust jar removed due to N11 roadwork's commencement

*** - dust jar damaged or contaminated and not suitable for analysis.

PM10 Data 2015

PM10 Results 2015 Ballynagran W0165-02				
Location	March 2015 Concentration (µg/m3)	May 2015 Concentration (µg/m3)	September 2015 Concentration (µg/m3)	December 2015 Concentration (µg/m3)
Location PM1	7	6	5	6
Location PM2	9	7	8	7
Location PM3	6	5	7	8
Location PM4	7	6	5	6
Limit Value	50	50	50	50

APPENDIX 4

E-PRTR Returns



Environmental Protection Agency

| PRTR# : W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Return Year : 2015 |

[Guidance to completing the PRTR workbook](#)

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2015
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1. FACILITY IDENTIFICATION

Parent Company Name	Ballynagran Landfill Limited
Facility Name	Ballynagran Residual Landfill
PRTR Identification Number	W0165
Licence Number	W0165-02

Classes of Activity

No.	class name
-	Refer to PRTR class activities below

Address 1	Ballynagran
Address 2	Coolbeg and Kilcandra
Address 3	
Address 4	
	Wicklow
Country	Ireland
Coordinates of Location	-8.41098 51.914
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Tomas Fingleton
AER Returns Contact Email Address	tomas.fingleton@landfills.ie
AER Returns Contact Position	Landfill Manager
AER Returns Contact Telephone Number	0867741813
AER Returns Contact Mobile Phone Number	0867741813
AER Returns Contact Fax Number	045 482629
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	10
User Feedback/Comments	Methane variance due to data input error in previous year.
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?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

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

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

[Link to previous years emissions data](#)

| PRTR#: W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Return Year : 2015 |

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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	Emission Point 4	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
			Method Code	Designation or Description								
02	Carbon monoxide (CO)	C	EN 15058:2004		5.79	672.4	4523.355	3704.98	8906.525	0.0	0.0	
08	Nitrogen oxides (NOx/NO2)	C	EN 14792:2005		211.14	273.34	2158.61	1375.72	4018.81	0.0	0.0	
11	Sulphur oxides (SOx/SO2)	C	OTH	TGN 21	4060.03	1664.43	11114.38	9006.98	25845.82	0.0	0.0	
01	Methane (CH4)	C	OTH	GasSim Lite Estimate and gas utilisation data	0.0	0.0	0.0	0.0	558733.0	0.0	558733.0	
					0.0	0.0	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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

RELEASERS TO AIR		METHOD		Please enter all quantities in this section in KGs				
Pollutant No.	POLLUTANT Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					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	Ballynagran Residual Landfill				
	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
			Method Code	Designation or Description	
Total estimated methane generation (as per site model)	5890000.0	C	OTH	Gassim Lite	N/A
Methane flared	531701.0	M	OTH	Facility on-site monitoring	0.0 (Total Flaring Capacity)
Methane utilised in engine/s	4799566.0	M	OTH	Facility on-site monitoring	0.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	558733.0	C	OTH	Model and monitoring data	N/A

4.2 RELEASES TO WATERS

[Link to previous years emissions data](#)

| PRTR#: W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Return Year : 2015 |

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

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

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Ret

03/05/2016 17:00

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			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					0.0	0.0	0.0	0.0

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

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

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

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

4.4 RELEASES TO LAND

[Link to previous years emissions data](#)

| PRTR# : W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Return Year : 2015 |

03/05/2016 17:00

SECTION A : PRTR POLLUTANTS

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

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

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

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

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0165 | Facility Name : Ballynagran Residual Landfill | Filename : W0165_2015.xls | Return Year : 2015 |

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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	Haz Waste : Address of Next Destination Facility	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		Haz Waste : Name and Licence/Permit No of Recover/Disposer	Non Haz Waste: Address of Recover/Disposer		
Within the Country	19 07 03	No	1821.32 in 19 07 02	landfill leachate other than those mentioned	D9	M	Weighed	Offsite in Ireland	Drogheda WWTP,D0041-01	Drogheda ,County Louth,-,ireland	Enva,184-01	Clonminam Industrial Estate,Portlaoise ,County Laois,Laois,Ireland
Within the Country	19 07 03	No	10073.89 in 19 07 02	landfill leachate other than those mentioned	D9	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,W0192-01	Block 402 ,Grant?s Drive ,Greenogue Business Park. Rathcoole ,Dublin,Ireland		
Within the Country	19 07 03	No	10976.68 in 19 07 02	landfill leachate other than those mentioned	D9	M	Weighed	Offsite in Ireland	Ringsend WWTP,D00-34-01	Ringsend ,Dublin,-,ireland		
Within the Country	19 07 03	No	921.94 in 19 07 02	landfill leachate other than those mentioned	D9	M	Weighed	Offsite in Ireland	Kilcullen Landfill Ltd.,W0081-04	Brownstown,Kilcullen Landfill Ltd., County Kildare,-,ireland		

* Select a row by double-clicking the Description of Waste then click the delete button