

BALLEALLY LANDFILL, BALLEALLY, LUSK, CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2017

IED LICENCE REF. NO. W0009-03

ORIGINAL

MARCH 2018

**Comhairle Contae
Fhine Gall
Fingal County
Council**



BALLEALLY LANDFILL, BALLEALLY, LUSK, CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2017

INDUSTRIAL EMISSIONS LICENCE (IED) LICENCE REF. NO. W0009-03

User is Responsible for Checking the Revision Status of This Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Issue to Client	SM/MG	TR	TR	29.03.2018

Client: Fingal County Council

Keywords: Annual Environmental Report (AER), landfill monitoring

Abstract: This report represents the monitoring results for Balleally landfill, Balleally, Lusk, Co. Dublin. This report covers the annual reporting period of 2017 in accordance with Industrial Emissions Licence Reg. No. W0009-03.

TABLE OF CONTENTS

PAGE

1 INTRODUCTION	1
1.1 REPORTING PERIOD	1
1.2 IED LICENCE	1
1.3 FACILITY LOCATION	1
1.4 LICENSED INDUSTRIAL EMISSIONS ACTIVITIES AT THE FACILITY	1
1.5 LOCAL ENVIRONMENTAL CONDITIONS	2
1.6 ENVIRONMENTAL MONITORING	2
1.7 EPA UPDATED REPORTING REQUIREMENTS	2
2 AIR EMISSIONS MONITORING	3
2.1 STACK EMISSIONS	3
2.2 DUST MONITORING	3
2.2.1 <i>Dust & PM₁₀ Monitoring Results</i>	3
2.2.2 <i>Interpretation of Results</i>	4
2.3 SURFACE EMISSIONS	4
3 LANDFILL GAS MONITORING	5
3.1 MONITORING RESULTS	5
3.2 INTERPRETATION OF RESULTS	5
4 SURFACE WATER & LEACHATE MONITORING	6
4.1 SURFACE WATER	6
4.2 SURFACE WATER MONITORING	6
4.2.1 <i>Surface Water Improvements</i>	7
4.2.2 <i>Conclusions</i>	7
4.3 LEACHATE MONITORING	7
4.3.1 <i>Leachate Treatment Plant</i>	7
4.3.2 <i>Bund / Pipeline Testing</i>	7
4.3.3 <i>Water Balance and Leachate Transfers</i>	8
4.3.4 <i>Leachate levels</i>	10
4.3.5 <i>Leachate Quality</i>	12
4.4 SEWER GAS MONITORING	12
5 GROUNDWATER MONITORING	13
5.1 MONITORING LOCATIONS	13
5.1.1 <i>Monitoring Parameters</i>	13
5.2 INTERPRETATION OF RESULTS	14
5.3 CONCLUSION	14
6 FINANCIAL PROVISIONS	15
7 ENVIRONMENTAL MANAGEMENT PROGRAMME	16
7.1 ENVIRONMENTAL OBJECTIVES AND TARGETS FOR 2017	16
7.2 ENVIRONMENTAL OBJECTIVES AND TARGETS FOR 2018	16
7.3 SUMMARY OF WRITTEN PROCEDURES	16
7.4 COMMUNICATIONS PROGRAMME FOR PUBLIC INFORMATION	16
7.5 MANAGEMENT STRUCTURE	17
7.6 STAFF TRAINING	17
8 NOISE MONITORING	18

TABLE OF CONTENTS - Cont'd...

PAGE

9 RESOURCE USAGE	19
9.1 LANDFILL GAS UTILISATION	21
10 ENVIRONMENTAL INCIDENTS & COMPLAINTS	23
11 WASTE SUMMARY	24
11.1 REMAINING LANDFILL CAPACITY	24
12 METEOROLOGICAL MONITORING	25
13 SITE DEVELOPMENT WORKS	27
13.1 WORK CARRIED OUT IN THE REPORTING PERIOD 2017	27
13.2 PROGRESS ON SITE RESTORATION	28
13.3 ANNUAL TOPOGRAPHICAL SURVEY	29
13.4 SLOPE STABILITY	29

LIST OF APPENDICES

- Appendix 1: Drawings
- Appendix 2: Management Structure
- Appendix 3: AER Summary Templates
- Appendix 3: PRTR

LIST OF FIGURES & TABLES

PAGE

FIGURE 4.1:	MONTHLY LEVEL OF LEACHATE RECORDED IN THE LANDFILL 2007-2017	11
TABLE 2-1:	TOTAL DUST DEPOSITION RESULTS (MG/M ² /DAY).....	3
TABLE 2-2:	TOTAL DUST PM ₁₀ RESULTS (UG/M ³)	3
TABLE 4-1:	WATER BALANCE CALCULATION FOR BALLEALLY LANDFILL 2017	9
TABLE 5-1:	GROUNDWATER MONITORING LOCATIONS	13
TABLE 7-1:	STAFF TRAINING 2017	17
TABLE 9.1:	SUMMARY OF RESOURCES USED ON SITE 2017	19
TABLE 9-2:	ELECTRICITY CONSUMPTION ON SITE FOR THE PERIOD JANUARY 2000 TO DECEMBER 2017	19
TABLE 9-3:	EQUIPMENT AND PLANT LIST AT BALLEALLY LANDFILL AND QUANTITIES 2017	21
TABLE 9-4:	ELECTRICITY OUTPUT (MWHRS) FROM THE LANDFILL GAS UTILISATION PLANT AT BALLEALLY LANDFILL 2003 - 2017	22
TABLE 9-5:	ELECTRICITY OUTPUT (MWHRS) FROM THE LANDFILL GAS UTILISATION PLANT AT BALLEALLY LANDFILL 2017	22
TABLE 12-1:	MEAN MONTHLY DATA FOR METEOROLOGICAL PARAMETERS: DUBLIN AIRPORT (SOURCE MET ÉIREANN)	26
TABLE 13.1:	WORK CARRIED OUT DURING 2017	27
TABLE 13.2:	WORKS TO BE CARRIED OUT DURING 2018.....	28

1 INTRODUCTION

1.1 Reporting Period

The reporting period for the AER is 1st January to 31st December 2017.

1.2 IED Licence

In 2000 Fingal County Council was granted a Waste Licence (Reg. W0009-01) to continue operating Balleally Landfill. In July 2001 Fingal County Council applied for a review of this licence. Waste Licence W0009-02 was issued on the 8th January 2003. On the 21st December 2009 the Environmental Protection Agency (EPA) issued Fingal County Council a third revision of the Waste Licence for Balleally Landfill: IED Licence W0009-03. The licence was subsequently brought into conformity with the provisions and requirements of the Council Directive 2010/75/EU on the 20th December 2013, becoming an Industrial Emissions (IE) Licence.

This licence permits the operation of a non-hazardous landfill. In accordance with the requirements of Condition 11.6 of the IED Licence, an Annual Environmental Report (AER) for the facility must be submitted to the EPA.

1.3 Facility Location

Fingal County Council has responsibility for the management and operation of the facility. The facility is located at:

Balleally Landfill
Balleally Lane
Lusk

National Grid reference E322500 N252200.

Drawing Monitoring Locations (Figure 1) in Appendix 1 is a map of the facility and the monitoring locations.

1.4 Licensed Industrial Emissions Activities at the Facility

Balleally Landfill is situated in Lusk, Co. Dublin. It has been in operation since 1971. Activities at the facility include landfill, special handling, a construction and demolition (C&D) recycling facility (which ceased in August 2005 due to capping commitments) and a civic amenity site (which ceased in December 2008 due to capping/operational commitments). Balleally Landfill closed to waste acceptance on 11th May 2012.

On January 8th 2003 Fingal County Council was licensed to carry out the following activities at Balleally Landfill, Lusk, Co. Dublin subject to twelve conditions.

The licensed activities under the IE amendment are:

- 11.5 Landfills, within the meaning of Section 5 (amended by Regulations 11(1) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008)) of the Act of 1996, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, other than landfills of inert waste.

- 11.1 The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

Landfill gas is collected and converted to electricity.

E39 is the appropriate NACE code to describe activities undertaken in Balleally during 2017 – “Remediation activities and other waste management activities.”

1.5 Local Environmental Conditions

The landfill site covers approximately 50 ha in total. The east face of the landfill is bordered by the Dublin-Belfast railway line and the southern boundary is the Rogerstown Estuary. See Figure 1, Drawing DE07-164-03-001, Appendix 1.

The former landfill facility was approx. 40ha. The extension to this facility to the north west of the site consists of 6 engineered / lined cells (approx. 10 Ha).

1.6 Environmental Monitoring

Environmental monitoring is carried out in accordance with licence conditions and is reported quarterly to the Agency. The quarterly reports include results, interpretation and a certificate of analysis. The original results certificates are not included again in this report. This report only presents summary data.

1.7 EPA Updated Reporting Requirements

Fingal County Council has prepared the annual environmental report in line with the new EPA 2013 draft reporting requirements “AER Draft Guidance Document: Annual Environmental Report: Standardised Reporting Guidance for all IPPC (Excluding Intensive Agriculture) and IED Licences”. To this end a text document is being employed whereby the 2017 AER follows the same format as the summary template structure, where possible, and includes only information as required in the AER template. In all instances except for Bund testing, individual tabs from the AER Workbook are filled out and included as appendices to the text document. The 2017 PRTR workbook is also included in Appendix 4.

2 AIR EMISSIONS MONITORING

2.1 Stack Emissions

As per Schedule D.7.1 of IED Licence W0009-03, the licensee is required to carry out annual or periodic environmental monitoring of the Gas Combustion Plant/Enclosed Flare. Exova Catalyst Ireland carried out the stack emissions monitoring on behalf of Fingal County Council. All results for 2017 were compliant with Emission Licence Values set out in the IED licence W0009-03 with the exception of carbon monoxide (1525 mg/m³) and nitrous oxide (1853 mg/m³) concentrations at engine BY04. An incident INCI013703 was raised on EDEN. Corrective actions were taken and this incident was subsequently closed. The Air emissions tab of the AER template is complete and included in Appendix 3.

2.2 Dust Monitoring

Dust monitoring was carried out at 4 locations in accordance with Schedule D of the licence. The locations of these monitoring points are shown on Balleally Monitoring Locations Map, Appendix 1.

Bergerhoff style gauges were used to determine total dust deposition levels at the site. Four gauges were set up so that the dust jars were at a height of at least 1.5 m above the ground and the jars were set in place during the monthly monitoring events. The samples were submitted to ALS Global for analysis of total dust contents.

2.2.1 Dust & PM₁₀ Monitoring Results

The annual results for total dust deposition are presented in Table 2.1. PM10 monitoring results are shown in Table 2.2.

Table 2-1: Total Dust Deposition Results (mg/m²/day)

Monitoring Locations	May-June 2017	Jul-Aug 17	Oct-Nov 17
D1	115.4	27.7	12.8
D2	356.9	46.8	7.39
D3	16.67	184	9.85
D4	10.92	3.78	7.39

Table 2-2: Total Dust PM₁₀ Results (ug/m³)

Monitoring Locations	24-hour sampling start date	Average Concentration Value µg/m ³ Q3 2017
PM1	24/07/2017	12.5
PM2	25/07/2017	<10
PM3	26/07/2017	<10

2.2.2 Interpretation of Results

A full laboratory analysis of daily dust deposition was completed. The results indicate that during the monitoring period all results were under the licence limit of 350 mg/m³/day except for location D2 during May-June 2017. This exceedance was attributed to the presence of sticks, leaves, insects or other organic matter from the surrounding farmers' fields and not originating from the landfill.

The PM10 limit (50 µg/m³) as set out in the IED Licence was not exceeded at any location during the monitoring period.

2.3 Surface Emissions

Fingal County Council commissioned Odour Monitoring Ireland to perform a landfill gas surface emissions survey of Balleally landfill facility to ascertain any likely sources of landfill gas surface emissions from the closed landfill.

The survey was carried out on the 15th July 2017.

Two specific features were identified which exceeded the limit of 500ppm. The identified features were disconnected gas extraction boreholes with loose seal caps. An incident INC1012918 was raised on EDEN. Bioverda Power Systems was notified and they repaired the borehole seals. Odour Monitoring Ireland resurveyed the two areas identified on the 6th October 2017 and VOC levels fell below trigger values. The incident was updated on EDEN with details of actions taken and re-survey – The Environmental Protection Agency subsequently closed the incident.

3 LANDFILL GAS MONITORING

The licence requires monthly monitoring of perimeter gas boreholes/vents/wells. The location of the 13 no. monitoring positions is shown on Balleally monitoring Locations Map, Appendix 1.

In addition to the perimeter landfill gas perimeter monitoring wells, two leachate monitoring wells (chosen at random) from each of the southern and eastern boundaries LMW1-LMW18 were also monitored. LMW1 – LMW18 boreholes are located on the landfill side of the vertical barrier wall.

It should be noted that boreholes LMW1-18 are leachate sampling wells in the waste body and not specifically designed for monitoring landfill gas.

In accordance with Table D.2.1 of the IED Licence, gas wells were monitored for Methane (CH₄), Carbon Dioxide (CO₂), Oxygen (O₂) and atmospheric pressure.

3.1 Monitoring Results

The gas (LFG) monitoring results were included in the 2017 quarterly reports submitted to the Agency.

3.2 Interpretation of Results

Carbon dioxide was detected on a number of occasions in perimeter monitoring wells at levels above the trigger levels of 1.5%v/v for carbon dioxide. These were reported as incidents to the EPA.

Methane was detected above the trigger level of 1% v/v at wells GA2 and GA3 in Q3-Q4 2017. Methane levels at these locations have historically been ≤0.1% v/v. Methane levels in December 2017 had returned to ≤0.1% v/v at GA2 and GA3. The EPA was notified of these incidents through Eden INCI012987 & INCI013243.

Elevated concentrations of carbon dioxide can occur naturally at shallow depths of up to 2 m due to microbial activity associated with the roots of many types of vegetation.

Please refer to incidences tab of AER template summary where further details of the above incidents are listed.

4 SURFACE WATER & LEACHATE MONITORING

The bulk of the AER information on surface water is contained in the Water/Wastewater tab of the AER Summary Template in Appendix 3. This section is in support of that information and to provide some supplementary information on:

- Leachate monitoring results
- Sewer Gas monitoring results

As of April 2014, Fingal County Council commenced the discharge of leachate to sewer on Rogerstown Lane. Relevant information is included on water/wastewater tab of the AER summary sheet (Appendix 3).

4.1 Surface Water

Schedule D of the IED Licence specifies the monitoring to be carried out for licence compliance. The licence lists 7 no. surface water monitoring locations. Monitoring is currently carried out at S7, S3, SW20a at SWV1 as listed in the licence and at SWFD. The surface water monitoring locations are predominately upstream of the landfill footprint. The results of surface water monitoring are included in the Water_Wastewater tab of the AER summary template (Appendix 3).

There are 2 no. surface water monitoring locations, in addition to those listed in the licence, that are monitored by Fingal County Council as part of an ongoing investigation into surface water quality. These locations are located on site and are part of the surface water management system. Surface water outfalls from the southern boundary of the site are also monitored on a quarterly basis.

Fingal County Council submitted 4 quarterly reports in 2017 which included the results of monthly, quarterly and annual sampling, visual and odour inspections and interpretation of the results.

4.2 Surface Water Monitoring

The sample locations can be seen in Drawing Balleally Monitoring Locations Map, Appendix 1. There are 5 no. surface water monitoring locations.

SWFD

Discharges to an open drain immediately west of the entrance to the wastewater treatment plant.

SWV1

The surface water discharge at the Western Point Surface Water Outfall – The samples are collected in the open channel immediately upstream of the discharge pipe/cut-off flap.

S3

This sampling point is located on a stream to the north-east edge of the landfill site prior to its discharge to the estuary.

S7

This sampling point is located upstream of the site on the stream to the north of the landfill site.

SW20a

This sampling point is located at a drainage ditch to the east of Rogerstown Lane, close to the north-eastern tip of the landfill. It is currently bunged and does not discharge to the estuary.

4.2.1 Surface Water Improvements

A review of surface water contamination at the site is ongoing since August 2011. Fingal County Council committed to continuing additional monitoring at P2, SWV1, SWMH7 and at surface water outfalls OF1-OF4 and submitted two reports to the Agency entitled "*W00-09-03-SWV1-010.pdf, SWV1 Trigger Level Proposal and Loading Report*" and "*Report OF1-OF4-009.pdf, Trigger Level and Nutrient Loading from OF1 to OF4 off Southern Boundary*" respectively. The former proposal was rejected by the Agency pending further investigations and the latter was accepted.

The ongoing capping programme and final restoration of the landfill has improved surface water quality at SWV1. The new shallow vertical barrier surrounding the facility has been completed at the entrance as part of the closure plan. The programme of works relating to remedial measures to address contamination of surface water in this area is being managed through Compliance Investigation CI 000992 and is ongoing.

Remedial works were first undertaken during Q2, 2009 and again in Q1, 2012 to protect the surface water drain/ditch near SW20A. A 50 m length of the drain/ditch was excavated and cleaned prior to lining with low-permeability clay and a HDPE liner pinned and stabilised to the underlying clay bank. These two layers of impermeable material serve to minimise inputs into the drainage ditch. The ditch adjacent to SW20a was re-graded with stone fill, which allows the movement of water through the gravel. A manhole access point was built to facilitate visual assessment and the required periodic environmental sampling. Consequently, there is no flow into the estuary from SW20a as the outfall point is bunged.

The shallow vertical barrier at the site entrance was constructed in 2016.

4.2.2 Conclusions

Surface water results during 2017 indicate that water quality is impacted by both the landfill (which is both a dilute and disperse landfill (40 ha) and an engineered landfill (10 ha)) and the nearby estuary, in terms of salinity sources from the estuary. However, surface water results improved significantly during the year after the completion of the vertical barrier.

Fingal County Council has and continues to undertake additional measures in relation to monitoring and on-site works to mitigate the impact in consultation with the EPA.

4.3 Leachate Monitoring

Prior to April 2014, leachate was tankered off-site to a wastewater treatment plant. As of April 2014, leachate was discharged to sewer. In 2017, leachate was discharged to sewer via tankering up to the manhole and through pumping to sewer. Monitoring of discharge to sewer is as per Technical Amendment B, Schedule C. Relevant information is therefore included on water/wastewater tab of the AER summary sheet.

4.3.1 Leachate Treatment Plant

Operation of the leachate treatment plant was suspended during Q2, 2009. During 2009, FCC applied for a full licence review for the site. The licence review was seeking to remove Chemical Oxygen Demand (COD) as a leachate treatment plant parameter and to raise the ELV levels for some of the other leachate treatment plant parameters. This application was withdrawn and a technical amendment was sought to facilitate discharge to sewer. Technical Amendment B to Industrial Emissions Licence (12/03/2014) provides for the discharge of leachate to a sewer on Rogerstown Lane and this commenced early in April 2014.

4.3.2 Bund / Pipeline Testing

Condition 3.11 of W0009-03 governs Tank and Drum Storage Areas and the need for testing of same. All tanks are rendered impervious to the materials stored therein as per condition 3.11.1.

Condition 3.11.2 stipulates that all tank and drum storage areas are to be bunded either locally or remotely, to a volume not less than the greater of the following:

- (a) 110% of the capacity of the largest tank or drum within the bunded area; or
- (b) 25% of the total volume of substance which could be stored within the bunded area.

There are two areas on site (Landfill Gas Utilisation Plant & Leachate Treatment Plant) that are remotely bunded in the sense that as per Condition 3.11.3 the drainage from these bunded areas can be diverted for collection and safe disposal – back through the leachate treatment plant and through the leachate storage and treatment tanks. The Leachate storage and treatment tanks are inspected by Irish Industrial Tanks Limited. As per condition 3.11.5 The Leachate and Storage Tanks are inspected at least once every three years.

Storage tanks T1a, T1b, SBR1, SBR2, T4 and T5 were inspected during 2017. –repairs were identified following inspection for structural and liquid integrity. These repairs have been scheduled for this year. The next integrity assessment will be carried out following repairs in 2018.

The inspection reports are available for inspection at the site offices.

4.3.3 Water Balance and Leachate Transfers

A water balance for the reporting period has been prepared and is included as Table 4.1. The water balance calculation is derived from EPA Landfill Manuals “Landfill Site Design” (EPA, 2000; p59) and indicates that there was 15,374 m³ of leachate was produced at the landfill. The infiltration rate used was 5% for capped areas.

The total of leachate removed from site was 20,562 m³. The volume of leachate tankered off-site was greater than that estimated as generated in the water balance, but some contaminated water pumped to plant may account for this.

4.3.4 Leachate levels

A trigger level of 5.5 meters above ordnance datum (m AOD) for wells between LMW1 to LMW18 and LMW30 to LMW34 has been established to indicate an elevated head of liquid in the landfill. Leachate was recorded above the trigger level at several locations, highlighted in Figure 4.1.

Leachate levels in LMW5, LMW31, LMW32 and LMW33 were above the trigger level frequently throughout the year. Leachate levels in LMW8 were above the trigger level until September after which levels dropped.

The wells (LMW31, LMW5, LMW8, LMW32, LMW33) which exceed the trigger are located beside one another on the southern boundary of the site.

There were no exceedances of the trigger level in leachate monitoring wells LMW10, LMW11, LMW13, LMW14, LMW34, LMW16, LMW18, LMW30 and L24.

The design level of the vertical barrier is 6 m and this level was exceeded at LMW5 on the southern boundary which is set back from the vertical barrier by approximately 20 m. LMW31, LMW32 and LMW33, which are adjacent to the vertical barrier recorded leachate levels below 6 m during the year. No leachate breakouts were evident along the southern boundary. These incidences were reported to the Agency through EDEN (INCI011533 and subsequent updates). Ammoniacal nitrogen levels at monitored surface water outfalls (OF1-OF4) directly south of the vertical barrier were below trigger levels when monitored, with the exception of OF2 in November 2017, reported through incident INCI013524. Further sampling found levels had returned to normal and this incident was subsequently closed.

4.3.5 Leachate Quality

This section presents a summary of the chemical analysis. The results for leachate monitoring were included in the quarter 3 report to the Agency. The pumping chamber receives leachate from a number of different locations on-site. As it collects leachate from a number of different areas over the site it is representative of general leachate quality over a greater time period than the individual grab samples from each of the leachate wells. The pumping chamber collects leachate from:

- Pipe 1A – New cells
- Pipe 1B – Old northern boundary
- Pipe 1C – Southern boundary

It is noted that the results for the southern boundary are slightly more concentrated, than the results along the eastern boundary. While variations are noted, the leachate quality is typical of leachate sampled from large landfills, as outlined in the Landfill Operational Practices Guidance Manual, EPA 1997 and EPA Manual on Landfill Site Design (2000).

4.4 Sewer Gas Monitoring

Sewer gas monitoring commenced in 2014 when Fingal County Council was granted permission to pump leachate to sewer, as per Technical Amendment B of the Industrial Emissions Licence, approved by the Agency on 12/03/2014.

The monitoring location is at a manhole on Rogerstown Lane.

The annualised results for monthly monitoring of the wastewater discharge are included in the Water Wastewater tab in the AER Summary Sheet (Appendix 3).

The sewer gas was compliant on all monitoring occasions, below the Methane daily mean concentration limit of 0.5 %v/v.

5 GROUNDWATER MONITORING

The summary results of groundwater monitoring are included in the GW-Soil tab of the AER Summary Template in Appendix 3. This section of the Annual Environmental Report is in support of that information. Balleally Landfill, unlike other landfills did not receive a Technical Amendment to its licence relating to the provisions of Article 12 of the European Communities Environmental Objectives (Groundwater) Regulation 2010. The landfill is on an estuary. The downgradient groundwater monitoring borehole is in an estuarine setting.

5.1 Monitoring Locations

Groundwater monitoring was carried out at the locations shown on Drawing Balleally Monitoring Locations Map, Appendix 1. As part of a previous extension to the landfill a number of the boreholes stipulated in W0009-03 are no longer accessible. During July 2004, a revised monitoring schedule was agreed with the Environmental Protection Agency (EPA) on which the present monitoring is based. Details of the groundwater locations now monitored are presented in Table 5.1.

Monitoring location MB18 is located up-gradient, approximately 535 m north of the landfill on private agricultural land. Access to the monitoring location was not granted during the monitoring period.

Table 5-1: Groundwater Monitoring Locations

Station	Classification	Easting	Northing
MB18	Eastern Up gradient	323 245	252 783
RC3	Western Up gradient	321 906	252 729
MB35	South western Down gradient	322 029	251 906
CD1	Control Drain N/W of Cell 1	322 008	252 356

Location Description

Borehole MB35

This borehole is situated approximately 190 m south of the landfill on the edge of the Inner Rogerstown Estuary, downgradient of the landfill.

Location CD1

The control drain sampling location CD1 is situated approximately 30 m south of Balleally Lane west of the landfill extension. This drain collects groundwater from underneath the newly constructed lined cells.

MB18

This is an upgradient private well of Rogerstown House which lies to the north east of the landfill site along the estuary. No access permitted.

RC3

This upgradient borehole is situated approximately 535 m north of the landfill on private agricultural land.

5.1.1 Monitoring Parameters

Groundwater levels were monitored and a visual assessment was performed monthly at all groundwater wells.

Groundwater monitoring location CD1 is sampled monthly and analysed for quarterly groundwater parameters, listed in Table D.5.1 of the IED Licence. MB35 and RC3 are sampled quarterly and analysed for quarterly groundwater parameters, listed in Table D.5.1 of the IED Licence. Additional sampling of RC3, CD1 and MB35 was carried out from March - November 2017 as part of investigative sampling of mineral oils in groundwater samples.

The results of monthly and quarterly groundwater monitoring undertaken for CD1, MB35 and RC3 were included in each of the quarterly reports to the Agency. Annualised and maximum results are presented in the GW-Soil tab of the AER summary templates. (Appendix 3).

5.2 Interpretation of Results

The groundwater results were historically compared to the relevant Interim Guideline Value (IGV) set out in the EPA report '*Towards Setting Guideline Values for the Protection of Groundwater in Ireland*' but following instruction from the EPA during the 2016 site audit, comparison with the GTVs from the European Communities, Environmental Objectives, Groundwater Regulations 2010 is now carried out. It should be noted that the groundwater beneath the landfill is likely to be estuarine in nature and would not generally be potable water.

Groundwater upgradient of the landfill at RC3 shows a rising trend over a 5-year period for pH, Conductivity and Ammoniacal Nitrogen. Downgradient, as mentioned above, the well is located within the estuary and the third well is located on-site. There is no demonstrable decrease in water quality at CD1 which is located on site. Levels of pH, ammoniacal N and TOC demonstrate an upward trend in MB35 (estuarine location).

5.3 Conclusion

Groundwater results indicate that groundwater quality upgradient of the landfill is impacted by local activities. Water quality on and downgradient of the landfill, maybe impacted by both the landfill (which is both dilute and disperse landfill and an engineered designed landfill) and the nearby estuary (saline intrusion from the estuary).

6 FINANCIAL PROVISIONS

Condition 12.2 of the licence requires the establishment of a fund to implement the Restoration and Aftercare Plan. Fingal County Council has provided in its accounts a reserve for the restoration of the site which amounted to €8,845,819 on 31/12/2017.

See ELRA tab from AER summary templates.doc in Appendix 3.

7 ENVIRONMENTAL MANAGEMENT PROGRAMME

7.1 Environmental Objectives and Targets for 2017

See EMP tab from AER summary templates.doc in Appendix 3.

7.2 Environmental Objectives and Targets for 2018

See EMP tab from AER summary templates.doc in Appendix 3.

7.3 Summary of written procedures

There were no new written procedures during the reporting period.

7.4 Communications Programme for Public Information

The Communications Programme for Fingal County Council contains information on Balleally Landfill. The information can roughly be divided into two areas. Background information prior to granting of the waste licence, and information concerning the waste licence and IED Licence (W009-02 & 03). There is also a register of correspondence to and from the Agency, along with the various correspondences relevant to the Licence. This information was updated on a continuous basis. During Q1 2013, a change came about in that correspondence with The Agency was almost exclusively sent through a new online web based system called EDEN. Most correspondence between the Agency and the Licensee must now be accessed through this system.

Environmental Information can be viewed at the following locations:

- At the Council's Headquarters between 9.30 a.m. and 12.45 p.m. and 2.00 p.m. and 4.00 p.m. Monday to Friday (excluding public holidays), unless otherwise arranged by prior appointment.
- At Balleally Landfill by prior appointment with the Landfill Manager.
- Since March 2013, Licence Reports have been submitted through, stored on and available through the Environmental Protection Agency's Website; www.epa.ie or reporting portal, EDEN.

Site Visits

- Site visits to Balleally Landfill can be arranged by writing to the Landfill Manager requesting the date and time of the proposed visit and indicating the number of visitors and the purpose of such a visit and whether any presentation is required. The use of cameras and video equipment during the visit must be agreed in advance with Fingal County Council.
- Such requests will be accommodated where possible.

Balleally Landfill Liaison Committee

Information relating to the restoration and aftercare of Balleally Landfill is presented to the Liaison Committee for comment and adoption. Members of the committee during 2017 comprised of:

- Three members of Balleally Residents and Farmers Association / Rush Community Council.
- One Member of Burrow Residents Association.
- One member of Donabate and Portrane Community Council.
- Two members of Rush Community Council.
- Seven elected members of Fingal County Council, including Mayor.
- Five Fingal County Council officials.

The Committee met four times during 2017; 14/2/2017, 11/4/2017, 13/9/2017 and 10/10/2017. Agendas were set and minutes kept.

7.5 Management Structure

The facility is owned and operated by Fingal County Council. The Environmental Services Department of Fingal County Council manage the landfill facility. A description of the current management structure is provided in Appendix 2.

7.6 Staff Training

Staff from Fingal County Council completed training in 2017 in various aspects of environmental management to improve their skills in operation and management of Balleally Landfill. Details are in Table 7.1 below.

Table 7-1: Staff Training 2017

Position	Training Completed
Senior Engineer	Practical Management and Control of Landfill Gas – The Chartered Institution of Wastes Management.
Landfill Manager, Executive Engineer	Practical Management and Control of Landfill Gas – The Chartered Institution of Wastes Management.
Landfill Manager, Executive Engineer	Practical Management and Control of Landfill Gas – The Chartered Institution of Wastes Management.
Executive Scientist	Practical Management and Control of Landfill Gas – The Chartered Institution of Wastes Management.

8 NOISE MONITORING

An Annual Noise Survey was undertaken in July 2017 to assess the existing noise emissions from the site and to establish the existing noise environment at potentially sensitive receptors near the site in accordance with Schedule D of IED Licence W0009-03. Noise monitoring was carried out during daytime hours. The location of noise monitoring points can be seen in Figure Balleally Monitoring Locations map, Appendix 1.

Noise measurements were taken for 30 minutes at each location. A Noise Monitoring Report has previously been submitted to the EPA along with commentary on noise sources. The results are included in the noise tab of the AER summary template in Appendix 3.

9 RESOURCE USAGE

See Resource-Energy tab from AER summary templates.xls in Appendix 3.

Resources consumed at Balleally Landfill include diesel fuel, electricity, hydraulic oil and lubricating oil. Table 9.1 presents a summary of the quantities of each used on site for the period of this report. Electricity consumed on site was used for the purpose of heating, lighting, the operation of office equipment and the leachate treatment plant. The largest consumer of electricity was the leachate treatment plant until it was mothballed during 2009. There was a sustained and significant drop in energy usage since 2008 peak, with an increase through 2013 - 2015 associated with new pumping arrangements from the Leachate Treatment Plant. Since 2016 electricity usage has dropped as tankering of leachate resumed and pumping of leachate from the Leachate Treatment Plant was suspended. Electricity consumption in Balleally was lower in 2017 (55,829 kWh) than 2016 (62,317 kWh).

Diesel and petrol consumption (zero) have dropped off on site because several items of plant were off-hired for longer periods than in previous years. Additionally, the area of operation for the excavator and Dozer has reduced.

Water Consumption in Balleally was lower in 2017 (1,689 m³) than 2016 (5,390 m³).

Bioverda Power Systems (BPS) operate the landfill gas utilisation plant at Balleally Landfill.

Table 9.1: Summary of resources used on site 2017

Resource	FCC	BPS
Electricity	55,829 kWh	17,215 kWh
Diesel *	86,886 litres	
Petrol*		
Lube Oil		2,110 litres
Water	1,689 m ³	

*Estimates based on average weekly usage

Table 9-2: Electricity consumption on site for the period January 2000 to December 2017

Year	Site	Site	Leachate Treatment Plant	KWHR Total
2017	Ceased	47,050	8,779	55,829
2016	Ceased	38,240	24,067	62,317
2015	Ceased	54,100	41,590	95,690
2014	Ceased	50,170	29,086	79,256
2013	Ceased	67,450	7,457	74,906
2012	Ceased	58,075	7,423	65,498*
2011	Ceased	59,100*	5,109*	64,209*
2010	Ceased	71,575*	6,460*	78,035*
2009	Ceased	82,950*	101,367*	184,317*

Year	Site	Site	Leachate Treatment Plant	KWhr Total
2008	1,832*	91,350*	202,739*	295,921*
2007	1,726*	84,900*	202,669*	289,295*
2006	2,109*	97,600*	73,420*	173,129*
2005	1,033*	115,050*	N/R	15,050*
2004	NR	66,250*	N/R	66,250*
2003	NR	NR	N/R	89,155
2002	NR	NR	N/R	76,529
2001	NR	NR	N/R	55,453
2000	NR	NR	N/R	49,016

- * Data derived from Website for three accounts registered to Balleally.
- N/R: Accounts not set up at these times.
- *Data sourced from AER 2006.*

Note:

1. There was a significant increase in electricity consumption in the period 2006 – 2008, from previous years as can be observed from the table. This was attributable to the operation of site leachate treatment plant. The decrease in 2009 was attributable to the mothballing of the leachate treatment plant.
2. The electricity consumption increased each year from 2000 (exception 2004) to 2008 and decreased through to 2011. 2011 decrease may in part be due to milder winter (less heating), direr conditions (less pumping) and the move from an automated to manual wheel wash. Electricity consumption was stable during 2012. There was an increase during 2013 to 2015, associated with pumping from the Leachate Treatment plant. During 2016 electricity usage dropped as tankering of leachate resumed and pumping of leachate from Leachate Treatment Plant was suspended – This continued in 2017.

See Waste tab from AER summary templates.xls in Appendix 3.

Table 9-3: Equipment and Plant list at Balleally Landfill and quantities 2017

Type of Item	Item	Quantity
Transport	Isuzu 4X4* Jeep	2
	VW Van Caddy	1
	Mitsubishi Canter Van	1
	CAT Minidigger	1
Plant	John Deere 4X4 Tractor*	1
	Same Tractor*	1
Heavy Plant		1
	Cat excavator 330* / Dozer Package	1
	30 Ton Vibrating Roller*	1
	8 Tonne MiniDigger	1
	Kubota Tractor	1
	6 Tonne MiniDigger	1
	Diesel H/P power washer and Bowser*	1
		1
Auxiliary Plant	CONSAW*	1
	6-inch pump*	1
	6.5 KVA diesel generator*	1
	Skimmers	3
Survey	Sokkisna level and tripod*	1
	Sokkisna theodolite & Tripod*	1
	NIKON auto level*	1
	Garmen GPS*	1
	GAS DATA LMSXi	1
	GMI FI 2000*	1
	30 Metre steel Tape*	1
	30m dip meter*	1
	Various P.C.s and printers*	1

9.1 Landfill gas utilisation

See Table 7 in the Waste tab from AER summary templates.xls in Appendix 3.

Landfill gas is actively extracted by means of a series of wells and a collection pipe network in the waste body. The gas is pumped through two main lines to the site utilisation plant. The utilisation plant comprises four generators (BY01-BY04), grouped into two operating units AER1 and AER3. BY01-BY04 ran for a total of 372, 0, 29 and 8,044 hours respectively, the flare ran for 96 hours. At present 42.3% methane gas concentration is achieved, 9,643,392 m³ of landfill gas was captured on site for utilisation in the landfill gas engines. This is an average of 1,100 m³/hr.

The power station/utilisation plant operators, Bioverda Power Systems Limited, regulate the inflow of gas to the station in an effort to achieve the 50% Methane target. The total power output from the station for the period is shown in Table 9.4 and Table 9.5.

Table 9-4: Electricity output (MWhrs) from the landfill gas utilisation plant at Balleally Landfill 2003 - 2017

YEAR	ELECTRICITY OUTPUT (MWhrs)
2003	30,194
2004	21,636
2005	21,234*
2006	20,529*
2007	23,762
2008	27,117
2009	25,429
2010	21,909
2011	20,534
2012	20,928
2013	16,693
2014	13,679
2015	10,811
2016	10,478
2017	9,073

Table 9-5: Electricity output (MWhrs) from the landfill gas utilisation plant at Balleally Landfill 2017

Month	Combined BY01-BY04 (MWhrs)
January	816
February	729
March	792
April	785
May	814
June	751
July	749
August	758
September	748
October	740
November	718
December	673
Total	9,073

10 ENVIRONMENTAL INCIDENTS & COMPLAINTS

Please See Complaints and Incidents tab from AER summary templates.doc in Appendix 3.

11 WASTE SUMMARY

Please refer to the Waste tab of the AER summary sheet (Appendix 3).

The landfill closed to waste acceptance in 2012. No C&D waste was accepted at the site in 2017 for closure and restoration works.

20,562 m³ of leachate was transferred off-site in 2017.

11.1 Remaining Landfill Capacity

The landfill is closed to waste acceptance.

12 METEOROLOGICAL MONITORING

Condition 8 and Schedule D.6.1 of Waste Licence W0009-03 require daily monitoring of precipitation volume, temperature (max. /min.), wind force and direction, and atmospheric pressure, Evaporation and Atmospheric humidity.

June, July and August were warmest with the highest mean monthly temperatures. Monthly Rainfall was highest during June, September and November when highest volumes of rainfall were recorded. The site was predominantly affected by south westerly winds, highest average monthly wind speeds were in February and December. Evaporation and potential evapo-transpiration were highest in May, June and July.

Meteorological data is obtained from Met Éireann for Dublin Airport's Met. Station. Please see Table 12.1 below for monthly averages of this data. Other meteorological parameters and daily data are available to view in Fingal County Hall and on site.

Table 12-1: Mean Monthly Data for meteorological parameters: Dublin Airport (Source Met Éireann)

Year	Month	Mean Temperature (C)	Max Air Temp °C	Min Air Temp °C	Total Rainfall (mm)	Mean MSL Pressure (hpa)	Mean Wind Speed (Knots)	Mean Evaporation mm	PE Mean Daily mm	Mean Atmospheric Humidity %
2017	1	5.7	11.9	-4.8	21.9	1010	10.3	0.6	0.5	85.5
2017	2	6.2	12.9	-3.9	41.6	999	13.2	1.1	0.8	84.1
2017	3	7.7	16.3	-1.7	67.2	1001	11.7	1.8	1.2	82.6
2017	4	8	16.5	-1.2	10	1012	9.6	2.5	1.7	77.3
2017	5	11.6	23.2	-1.5	43.5	1005	9.6	4	2.7	77.2
2017	6	14.4	26.3	3.7	86.4	1001	11	4.2	2.9	77.7
2017	7	15	24.2	6	42.2	1002	9.8	4.1	2.8	78.8
2017	8	14.6	21.8	4.9	73.2	1004	10	3.2	2.3	80.1
2017	9	12.4	18.9	4.5	82.3	1000	10.9	2.3	1.6	83.5
2017	10	11.2	19.5	0.8	47.8	1003	12.1	1.3	0.9	85.5
2017	11	6.5	14.1	-0.5	81.5	1005	10.9	0.6	0.5	86.8
2017	12	5.3	13.6	-4.8	63.1	1002	12.4	0.5	0.4	88.7

13 SITE DEVELOPMENT WORKS

13.1 Work carried out in the reporting period 2017

Table 13.1: Work carried out during 2017

Objective/Target	Description	Timescale
Objective 1	To minimise environmental impact on the immediate environment	
Target 1	To continue to monitor Ammonical Nitrogen levels at OF1-OF4 in line with agreed trigger levels.	Ongoing.
Target 2	Continue to monitor SW quality in landfill in catchment of SWV1. To determine if improvements since 2016 are sustained.	Ongoing.
Target 3	Replacement / Rehabilitation of surface water and foul lines, manholes and pumps in area between Gas Utilisation Plant and Site Offices.	completed
Target 4	To determine final mitigation measures to deal with surface water contamination at SW20a and propose Specified Engineering Works if required.	2017/2018-Ongoing
Target 5	Address remaining flooding issue at Entrance to Site.	2017/2018-Ongoing
Target 6	Final Capping of area around Site Offices / Gas Compound.	Completed.
Objective 2	Restoration of the facility.	
Target 1	Completion of a vertical barrier at the northern boundary.	Completed.
Target 2	Install footpaths and Service Road	2017/2018 - ongoing.
Target 3	Address flooding issue at entrance.	2017/2018 – ongoing.
Target 4	Revise Restoration and Aftercare Plan	Submitted 2016 ongoing
Target 5	Grass seeding of capped areas	Completed.
Target 6	Install Footpaths and Service Road	2017/2018 – ongoing.

Works for next reporting period (2018)

Table 13.2: Works to be carried out during 2018

Objective/Target	Description	Timescale
Objective 1	To minimise environmental impact on the immediate environment	
Target 1	To continue to monitor Ammoniacal Nitrogen levels at OF1-OF4 in line with agreed trigger levels.	Ongoing.
Target 2	Continue to monitor SW quality in landfill in catchment of catchment of SWV1. To determine if improvements since 2016 are sustained.	Ongoing.
Target 3	To determine final mitigation measures to deal with surface water contamination at SW20a and propose Specified Engineering Works if required.	2017/2018
Target 4	Address remaining flooding issue at Entrance to Site.	2017/2018
Target 5	Surface Water line rehabilitation	2018
Target 6	Leachate Treatment Plant remedial works.	2018
Target 7	Install topographical Monitoring points	2018
Target 8	Southern Boundary Leachate Pumps and Drainage Improvement works	2018
Target 9	Leachate Treatment Plant Calcification Removal & and Leachate Treatment Design and Construction	2018
Objective 2	Restoration of the facility	
Target 1	Install footpaths and Service Road	2017 / 2018 Ongoing.
Target 2	Address flooding issue at entrance.	2017/2018 - ongoing
Target 3	Revise Restoration and Aftercare Plan	Submitted 2016 / ongoing
Target 4	Maintenance Shed Design and Construction	2018

13.2 Progress on Site Restoration

The Restoration and Aftercare Plan for the landfill was submitted in July 2003 as per condition 4.1. This plan set out a framework to successfully restore Balleally Landfill to a condition suitable for use as an amenity for the general public. The plan has been prepared in accordance with the EPA Landfill manual 'Landfill Restoration and Aftercare' (1999), the Council Directive (1999/31/EC) on the Landfill of Waste and Waste Licence W0009-02 & -03. Restoration was undertaken at Balleally Landfill using a phased approach due to the size of the site and seasonal constraints. On completion of restoration in each phase, the aftercare plan to establish and maintain the after use of the site shall be implemented.

Capping of the site is as per Condition 4.3. The geotextile alternative was investigated and agreed in early 2004 with the EPA. This decreased the number of vehicle movements required for importing soil for the final cap.

Figure 2, Appendix 1, indicates the agreed phases for the capping and restoration of Balleally Landfill. The phasing provided for the restoration of the original landfill initially, and then the landfill extension area.

The total area for capping was 46.5 Hectares approx.

Between 2004 and December 2017, approx. 46.5 Hectares were capped. During 2017, the last remaining area to be capped around the Landfill Gas Plant was completed. A map showing the current extent of capping is included in Appendix 1.

13.3 Annual Topographical Survey

Condition 8.5.1 of WL W0009-03 requires an annual Topographical Survey to be undertaken in Balleally Landfill. The last full topographic survey was completed Q1 2017, and is available to view on site or in Fingal County Hall.

13.4 Slope Stability

As required under Licence Condition 8.8.1. a slope stability survey was undertaken in Balleally Landfill in October 2017.

The conclusions and recommendations in the survey report are noted and will be implemented.

APPENDIX 1

DRAWINGS

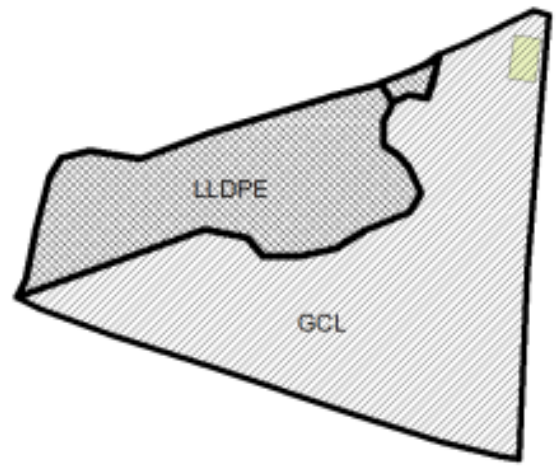


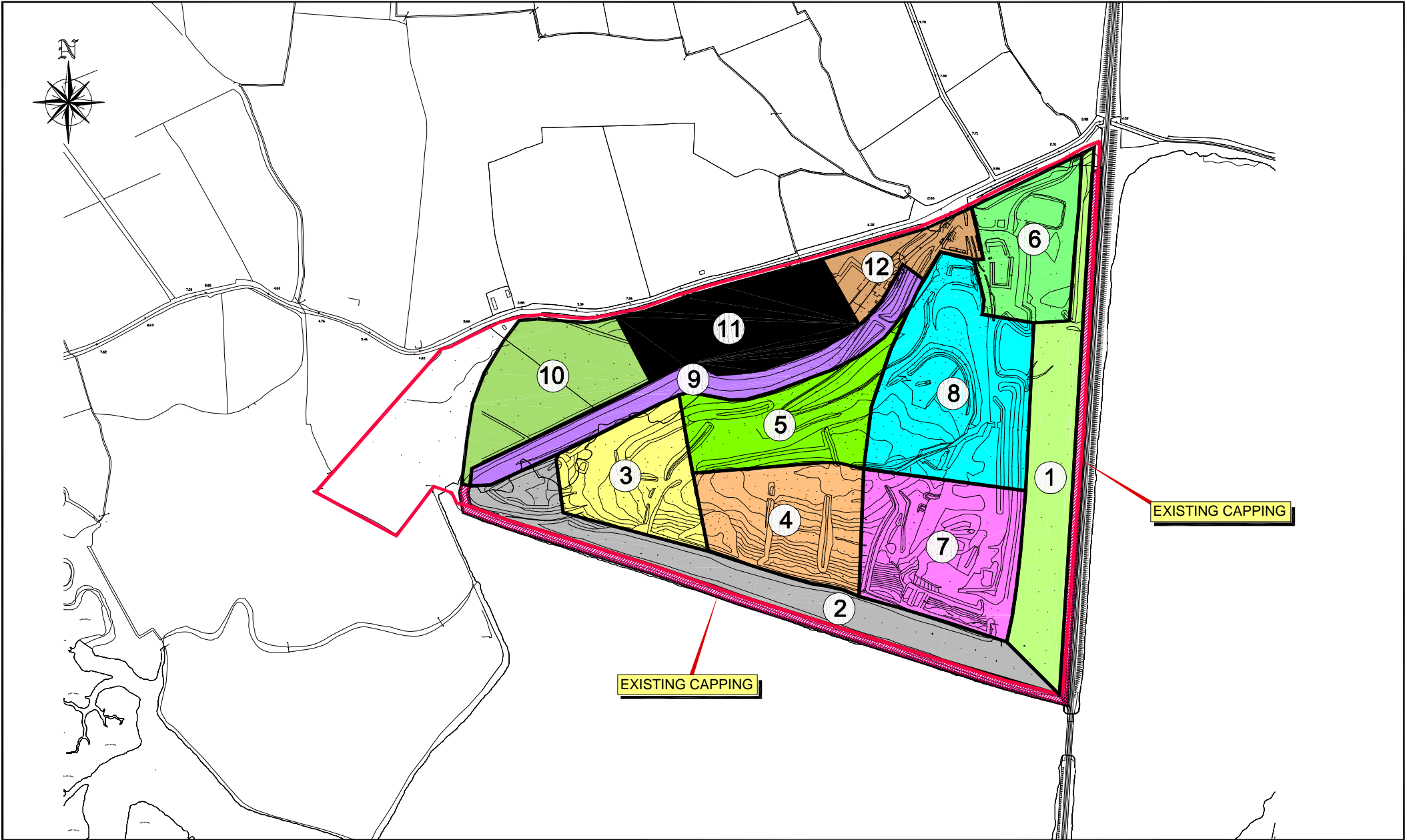
BALLEALLY LANDFILL - LLDPE AND GCL CAPPING SYSTEMS



CAPPING MATERIALS

-  GAS PLANT
-  GCL
-  LLDPE






Comhairle Chontae Fhine Gall
FINGAL COUNTY COUNCIL
 Mr. P.J. Howell,
 Director of Service
 Phone: (01) 890 5000

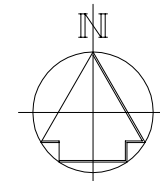
mcOS
COWI
 Carnegie House,
 Library Road,
 Dun Laoghaire,
 Co. Dublin.
 Phone 01 - 2020870
 Fax 01 - 2020707

A04	May'03	HF	RE-ISSUED FOR APPROVAL
A03	Apr'03	RH	RE-ISSUED FOR APPROVAL
A02	Nov'02	GDB	RE-ISSUED FOR APPROVAL
A01	Oct'02	SBG	ISSUED FOR APPROVAL
No.	Date	By	Amendments

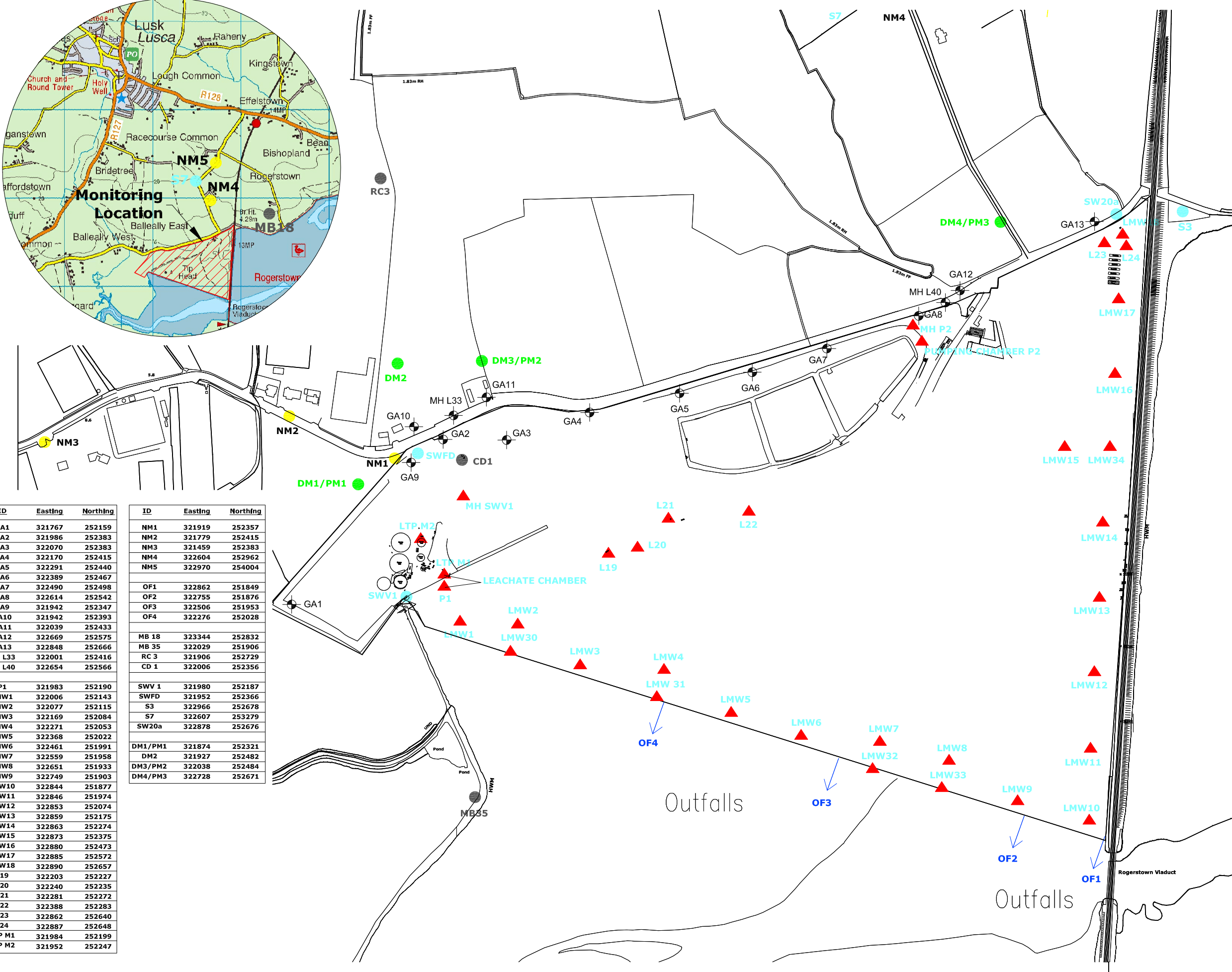
Job:	BALLEALLY LANDFILL RESTORATION AND AFTERCARE PLAN
Title:	RESTORATION PHASING
Drawn:	HF
Checked:	HD
Approved:	CB
Scale:	1:7500
Date:	Oct'02

File Ref.:	149507002FG0300
Drawing No.	FIG 3.0
Rev.	A04

NOT FOR CONSTRUCTION UNLESS SPECIFICALLY STATED OTHERWISE
 No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Fehily Timoney & Company as copyright holder except as agreed for use on the project for which the document was originally issued.
 Drawing/Displaying this document without the copyright signature is prohibited - Ask! when scaling distances from this drawing.
 Use figured dimensions only. If in doubt - Ask!



- KEY**
- NSL1 Noise Monitoring Location
 - AD1 Dust Monitoring Location
 - OF1 Outfall Location
 - 3d Groundwater Monitoring Location
 - SW1 Surface Water Monitoring
 - MG1 Gas Well Monitoring Locations
 - ▲ LM1 Leachate Monitoring Locations



ID	Easting	Northing
GA1	321767	252159
GA2	321986	252383
GA3	322070	252383
GA4	322170	252415
GA5	322291	252440
GA6	322389	252467
GA7	322490	252498
GA8	322614	252542
GA9	321942	252347
GA10	321942	252393
GA11	322039	252433
GA12	322669	252575
GA13	322848	252666
MH L33	322001	252416
MH L40	322654	252566

ID	Easting	Northing
NM1	321919	252357
NM2	321779	252415
NM3	321459	252383
NM4	322604	252962
NM5	322970	254004
OF1	322862	251849
OF2	322755	251876
OF3	322506	251953
OF4	322276	252028
MB 18	323344	252832
MB 35	322029	251906
RC 3	321906	252729
CD 1	322006	252356

ID	Easting	Northing
P1	321983	252190
LMW1	322006	252143
LMW2	322077	252115
LMW3	322169	252084
LMW4	322271	252053
LMW5	322368	252022
LMW6	322461	251991
LMW7	322559	251958
LMW8	322651	251933
LMW9	322749	251903
LMW10	322844	251877
LMW11	322846	251974
LMW12	322853	252074
LMW13	322859	252175
LMW14	322863	252274
LMW15	322873	252375
LMW16	322880	252473
LMW17	322885	252572
LMW18	322890	252657
L19	322203	252227
L20	322240	252235
L21	322281	252272
L22	322388	252283
L23	322862	252640
L24	322887	252648
LTP M1	321984	252199
LTP M2	321952	252247

ID	Easting	Northing
DM1/PM1	321874	252321
DM2	321927	252482
DM3/PM2	322038	252484
DM4/PM3	322728	252671
SWV 1	321980	252187
SWFD	321952	252366
S3	322966	252678
S7	322607	253279
SW20a	322878	252676

Rev.	Drawn	Checked	App'd	Date	Description	
B	MM/c	TM	DD	DD	10.01.08	ISSUE FOR INFORMATION
A	MM/c	TM	DD	DD	05.07.07	ISSUE FOR INFORMATION

Name of Client
 Fingal County Council
 Name of Job
 ENVIRONMENTAL MONITORING
 BALLEALLY

Title of Drawing
 ENVIRONMENTAL MONITORING
 LOCATIONS

Scales Used
 1:2500 A1 / 1:5000 A3
 Dwg. No. DE07-164-03-001
 Rev. B
 Dublin

**FEHILY
TIMONEY
& COMPANY**

CONSULTANTS IN
 ENGINEERING &
 ENVIRONMENTAL
 SCIENCES

Core House, Pouladuff Rd, Cork, Ireland.
 T: +353-21-4964133, F: +353-21-4964464
 Mill House, Ashtown Gate, Navan Rd, Dublin 15, Ireland.
 T: +353-1-6583500, F: +353-1-6583501
 W: www.fehilytimoney.ie, E: info@ftco.ie

APPENDIX 2

MANAGEMENT STRUCTURE



Balleally Landfill Management Structure – 2017

TITLE	NAME	BASE	DUTIES AND RESPONSIBILITIES	QUALIFICATIONS	EXPERIENCE
Director of Services	Mr. Gilbert Power	Blanchardstown Office, Grove Road Dublin 15	Responsible for Environmental and Water Services Department		39 years LA Experience
A/Senior Engineer	Mr. James Walls	HQ	Responsibility for Environment Section	B.Eng in Civil Engineering 1984, MIEI Post Grad. Diploma in Env. Protection 2016	15 years Water Service experience. 4 years in Waste Management and Water Pollution Control
A/Senior Executive Scientist	Mr. Brian Reynolds	HQ	Responsibility for Waste Infrastructure	MSc in Operations Management 2004 MSc in Applied Environmental Science 1997 C Eng. MIEI	18 years experience in Water and Waste Management and Water Pollution Control Experience in Local Authority
Landfill Manager, Executive Engineer	Mr. David Devine	Balleally Landfill & HQ	Landfill Management. Management of Waste Licence Compliance. Specified Engineering Works	BSc Civil Engineering, MIEI, Chartered Engineer, F.A.S. Waste Management Training Course. F.A.S. Management Safety in Construction Training Course.	19 years Civil Engineering and Project Management experience. 13 Years Local Authority experience
Executive Scientist	Mr. Mortimer Loftus	HQ & Balleally Landfill	Supervision of Scientific Monitoring, Reporting and liaison with the Environmental Protection Agency on issues relating to Environmental monitoring	PhD Ecology, BSc Environmental Science, Dip Environmental Impact Assessment Management, F.A.S. Waste Management Training Course, F.A.S. Managing Safety in Construction Training Course.	13 years Local Authority experience
	Mr. Richard Donnelly	Balleally Landfill	Deputy in the absence of the Landfill Manager, Waste Acceptance Manager, Safety inspections and day to day supervision of staff.	Completed course in Health & Safety (SAFE PASS), Manual Handling, Specified Signing Lighting and Guarding Training, CONSAW Training. Also, Elected Health & Safety Rep.	Over 20 years Local Authority Service. Assistant Foreman in Dunsink Landfill and appointed to Balleally Landfill in 2010.

APPENDIX 3

AER SUMMARY TEMPLATES



Groundwater/Soil monitoring template	Lic No:	W0009-03	Year	2017
---	---------	----------	------	------

			Comments	
1	Are you required to carry out groundwater monitoring as part of your licence requirements?	yes	Please provide an interpretation of groundwater monitoring data in the interpretation box below or if you require additional space please include a groundwater/contaminated land monitoring results interpretaion as an additional section in this AER	
2	Are you required to carry out soil monitoring as part of your licence requirements?	no		
3	Do you extract groundwater for use on site? If yes please specify use in comment section	no		
4	Do monitoring results show that groundwater generic assessment criteria such as GTVs or IGVs are exceeded or is there an upward trend in results for a substance? If yes, please complete the Groundwater Monitoring Guideline Template Report (link in cell G8) and submit separately through ALDER as a licensee return AND answer questions 5-12 below.	yes	This landfill has unlined cells built to dilute and disperse sepcification. There is evidence of an upward trend in ammonical nitrogen in MB35 a downgradient well in the estuary. Conductivity and chloride levels in these wells are impacted by saline water as well as potentially by leachate. There is an upward trend in EC and ammonical N levels at the upgradient monitoring point. The onsite well CD1 has not shown upward trends in parameters assessed for the 5 year period with the exception of chloride. Quarterly groundwater monitoring reports with interpretation are submitted to the Agency through EDEN providing all of the monitoring results for groundwater sampling on a monthly, quarterly and annual basis. A separate groundwater monitoring template has not been completed.	
5	Is the contamination related to operations at the facility (either current and/or historic)	yes		influenced by leachate from the unlined portion
6	Have actions been taken to address contamination issues?If yes please summarise remediation strategies proposed/undertaken for the site	yes		See text of AER
7	Please specify the proposed time frame for the remediation strategy	SELECT		See text of AER
8	Is there a licence condition to carry out/update ELRA for the site?	SELECT		See text of AER
9	Has any type of risk assesment been carried out for the site?	N/A		See text of AER
10	Has a Conceptual Site Model been developed for the site?	N/A		See text of AER
11	Have potential receptors been identified on and off site?	N/A		See text of AER
12	Is there evidence that contamination is migrating offsite?	N/A		See text of AER

Table 1: Upgradient Groundwater monitoring results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration++	Average Concentration+	unit	GTV*s*	SELECT**	Upward trend in pollutant concentration over last 5 years of monitoring data
2017	RC3	pH (pH units) (Field)	Probe	Quarterly	7.96	7.83	pH units	>6.5 & <9.5		Yes
2017	RC3	Temperature (°C) (Field)	Probe	Quarterly	20.02	13.72	°C		25	No
2017	RC3	Dissolved Oxygen mg/l (Field)	Probe	Quarterly	10.69	9.78	mg/l		No Abnormal Change	No
2017	RC3	Ammoniacal Nitrogen as NH3	Kone Spectrophotometric Analyser	Quarterly	0.117	0.09	mg/l	0.136		Yes
2017	RC3	Chloride	Kone Spectrophotometric Analyser	Quarterly	29.9	24.2	mg/l	187.5		No
2017	RC3	Conductivity	Determination of EC using a Conductivity meter	Quarterly	0.712	0.697	mS/cm	1.875		Yes
2017	RC3	Organic Carbon, Total	Colorimetry	Quarterly	<3	<3	mg/l		No Abnormal Change	No

.+ where average indicates arithmetic mean

++. maximum concentration indicates the maximum measured concentration from all monitoring results produced during the reporting year

Groundwater/Soil monitoring template

Lic No:

W0009-03

Year

2017

Table 2: Downgradient Groundwater monitoring results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration	Average Concentration	unit	GTV's*	SELECT**	Upward trend in yearly average pollutant concentration over last 5 years of monitoring data
2017	MB 35	pH (field)	Probe	Quarterly	7.76	7.62	pH units	>6.5 &<9.5		yes
2017	MB 35	Temperature	Probe	Quarterly	15.1	12.83	°C		25	no
2017	MB 35	Ammoniacal Nitrogen	Kone Spectrophotometric Analyser	Quarterly	6.19	5.32	mg/l	0.136	No Abnormal Change	yes
2017	MB 35	Dissolved Oxygen	Probe	Quarterly	9.37	6.76	mg/l			yes
2017	MB 35	Conductivity (Laboratory)	Determination of EC using a Conductivity meter	Quarterly	39.8	35.17	mS/cm	1.875		no
2017	MB 35	Chloride	Kone Spectrophotometric Analyser	Quarterly	16500	15675	mg/l	187.5		yes
2017	MB35	TOC	Colorimetry	Quarterly	<6	<6	mg/l		NAC	no
2017	CD1	pH (field)	Probe	Monthly	8.02	7.6	pH units	>6.5 &<9.5		yes
2017	CD1	Temperature	Probe	Monthly	16.2	12.34	°C		25	no
2017	CD1	Ammoniacal Nitrogen	Kone Spectrophotometric Analyser	Monthly	14.7	1.644	mg/l	0.136		no
2017	CD1	Dissolved Oxygen	Probe	Monthly	10.57	6.78	mg/l		No Abnormal Change	yes
2017	CD1	Conductivity (Laboratory)	Determination of EC using a Conductivity meter	Monthly	1.31	1.047	mS/cm	1.875		no
2017	CD1	Chloride	Kone Spectrophotometric Analyser	Monthly	152	75.73	mg/l	187.5		yes
2017	CD1	TOC	Colorimetry	Monthly	5.68	3.75	mg/l		No Abnormal Change	no

*please note exceedance of generic assessment criteria (GAC) such as a Groundwater Threshold Value (GTV) or an Interim Guideline Value (IGV) or an upward trend in results for a substance indicates that further interpretation of monitoring results is required. In addition to completing the above table, please complete the Groundwater Monitoring Guideline Template Report at the link provided and submit separately through ALDER as a licensee return or as otherwise instructed by the EPA.

[Groundwater monitoring template](#)

More information on the use of soil and groundwater standards/ generic assessment criteria (GAC) and risk assessment tools is available in the EPA published guidance (see the link in G31)

[Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites \(EPA 2013\)](#)

**Depending on location of the site and proximity to other sensitive receptors alternative Receptor based Water Quality standards should be used in addition to the GTV e.g. if the site is close to surface water compare to Surface Water Environmental Quality Standards (SWEQS), If the site is close to a drinking water supply compare results to the Drinking Water Standards (DWS)

[Groundwater regulations](#), [Drinking water \(private supply\) standards](#), [Drinking water \(public supply\) standards](#), [Surface water EQS](#), [GTV's](#), [Interim Guideline Values \(IGV\)](#)

Table 3: Soil results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration	Average Concentration	unit
							SELECT
							SELECT

Where additional detail is required please enter it here in 200 words or less

APPENDIX 4

PRTR





[Guidance to completing the PRTR workbook](#)

PRTR Returns Workbook

REFERENCE YEAR 2017

1. FACILITY IDENTIFICATION

Parent Company Name	Fingal County Council
Facility Name	Balleally Landfill
PRTR Identification Number	W0009
Licence Number	W0009-03

Classes of Activity	
No.	class_name
	- Refer to PRTR class activities below

Address 1	Balleally
Address 2	Lusk
Address 3	
Address 4	
Country	Dublin
Coordinates of Location	Ireland
River Basin District	-7.26329 55.2542
NACE Code	IEEA
Main Economic Activity	3821
AER Returns Contact Name	Treatment and disposal of non-hazardous waste
AER Returns Contact Email Address	Mortimer Loftus
AER Returns Contact Position	mortimer.loftus@fingal.ie
AER Returns Contact Telephone Number	Executive Scientist
AER Returns Contact Mobile Phone Number	018905000
AER Returns Contact Fax Number	0876872025
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	6
User Feedback/Comments	Em to Air: total capacity is in m3 LFG. Engine 4 tested 2017, engines 3 and 4 tested 2016. Flare ran 96 hrs in 2017 and 48 hours in 2016 so higher mass emissions. Net methane generation dropped slightly as expected, total capture also decreased and net emissions were slightly higher due to the lower capture rate. This is expected as gas quality diminishes.
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

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

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

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

[PRTR# : W0009 | Facility Name : Balleally Landfill | Filename : w0009_2017.xls | Return Year : 2017]

29/03/2018 10:44

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR		METHOD			Please enter all quantities in this section in KGs		QUANTITY		
POLLUTANT		Method Used			Flare	BY04			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Predicted generation minus captured gas.	0.0	0.0	2531420.0	0.0	2531420.0
02	Carbon monoxide (CO)	M	EN 15058:2004	NDIR by Horiba PG-250	1.79	39085.8	39087.59	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M	EN 14792:2005	Chemiluminescence by Horiba PG-250	7.3	47484.7	47492.0	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR		METHOD			Please enter all quantities in this section in KGs		QUANTITY		
POLLUTANT		Method Used			Flare	BY04			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
84	Fluorine and inorganic compounds (as HF)	M	ISO/DIS 15713:2004	CAT-AP-01	0.19	33.78	33.97	0.0	0.0
80	Chlorine and inorganic compounds (as HCl)	M	EN 19111-1 to 3:2003	CAT-AP-01	0.81	121.46	122.27	0.0	0.0

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

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

RELEASES TO AIR		METHOD			Please enter all quantities in this section in KGs		QUANTITY		
POLLUTANT		Method Used			Flare	BY04			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
230	TA Luft organic substances class 1	M	ALT	CEN/TS 13649 M109(N) GC MS	0.0	210.75	210.75	0.0	0.0
231	TA Luft organic substances class 2	M	ALT	CEN/TS 13649 M109(N) GC MS	0.0	210.75	210.75	0.0	0.0
229	TA Luft inorganic dust particles class 3	M	ALT	CEN/TS 13649 M109(N) GC MS	0.0	210.75	210.75	0.0	0.0
237	Volatile organic compounds (as TOC)	M	ALT	EN12619:2013 Flame Ionisation by Sick 3006FD	0.09	0.0	0.09	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	Balleally 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)	4581646.0	E	Model	Gassim 2.5	N/A
Methane flared	22536.0	M	measured	Measured at flare	2500.0 (Total Flaring Capacity)
Methane utilised in engine/s	1964690.0	M	measured	measured at engines	3750.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	2531420.0	C	calculated	Subtraction gas capture from	N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR#: W0009 | Facility Name : Balleally Landfill | Filename : w0009_2017.xls | Return Year : 2017 |

29/03/2018 10:44

Please enter all quantities on this sheet in Tonnes

3

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: Name and Licence/Permit No of Recover/Disposer	Haz Waste: Address of Next Destination Facility	Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used		Non	Non Haz Waste: Address of Recover/Disposer				
Within the Country	19 07 03	No	20562.0	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Irish Water Portrane Sewerage Works,D0114-01		Portrane Sewerage Works,St. Ita's Hospital,Portrane,Co. Dublin,Ireland			

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

[Link to previous years waste data](#)

[Link to previous years waste summary data & percentage change](#)

[Link to Waste Guidance](#)

Irish Water Pc Portrane Sewerage Works,St. Ita's Hospital,Portrane,Co. Dublin,Ireland