DUNSINK LANDFILL, DUNSINK LANE, FINGLAS, CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2017

WASTE LICENCE REG. NO. W0127-01

MARCH 2018

Comhairle Contae Fhine Gall
Fingal County Council

FEHILY TIMONEY & COMPANY

DUNSINK LANDFILL, DUNSINK LANE, FINGLAS, CO. DUBLIN

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Abstract: This report represents the monitoring results for Dunsink Landfill, Dunsink Lane, Finglas, Co. Dublin. This report covers the annual reporting period of 2017 in accordance with Waste Licence Reg. No. W0127-01.

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1 INTRODUCTION

1.1 Reporting Period

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

1.2 Waste Licence

On the 9th January 2014, the Environmental Protection Agency (EPA) granted a waste licence (register no. 127-1) to Fingal County Council in respect of their landfill facility at Dunsink, Co. Dublin. The register number was changed to W0127-01 from July 2006.

The licence is for the closure and restoration of areas previously landfilled at the site. The licence required Fingal County Council to restore and remediate the facility, to install infrastructure to monitor and manage landfill gas and leachate emissions and to cap previously filled areas using inert materials. These tasks have been completed. In accordance with the requirements of Condition 11.6 of the Waste 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:

Dunsink Landfill
Dunsink Lane
Finglas
Co. Dublin

National Grid reference E311766, N238886.

Access to the landfill is from the Elm Green end of Dunsink Lane only.

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

1.4 Licensed Waste Activities at the Facility

Dunsink landfill opened in 1976. Approximately 4,400,000 tonnes of waste is estimated to have been deposited at the facility up until June 1996. The landfill subsequently phased to closure, culminating in the closure of the civic amenity facility in 2003. A landfill gas utilisation plant was installed on site in 1996.

The original application for a waste licence was submitted to the EPA in September 1999. An amendment to the original application was sought in February 2003. A Proposed Decision was issued in August 2003. Waste Licence 127-1 was issued in January 2004.

On January 9th 2004, Fingal County Council was licensed to carry out the following waste activities at Dunsink Landfill subject to twelve conditions.

Licensed Waste Disposal Activities, in accordance with the Third Schedule of the Waste Management Act 1996:

- *Class 4 Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons:*

This activity is limited to:

- The provision and use of a leachate lagoon to temporarily store leachate generated in the landfill, prior to discharge to the public foul sewer; and
- The provision and use of a surface water attenuation pond to control the quality and quantity of the surface water run-off from the site.

Licensed Waste Recovery Activities, in accordance with the Fourth Schedule of the Waste Management Act 1996:

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

  This activity is limited to the composting of green waste, the recycling / reclamation of cardboard, paper and waste oil at the facility.

- *Class 3 Recycling or reclamation of metals and metal compounds:*

  This activity is limited to the recycling of ferrous / non-ferrous metals and white goods.

- *Class 4 Recycling or reclamation of other inorganic materials:*

  This activity is limited to the recycling or reclamation of subsoil and topsoil (for the restoration of the site) and dry recyclables at the bring centre.

- *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 for the generation of electricity.

- *Class 11 The use of waste obtained from any activity referred to in a preceding paragraph of this Schedule:*

  This activity is limited to the use of suitable subsoil and topsoil and composted material for the restoration programme.

- *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 recyclable waste prior to recovery off site and the storage of soil on site for the restoration programme.

1.5 Local Environmental Conditions

The landfill site is bounded by Dunsink Lane to the South, Rathoath Road to the East, the M50 motorway to the Northwest and Cappagh Hospital to the North. It is approximately 61 ha in extent.

The most elevated point of the site (as measured in 2010) lies at 100m on the western side of the site. The base of the landfill varies topographically but is estimated to average from 65-70 m.

1.6 Environmental Policy

The primary elements of the environmental policy for Dunsink landfill are as follows:

- To comply with the terms of waste licence W0127-01 and all other relevant legislation, standards and codes of practice.
- To strive for continuous improvement in the management of the facility, to minimise the effects of the landfill on the environment.

1.7 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.

2 GROUNDWATER MONITORING

This section of the Annual Environmental Report presents the findings of the groundwater monitoring.

2.1 Monitoring Locations

Monitoring was carried out at the locations set out in Table D.1.1 of the licence, amended as follows: BH33 and BH34 were added to the monitoring programme during Q1 2005. BH18 was blocked and replaced by BH35 at a location further North in 2011. BH34 was blocked and replaced by BH34N in 2012. Drawing W0127-01 GW Monitoring Locations shows the locations of the 9 wells and is included in Appendix 1.

Table 2.1 presents details of the location and orientation of the monitoring points in relation to the site.

Table 2.1: Groundwater Monitoring Locations

Monitoring Location	Location	Location Description
BH3	Upgradient	Deep groundwater monitoring borehole, upgradient of the landfill. It is located on the Northern side of the Scribblestown stream and close to the M50 motorway.
BH4	Upgradient	Shallow groundwater monitoring borehole, adjacent to borehole BH3.
BH16	Downgradient	Deep groundwater monitoring borehole, Down-gradient of the landfill at the rear of the leachate lagoon.
BH27	Downgradient	Deep groundwater monitoring borehole, down-gradient of the landfill in Elm green golf course.
BH31	Downgradient	Shallow groundwater monitoring borehole, down-gradient of the landfill, adjacent to BH32.
BH32	Downgradient	Down-gradient of the landfill. Deep groundwater borehole is situated down-gradient of the landfill, just off the Ratoath Road at the rear of halting sites.
BH33	Upgradient	Deep groundwater monitoring borehole, located just off the grounds (east) of Dunsink Observatory.
BH34N	Upgradient	Shallow groundwater monitoring borehole, located off the grounds of the Dunsink Observatory.
BH35	Upgradient	Deep groundwater monitoring borehole, located near Cappagh Hospital, at the northern boundary of the site

2.2 Monitoring Parameters

Groundwater levels were monitored and a visual assessment was performed during the quarterly reporting period by FT personnel.

Borehole wells were sampled and analysed for quarterly groundwater parameters, listed in Table D.5.1 of the licence.

2.3 2017 Sampling Programme

The following sampling programme was completed in 2017:

Table 2.2: Groundwater Sampling Programme 2017

Groundwater Borehole Monitoring Location	Q1 January – March	Q2 April – June	Q3 July – September	Q4 October – December
BH3	Sampled	Not sampled**	Sampled	Sampled
BH4	Not sampled**	Not sampled**	Sampled	Sampled
BH16	Sampled	Sampled	Sampled	Sampled
BH27	Sampled	Sampled	Sampled	Sampled
BH31	Sampled	Sampled	Sampled	Sampled
BH32	Sampled	Sampled	Sampled	Sampled
BH33	Sampled	Sampled	Sampled	Sampled
BH34N	Sampled	Not sampled*	Not sampled*	Not sampled*
BH35	Sampled	Sampled	Not sampled**	Sampled

* Well not sampled as location was dry
** Well not sampled due to health and safety issue

2.4 Interpretation of Results

The groundwater results were compared to overall threshold value from the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) or where appropriate, the IGV (interim guideline values) from EPA document, Towards Setting Guideline Values for the Protection of Groundwater in Ireland (2010).

Comparisons have also been made with control values and trigger values that have been established for pH, conductivity, ammoniacal nitrogen and total organic carbon at the boreholes.

2.4.1 Q1 January to March 2017 – Sampling dated 7th February 2017

Results from groundwater sampling during the 1st Quarter of 2017 indicated generally good groundwater quality. There was a slightly elevated level of ammoniacal nitrogen at BH35 (0.231 mg/l, upgradient) and at BH31 (0.215 mg/l, downgradient) above the regulatory threshold. However, both values were below the control and trigger values.

All other parameters at all other monitoring boreholes were below the regulatory limits, control and trigger values.

2.4.2 Q2 April to June 2017 – Sampling dated 2nd and 26th June 2017

Results from groundwater sampling during the 2nd Quarter of 2017 indicated generally good groundwater quality. Groundwater wells BH3 and BH4 were not sampled due to a health and safety issue while location BH34N was dry. There was a slightly elevated level of ammoniacal nitrogen at BH35 (0.207 mg/l, upgradient) and BH31 (0.292 mg/l, downgradient) above the regulatory threshold. However, both values were below the control and trigger values.

All other parameters at all other monitoring boreholes were below the regulatory limits, control and trigger values.

2.4.3 Q3 July to September 2017 – Sampling dated 11th September 2017

Results from groundwater sampling during the 3rd Quarter of 2017 indicated generally good groundwater quality. Groundwater well BH35 was not sampled due to a health and safety issue in the area while location BH34N was dry during the sampling round.

There was a slightly elevated level of ammoniacal nitrogen at BH32 (0.232 mg/l, downgradient) above the regulatory threshold. However, this value was below the control and trigger values.

All other parameters at all other monitoring boreholes were below the regulatory limits, control and trigger values.

2.4.4 Q4 October to December 2017 – Sampling dated 18th October 2017

Results from groundwater sampling during the 4th Quarter of 2017 indicated generally good groundwater quality. Groundwater well BH34N was not sampled during this round as the location was dry.

There was a slightly elevated level of ammoniacal nitrogen at BH35 (0.215 mg/l, downgradient) above the regulatory threshold. However, this value was below the control and trigger values.

All other parameters at all other monitoring boreholes were below the regulatory limits, control and trigger values.

2.4.5 Analysis of 5 year trends

Groundwater monitoring results were analysed over the past 5 years at one monitoring well upgradient of the landfill (BH4) and one monitoring well downgradient of the landfill (BH31). The trendlines showed slightly declining trends at BH4 for EC, TOC and Chloride, with marginal increase in Ammoniacal N over the past 5 years. The trendlines for Ammoniacal N and TOC are decreasing at BH31, while EC and Chloride trendlines are increasing. The trend for Chloride at BH31 is increasing over the past 5 years, however the levels of Chloride are significantly lower than those at BH4 showing that the influence is off site (salting of the M50).

2.5 Groundwater Levels

Groundwater levels were recorded from each borehole during each quarter, with the results displayed in Table 2.3.

Table 2.3: Groundwater borehole water levels – well dip, depth to well (mb TOC)*

Groundwater Borehole Monitoring Location	Q1 2017 07/02/2017	Q2 2017 22/06/2017	Q3 2017 11/09/2017	Q4 2017 18/10/2017
BH3	3.84	-	4.12	4.17
BH4	0	-	3.34	3.31
BH16	0.73	0.51	0.4	1.03
BH27	2.51	3.98	3.44	3.44
BH31	3.74	1.22	0.81	3.8
BH32	0.81	4.3	3.64	0.7
BH33	2.2	2.5	2.69	2.57
BH34N	1.23	2.26	-	-
BH35	3.54	3.97	-	4.26

* Well dip (meters) below top of casing

A hydrogeological Assessment of the facility was forwarded to the Agency in November 2004 (FCC-127-1-2004-065). It determined a regional up gradient/down gradient trending of groundwater from west-north-west to east-south-east beneath the landfill and surrounds. This pattern is generally consistent with the regional drainage pattern.

2.6 Conclusion

While variations were noted, parameter levels remained broadly similar overall across all wells in 2017. Low levels for the majority of the parameters at downgradient wells indicate an absence of landfill influence on the quality of the groundwater.

3 SURFACE WATER MONITORING

This section of the Annual Environmental Report presents the findings of surface water monitoring.

3.1 Monitoring Locations

A description of the surface water monitoring locations is outlined in Table 3.1 below.

Surface water monitoring for monthly parameters was carried out at 8 No. locations during 2017: SW21, SW18, SW19, SW7, SW10, SW2, SW11A and SW22.

Surface water monitoring for quarterly parameters was carried out at 8 no locations during 2017: SW21, SW18, SW19, SW7, SW10, SW2, SW11A, and SW22 as defined in schedule D of the licence and shown in the Drawing W0127-01 SW monitoring locations in Appendix I.

Lane Pond has been monitored as an additional monitoring point since 2015 on a monthly and quarterly basis. SW10A is also an additional monitoring point, used for investigative monitoring.

Table 3.1: Surface Water Monitoring Locations

Monitoring Location	Description
SW21	Upstream of site, western side of M50 motorway
SW18	Onsite. Junction of 3 stormwater drains in a manhole downstream of SW21 and East of M50 motorway
SW19	Between SW18 and landfill attenuation pond
SW7	On Scribblestown stream, downstream of attenuation pond
SW10	On Scribblestown stream, north east of the leachate lagoon
SW10A	Outfall pipe on northern tributary to the Scribblestown stream, downstream of SW10. For additional investigative monitoring
SW2	On Scribblestown stream, South East of leachate lagoon
Lane pond	On site access road on the southern boundary of the site, near upwelling springs
SW11A	Outfall from the Southern Tributary to the Scribblestown Stream
SW22	Monitoring point on Scribblestown Stream, above confluence of Dunsoghly tributary and Scribblestown stream

3.2 Monitoring Parameters

Monthly surface water monitoring took place at 9 no locations: SW2, SW7, SW10, SW11A, SW18, SW19, SW21, SW22 and Lane Pond in 2017 (see Table 3.2). Electrical conductivity, temperature, and pH were measured in situ using field meters. Visual odour inspections were also carried out. Water was sampled monthly at SW22, SW18 and SW21 for analysis of ammoniacal nitrogen.

In the quarterly and annual events, the above measurements were completed and, when possible, all locations were sampled for chemical analysis as per licence requirements.

In addition to the schedules of the licence, additional investigative monitoring was completed at SW7, SW18, SW19, SW21 and SW22 for chloride, manganese and coliforms. Additional investigative monitoring was also carried out at SW7 in September 2017 and at the attenuation pond location in September and October 2017 for quarterly parameters.

The annual round of surface water monitoring was carried out in September. The annual round involved analysis of a longer list of parameters than the monthly and quarterly list.

3.3 Sampling Programme

The following sampling programme was completed in 2017:

Table 3.2: Surface Water Sampling Programme 2017

Surface Water Monitoring Location	Q1	Q2	Q3	Q4	Monthly Visual	Annual	Additional
SW21	Y	Y	Y	Y	Y	Y	Y
SW18	Y	Y	Y	Y	Y	Y	Y
SW19	Y	Y	Y	Y	Y	Y	Y
SW7	Y	Y	Y	Y	Y	Y	Y
SW10	Y	Y	Y	Y	Y	Y	Y
SW10A	N	N	N	N	N	N	N
SW2	Y	Y	Y	Y	Y	Y	N
Lane pond	Y	*	*	*	Y	*	N
SW11A	Y	Y	Y	Y	Y	Y	N
SW22	Y	Y	Y	Y	Y	Y	N
Attenuation Pond	N	N	N	N	N	N	Y
Downstream of SW7	N	N	N	N	N	N	Y

* = No sample possible (dry)

N=sampling not required

3.4 Interpretation of Results

The surface water quality results were compared to the S.I. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988 and S.I. 272 of 2009 (Surface Water Regulations).

3.4.1 Q1 January to March 2017 – Quarterly Sampling dated 7th February 2017

Overall surface water quality during the Q1 2017 rounds showed potential contamination due to elevated conductivity results. These results were similar in pattern to Q1 2016, in which conductivity was elevated across many of the monitoring sites. This may be related to winter gritting of road (M50) or seasonal patterns.

Water quality parameters downstream of the attenuation pond at SW7, SW10, SW2, SW11A for most parameters remained relatively stable throughout Q1 2017 although an increase in ammoniacal nitrogen levels with marginal exceedances of the EQS recorded during February and March of this quarter. There was a slight upward trend in ammoniacal nitrogen levels at SW22, but this upward trend was also apparent upstream of the facility.

3.4.2 Q2 April to June 2017 – Quarterly Sampling dated 22nd June 2017

Surface water monitoring at the monitoring locations upstream of the site (SW21) and the attenuation pond (SW18, SW19) indicate some contamination as evidenced by elevated ammoniacal nitrogen and electrical conductivity, BOD and TSS. The elevated levels of parameters are not due to the landfill but are attributed to activities upstream of the site.

Water quality parameters downstream of the attenuation pond at SW7, SW10, SW2, SW11A for most parameters have remained relatively stable throughout Q2 2017 although slightly elevated levels of electrical conductivity with marginal exceedances of the EQS were recorded at SW11A during April and at SW2 and SW11A during May of this quarter. Ammoniacal nitrogen levels were lower at SW22 during Q2 2017 than the previous quarter, and were similar to 2016 levels.

The results for electrical conductivity are stable overall and show similar patterns to 2015, 2016 and 2017 levels. As identified previously, winter road gritting on the M50 was proposed as a possible source of elevated conductivity in the winter period on site.

3.4.3 Q3 July to September 2017 – Quarterly Sampling dated 11th September 2017

Surface water monitoring at the monitoring locations upstream of the site (SW21) and the attenuation pond (SW18, SW19) indicate some contamination as evidenced by elevated ammoniacal nitrogen and electrical conductivity, BOD and TSS. The elevated levels of parameters are not due to the landfill but are attributed to activities upstream of the site.

Water quality parameters downstream of the attenuation pond at SW7, SW10, SW2, SW11A for most parameters have remained relatively stable throughout Q3 2017 although slightly elevated levels of electrical conductivity with marginal exceedances of the EQS were recorded at SW11a during August and September of this quarter. BOD levels were elevated at SW7 during July of this quarter. Ammoniacal nitrogen levels were lower at SW22 during Q3 2017 than the previous quarter, and were slightly lower than 2016 levels.

Additional sampling at SW7 to identify the source of BOD monitored in July was inconclusive.

The results for electrical conductivity are stable overall and show similar patterns to 2015, 2016 and 2017 levels. In previous reports, winter road gritting on the M50 was proposed as a possible source of elevated conductivity in the winter period on site.

The majority of annual results during Q3 were within the relevant MAC/EQS for each parameter measured.

3.4.4 Q4 October to December 2017 – Quarterly Sampling dated 18th October 2017

Surface water monitoring at the monitoring locations upstream of the site (SW21) and the attenuation pond (SW18, SW19) indicate some contamination as evidenced by elevated ammoniacal nitrogen and electrical conductivity, BOD and TSS. The elevated levels of parameters are not due to the landfill but are attributed to activities upstream of the site.

Water quality parameters downstream of the attenuation pond at SW7, SW10, SW2, SW11A for most parameters have remained relatively stable throughout Q4 2017 although slightly elevated levels of electrical conductivity with marginal exceedances of the EQS were recorded at SW11a during Q4 and at all locations in December Q4 2017. Ammoniacal nitrogen levels remain continually lower at SW22 during Q4 2017 similar to Q3 2017.

The additional testing in upstream of SW7 at the attenuation pond on the source of BOD in October has ceased.

The results for electrical conductivity are stable overall and show similar patterns to 2015, 2016 and 2017 levels but elevated in December Q4 at all locations. These elevated levels are thought to be linked to winter road gritting on the M50.

3.4.5 Analysis of 5 year trends

Surface water monitoring results were analysed over the past 5 years at one monitoring location upstream of the landfill (SW18) and one monitoring location downstream of the landfill (SW22).

The trendline for SW18 for EC is downwards, whereas the trendlines for Ammoniacal N, BOD and TSS at this upgradient location are upwards.

The trendlines for SW22 for Ammoniacal N, BOD, EC and TSS are downwards over the 5-year period.

3.5 Conclusion

There were elevated levels of electrical conductivity and ammoniacal nitrogen at some of the sampling stations in 2017, particularly during the winter months early in the year, when winter gritting of road (M50) or seasonal patterns are considered a possible source of these elevated levels.

The leachate pumping infrastructure (pumps, sump and leachate valve configuration) commissioned in June 2005 and the leachate interceptor drains established to the west and south of the lagoon along with the remedial works carried out at SW21 in 2013 (upstream pollution source affecting water quality through the landfill) have significantly aided in the general improvement in water quality at the facility.

4 LEACHATE MONITORING

This section of the Annual Environmental Report presents the findings of the leachate monitoring.

4.1 Monitoring Locations

Monitoring was carried out at the 2 locations as set out in set out in Table D.1.1 of the licence and in Drawing W0127-01 Leachate monitoring locations which is included in Appendix I.

Table 4.1 presents details of the location and orientation of the monitoring points in relation to the site.

Continuous monitoring is also undertaken at the Leachate Sump for dissolved methane. Leachate is collected on site and pumped via the leachate sump to the leachate lagoon. It is pumped to sewer back through the leachate sump. The probe is measuring dissolved methane in the leachate sump and the direction of leachate is dependent on valve positions. Fingal County Council manually opens and closes the valves and notes the time and date so that the dissolved methane measurements can be filtered for leachate discharging to sewer.

Leachate is discharged from the site via the leachate lagoon to the sewer at a point named Finglas Sewer. The leachate is conveyed in a rising main to a sewer discharge point in Finglas (Finglas sewer) after which it enters a gravity fed sewer to convey it to Ringsend WWTP.

Quarterly samples of leachate were collected from the Leachate Sump and Leachate Lagoon for analysis of dissolved methane.

Table 4.1: Leachate Monitoring Locations

Leachate Monitoring locations	Eastings	Northings
Northeast Lagoon	311323	239031
Leachate Sump	311417	238895

4.2 Monitoring Parameters

Visual inspections of the leachate lagoon as well as sampling for field parameters (electrical conductivity, temperature and pH) were undertaken in 2017.

4.3 Sampling Programme

The following sampling programme was completed in 2017:

Table 4.2: Leachate Sampling Programme 2017

Leachate Monitoring Location	Q1	Q2	Q3	Q4	Annual
North East Lagoon	Sampled	Sampled	Sampled	Sampled	Sampled (Q3)
Leachate Sump	Sampled	Sampled	Sampled	Sampled	Sampled (Q3)

4.4 Interpretation of Results

4.4.1 Q1 January to March 2017 – Quarterly Sampling dated 7th February 2017

For Q1 monitoring at the Northeast Lagoon, pH was recorded at 7.9 units, electrical conductivity at 2.53 mS/cm and temperature at 3.8°C. Ammoniacal nitrogen was found to be 117 mg/l and dissolved methane was 0.0342 mg/l. Results overall were broadly similar to Q4 2016.

For Q1 monitoring at the Leachate Sump, pH was recorded at 8.05 units, electrical conductivity at 2.39 mS/cm and temperature at 3.8°C. Ammoniacal nitrogen was reported at 107 mg/l and dissolved methane was 0.085 mg/l.

4.4.2 Q2 April to June 2017 – Quarterly Sampling dated 8th May 2017

For Q2 monitoring at the Northeast Lagoon, pH was recorded at 7.98 units, electrical conductivity at 3.08 mS/cm. Ammoniacal nitrogen was found to be 151 mg/l and dissolved methane was at 0.0444 mg/l. Results overall were broadly similar to Q1 2017.

For Q2 monitoring at the Leachate Sump, pH was recorded at 7.82 units, electrical conductivity at 2.98 mS/cm. Ammoniacal nitrogen was reported at 136 mg/l. The level of dissolved methane was 0.0262 mg/l. Results overall were broadly similar to Q1 2017.

4.4.3 Q3 July to September 2017 – Quarterly Sampling dated 11th September 2017

For Q3 monitoring at the Northeast Lagoon, pH was recorded at 8.02 units, electrical conductivity at 2.73 mS/cm and temperature at 13.4°C. Ammoniacal nitrogen was found to be 130 mg/l and dissolved methane was at 0.0159 mg/l which is below the licence ELV (0.14 mg/l). Results overall were broadly similar to Q1 2017.

For Q3 monitoring at the Leachate Sump, pH was recorded at 7.53 units, electrical conductivity at 3.26 mS/cm and temperature at 14.1°C. Ammoniacal nitrogen was reported at 158 mg/l. The level of dissolved me thane was 0.002 mg/l. Results overall were broadly similar to Q2 2017.

All parameters measured at the North-East Lagoon and Leachate Sump on the annual round (inorganics, filtered and unfiltered metals) were below the mean levels for leachate and in-line with the parameter levels presented in the EPA Landfill Manual on Landfill Operational Practices (1997) and the EPA Landfill Manual on Landfill Site Design (2000).

4.4.4 Q4 October to December 2017 – Quarterly Sampling dated 12th December 2017

For Q4 monitoring at the Northeast Lagoon, pH was recorded at 7.85 units, electrical conductivity at 1.95 mS/cm and temperature at 1.5°C. Ammoniacal nitrogen was found to be 70.7 mg/l. The level of dissolved methane was at 0.0024mg/l. Results overall were broadly similar to Q3 2017.

For Q4 monitoring at the Leachate Sump, pH was recorded at 7.25 units, electrical conductivity at2.6 mS/cm and temperature at 9.5°C. Ammoniacal nitrogen was reported at 91.4 mg/l and dissolved methane was at 0.216 mg/l which is above the licence ELV (0.14 mg/l).

4.4.5 Continuous Emissions Monitoring

Approximately 104,183 m^3 of leachate was discharged to public sewer during 2017.

The ELV for dissolved methane of 0.14 mg/l was breached throughout 2017, however the aeration of leachate in the lagoon prior to discharging it to sewer allowed to bring the dissolved methane levels closer to the ELV.

4.5 Conclusion

While variations were noted for quarterly parameters during 2017, most parameters overall remained stable when compared with 2016 results.

Annual parameters monitored during 2017 were below the mean levels for leachate and in line with the parameter levels presented in the EPA Landfill Manuals on Landfill Operational Practices (1997) and the EPA Landfill Manual on Landfill Site Design (2000).

Results of continuous monitoring for dissolved methane were above the ELV throughout 2017.

Fingal County Council continues to monitor gas at the public sewer in Finglas on a weekly basis.

5 LANDFILL GAS MONITORING & EMISSIONS TO AIR

The 2017 PRTR is included as Appendix 3.

5.1 Monitoring Locations

Landfill gas monitoring was carried out during 2017:

- weekly at the Finglas Sewer and 1 perimeter gas monitoring well (G45)
- quarterly and monthly in the perimeter gas monitoring wells
- monthly at the Inlet to Landfill Gas Utilisation Plant and of the headspace at the leachate sump

This was in accordance with Table D.1.1 of the licence and amendments, as per Drawing W0127-01 Gas Monitoring Locations which is included in Appendix I.

In addition, two surface VOC emissions surveys were carried out on the landfill in 2017.

Stack emissions monitoring is carried out annually in compliance with Schedule D.7 of the licence. Stacks of operational flare(s) and engine(s) are sampled.

5.1.1 Perimeter Wells, Fingal Sewer & Leachate Sump

Weekly monitoring was carried out in the headspace of the Finglas Sewer discharge point during 2017 and at borehole G45.

Monthly monitoring was carried out at the following locations during 2017: landfill gas monitoring boreholes (G18R, G23, G32, G35, G36, G37, G38, G39, G40, G41R, G46, G47, G48) and of the headspace of the leachate sump.

In addition, perimeter landfill gas monitoring boreholes G3, G6, G7, G8, G9, G10, G12, G13, G21, G42, G43 and G44 were monitored on a quarterly basis.

5.1.2 Inlet to Landfill Gas Utilisation Plant

Weekly monitoring at the IPS inlet and continuous monitoring at the engine outlet commenced during Q1 2006. The monitoring at the IPS inlet is now monthly. It was agreed with the Agency during the first quarter of 2006 that reporting of incidents for this monitoring could be included in the quarterly reports.

5.1.3 Outlet from Landfill Gas Utilisation Plant

A continuous monitor on the outlets of the gas engine is installed. Carbon monoxide and nitrogen oxides are monitored continuously. The analysers have proven to be effective on other landfill gas utilisation plants. An appropriate data management system has been installed. This provides for data logging and data storage.

The historic emission points were (as shown in Figure 5.1):

- UP1 Utilisation Plant Input 1 (no longer in use)
- UP2 Utilisation Plant Output Engine 1
- UP3 Utilisation Plant Output Engine 2 (no longer in use)

The analysers are able to measure and report at a sufficient resolution to register the emission limit for carbon monoxide (1,400 mg/m^3).

The source of the engine emissions during 2017 is identified as UP2. Engine #2 was removed and UP3 is no longer used (see Figure 5.1).

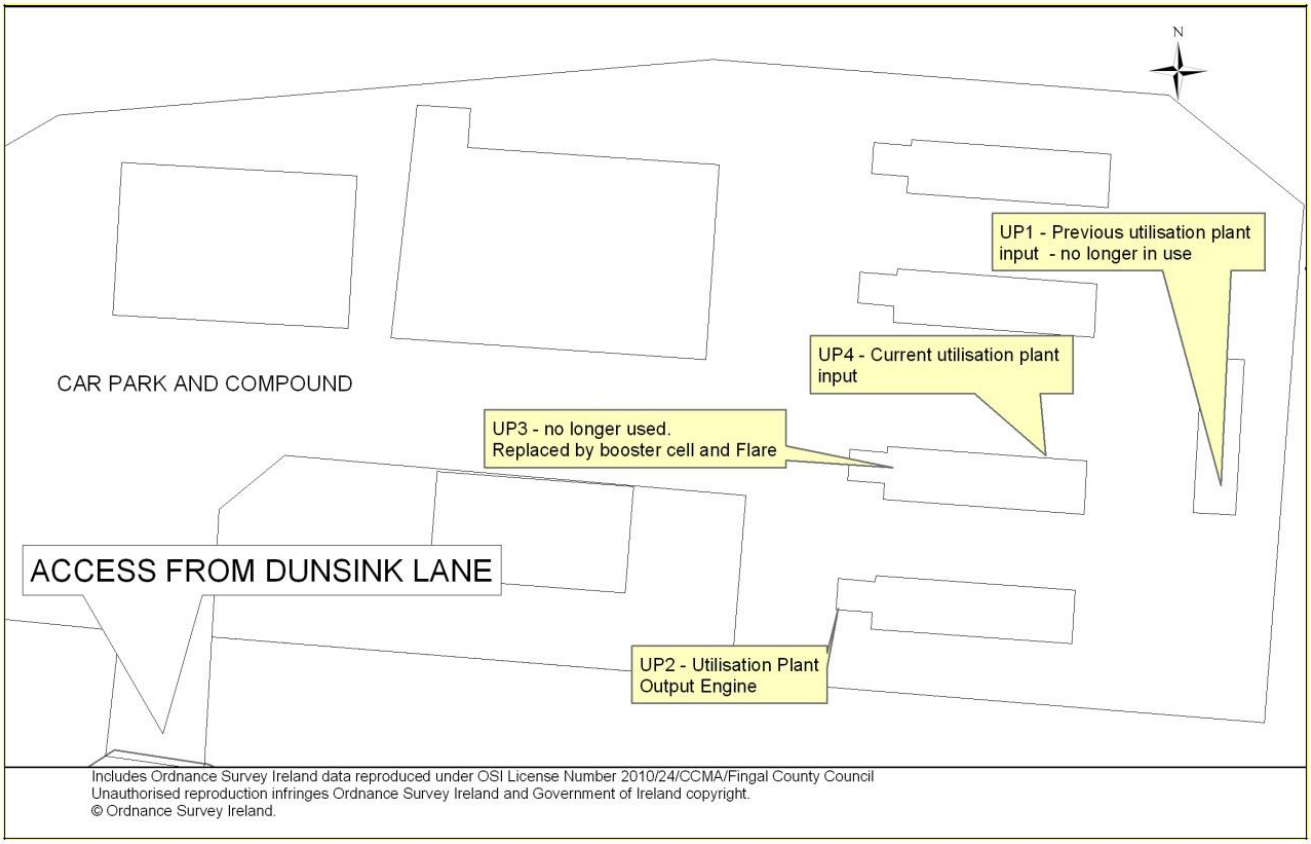


Figure 5.1: Dunsink Landfill Gas Utilisation Plant

5.2 Monitoring Parameters

5.2.1 Perimeter Wells, Fingal Sewer, Leachate Sump & IPS Inlet

In accordance with Table D.2.1 of the licence, methane (CH_4), carbon dioxide (CO_2), oxygen (O_2) and atmospheric pressure were measured using the Geotechnical Instruments GEM5000 Landfill Gas analyser and Gas Data GFM410 Landfill Gas Data Analyser. These parameters were monitored at perimeter landfill gas wells, IPS inlet, headspace of Leachate Sump and the headspace of Finglas Sewer.

5.2.2 Outlet from Landfill Gas Utilisation Plant

A continuous monitor on the outlet of the gas engine was installed. Carbon monoxide and nitrogen oxides are monitored continuously. Additionally, a gas sampling system to allow for annual monitoring of total VOCs as carbon, total non-methane VOCs and particulates, hydrochloric acid and hydrogen fluoride, and, quarterly monitoring of nitrogen oxides has been installed.

Emission limit values for the landfill gas utilisation plant are as per Schedule C.5 of the Waste Licence W0127-01.

Table 5.1: Emission Limit Values for continuously monitored parameters at outlets from utilisation plant

Parameter	Utilisation Plant ELV
Nitrogen Oxides (NO_x)	500 mg/m^3
CO	1,400 mg/m^3

Note 1: Dry gas referenced to 5% oxygen by volume for utilisation plants.

Regular checks of the monitoring equipment were carried out throughout each quarter of the year to ensure that the equipment was turned on and monitoring the emissions.

5.3 Monitoring Programme

The following monitoring programme was completed in 2017:

Table 5.2: Landfill Gas Monitoring Programme 2017

Landfill Gas Monitoring Location	Weekly	Monthly	Q1	Q2	Q3	Q4	Continuous
G3	N	N	Y	Y	Y	Y	N
G6	N	N	Y	Y	Y	Y	N
G7	N	N	Y	Y	Y	Y	N
G8	N	N	Y	Y	Y	Y	N
G9	N	N	Y	Y	Y	Y	N
G10	N	N	Y	Y	Y	Y	N
G12	N	N	Y	Y	Y	Y	N
G13	N	N	Y	Y	Y	Y	N
G18R	N	Y	N	N	N	N	N
G21	N	N	Y	Y	Y	Y	N
G23	N	Y	N	N	N	N	N
G35	N	Y	N	N	N	N	N
G36	N	Y	N	N	N	N	N
G37	N	Y	N	N	N	N	N
G38	N	Y	N	N	N	N	N
G39	N	Y	N	N	N	N	N
G40	N	Y	N	N	N	N	N
G41R	N	Y	N	N	N	N	N
G42	N	N	Y	Y	Y	Y	N
G43	N	N	Y	Y	Y	Y	N
G44	N	N	Y	Y	Y	Y	N
G45	Y	N	N	N	N	N	N
G46	N	Y	N	N	N	N	N
G47	N	Y	N	N	N	N	N
G48	N	Y	N	N	N	N	N

Landfill Gas Monitoring Location	Weekly	Monthly	Q1	Q2	Q3	Q4	Continuous
Finglas Sewer	Y	N	N	N	N	N	N
Inlet to Landfill Gas Utilisation Plant	N	Y	N	N	N	N	N
Headspace of the leachate sump	N	Y	N	N	N	N	N
Outlet from Landfill Gas Utilisation Plant	N	Y	N	N	N	N	N

N=not required

In addition, stack emissions testing is carried out annually at the landfill gas utilisation plant.

5.4 Interpretation of Results

5.4.1 Perimeter Wells

Exceedances of the trigger level for carbon dioxide (CO_2) occurred at a number of monitoring boreholes on site during 2017. The number of CO_2 readings recorded above the trigger level varied from 13 during Q2 to 18 during Q3. The levels of CO_2 recorded were overall broadly similar in concentration range when compared to previous results in 2016. High concentrations of CO_2 can occur naturally at shallow depths of up to 2 m due to microbial activity associated with the roots of many types of vegetation.

Exceedances of the trigger level for methane were recorded during weekly monitoring in Q1-Q4 2017 at the perimeter borehole G45, with recordings in the range of 1.5-33.5 % v/v. Methane was not detected above the trigger level at any other monitoring wells during 2017.

5.4.2 Finglas Sewer

Methane was not detected in the explosive range at this location during the 2017 monitoring period.

5.4.3 Leachate Sump

Methane was not detected in the explosive range at this location during the 2017 monitoring period.

5.4.4 Inlet to the Landfill Gas Utilisation Plant

Gas readings have been relatively consistent throughout 2017.

5.4.5 Outlet from the Landfill Gas Utilisation Plant

The results below in Table 5.3 show compliance with Schedule C.5 and condition 6.3.3.1 of the waste licence during 2017 at the times when the equipment was in working order.

There were several periods of downtime during 2017, with a total of 58 days for which no monitoring was possible. These were reported as incidents as they arose.

Table 5-3: Results from continuous sampling of parameters at the landfill gas utilisation plant outlets

Condition 6.3.3.1 of W0127-01	Q1-Q4 2016 Results
No 24-hour mean value shall exceed the ELV	0 no. 24-hour means exceeded 500 mg/m^3 for nitrogen oxides and 0 no. 24-hour means exceeded 1400 mg/m^3 for carbon monoxide.
97% of all 30-minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value	0 no. 30-minute mean values or 0% of samples taken continuously over this quarter for carbon monoxide exceeded 1.2 times the 1400mg/m^3 ELV. 0 no. 30-minute mean value or 0% taken continuously over this quarter for nitrogen oxides exceeded 1.2 times the 500mg/m^3 ELV.
No 30-minute mean value shall exceed twice the emission limit value	0 no. or 0% of 30-minute mean values taken continuously over this quarter for carbon monoxide exceeded twice the 1400mg/m^3 ELV. 0 no. or 0% of 30-minute mean values taken continuously over this quarter for nitrogen oxides exceeded twice the 500mg/m^3 ELV.

5.4.6 VOC Surface Emissions

Two VOC surface Emissions were carried out on the landfill in 2017, one in June and one in October.

The June survey identified 4 areas of emissions above the 500 ppm trigger level at identified features (wells and manifolds), and 2 surface emissions zones greater than 100 ppm instantaneous reading on open surfaces within the landfill.

The October survey identified 4 areas of emissions above the 500 ppm trigger level at identified features (wells and manifolds), and no surface emissions zones greater than 100 ppm instantaneous reading on open surfaces within the landfill.

Works were carried out with Bioverda Power Systems to remediate the areas where issues were identified by the surveys.

5.4.7 Stack Emissions

The results of stack emissions monitoring were compliant with the licence. The full report has previously been uploaded to EDEN. Table 5.4 shows the results.

Table 5.4: Stack Emissions Results

Parameter Units mg/m^3	Flare		Inlet to Utilisation Plant		Engine Outlet	
	Result	Limit	Result	Limit	Result	Limit
Total Particulates	-	-	-	-	3.83	130
Hydrochloric Acid as HCL Chloride	8.16	50	-	-	0.23	50
Hydrogen Fluoride as HF	0.38	5	-	-	<0.12	5
Sulphur Dioxide	1.43	-	-	-	2.10	-
Non-methane Volatile Organic Carbon	<1.33	75	-	-	<1.03	75
Total VOCs as Carbon	0.58	1000	-	-	597.1	1000
Total Sulphur	-	-	0.14	-	-	-
Total Chlorine	-	-	0.31	-	-	-
Fluorine	-	-	<0.05	-	-	-

5.5 Conclusion

Carbon dioxide (CO_2), an odourless gas, was detected above the trigger level of 1.5% v/v at a number of perimeter monitoring boreholes during 2017. Methane (CH_4) was detected above the trigger level of 1.0% v/v at gas well G45 during Q1-Q4 2017.

No methane in the explosive range was detected in the Finglas sewer or leachate sump during monitoring events in 2017.

Continuous monitoring of the landfill gas engine outlet was fully compliant with licence conditions for the period. The annual stack monitoring event found emissions in compliance with the licence.

6 BIOLOGICAL SURFACE WATER QUALITY ASSESSMENT

Biological monitoring of surface water quality was undertaken by means of a macroinvertebrate 'kick sampling' survey in accordance with Schedule D.5 of the waste licence (W0127-01) on the 13th November 2017. The report has been submitted through EDEN.

6.1 Monitoring Locations

Monitoring was carried out at the following six locations during 2017:

Table 6.1: Biological Monitoring Locations

Sampling Station	Location
KS1	Approximately 10m downstream of surface water sampling point SW19 on Scribblestown Stream
KS2	Approximately 20m downstream of the site surface water attenuation pond onsite
KS3	Towards the eastern boundary of the site, close to where the Scribblestown stream leaves the site. It is downstream of the confluence of the Scribblestown stream and Dunsoghly Tributary.
KS3a	Upstream of the confluence of the Scribblestown stream and Dunsoghly Tributary
KS4	On Scribblestown Stream, downstream of KS2
KS6	On the Dunsoghly tributary to the Scribblestown Stream

6.2 Interpretation of Results

Previous surveys at these locations from 2005-2014 and 2016 carried out biological monitoring by means of calculating EPA Q-Values or using the Q-Rating system and SSRS scoring system. Q-Rating is generally more useful in larger rivers and less applicable to 1st and 2nd order streams and streams such as those within Dunsink Landfill.

The SSRS scores calculated in the current 2017 survey has shown that Sites KS1-KS6 are all 'at risk' category of SSRS scoring. The scores achieved in this survey are broadly similar to 2014 and 2016 results. Some of the sampling sites (KS1, KS3a, KS4 and KS6) were heavily silted or vegetated, with a lack of riffle habitat and less than ideal for carrying out kick sampling surveys available. Scores overall reflect the dominance of Group 4 and Group 5 invertebrates and thus poor water quality. The presence of Group 1 species *Ephemera danica* at sample site KS2 may indicate an improvement in water quality at this location, though this was not reflected in the SSRS score achieved.

The Q-Value was also calculated for the Dunsink sites and is shown on Table 3.2. In previous surveys the Q-values calculated were mostly Q2 or Q3 which is classed as 'poor status' according to the Water Framework Directive (WFD) (see Table 3.2). The 2016 scores also indicated that all sites achieved 'poor status' attaining scores of between Q2 and Q3. Q value scores overall have remained similar to 2016 results.

None of the sites have moderate or good water quality that would be indicative of the 'not at risk' category in SSRS or Q4 'good status' in Q sampling.

Results overall for SSRS and Q values for 2017 were broadly similar to the 2016 survey. As discussed, the stream conditions onsite were heavily vegetated and/or silted at a number of locations, which was a limiting factor in the carrying out kick sampling surveys.

6.3 Water Framework Directive Classification

The current Water Framework Directive Score for the Scribblestown Stream on the section entering the Tolka River has been checked though the EPA Envision map viewer (http://gis.epa.ie/Envision/). The current score classifies the stream as at "poor status".

6.4 Conclusion

The biological data from 2017 indicate SSRS "stream at risk" conditions for all sites assessed on the Scribblestown Stream both within and downstream of the landfill, which was overall similar to previous surveys.

The Q values overall still indicate poor status waters. With the absence of an upstream control site, it is difficult to interpret if the low scores are related to the landfill or not. The landfill is currently closed, capped and the category of at risk is unlikely to change due to heavily silted stream conditions on site and lack of riffle habitat. This is reflected in the low scores of the 2017 survey and absence of Group 1, Group 2 species and dominance of Group 4, Group 5 species. The presence of Group 1 species *Ephemera danica* at sample site KS2 may indicate an improvement in water quality at this location, though this was not reflected in the SSRS score achieved. The highest percentage of Dissolved Oxygen was also recorded at this location at 105.9% saturation.

As indicated in the EPA monitoring results (according to the Envision Map viewer), the stretch of the Scribblestown Stream entering the Tolka has been classed as "poor status".

7 NOISE MONITORING

No noise monitoring was undertaken at Dunsink Landfill in 2017. This was addressed in The Licence Audit Report for 2008 from the Agency W1027-01/08/AR08EM, observation No.5, on Environmental Monitoring.

8 DUST MONITORING

No dust monitoring was carried out at Dunsink Landfill in 2017. This was addressed in the Licence Audit Report for 2008 from the Agency W1027-01/08/AR08EM, observation No.5, on Environmental Monitoring.

9 PM_{10} MONITORING

The Agency in correspondence referenced 127-1/GEN01EM stated that "The Agency, in accordance with Condition 8.2, does not require monitoring of PM_{10} as listed in Table D.3.1 of the waste licence unless otherwise instructed by the Agency."

10 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 made a financial provision of €4.37 million on its accounts (as of 31 December 2017) for the aftercare of Dunsink Landfill. Aftercare costs continued to be paid for from the revenue account. The reserve was increased compared to 2016 to cover any requirements for works as a result of the compliance investigations.

11 ENVIRONMENTAL MANAGEMENT PROGRAMME

11.1 Environmental Objectives and Targets for 2017

The phased handover of the landfill and surrounding areas to the Parks Department which began in 2008 was completed as of December 2009.

Capping works, final landscaping and slope stability maintenance were completed in 2009.

Environmental Infrastructure Inspection, Maintenance and Monitoring were on-going in 2017.

Progress with Compliance Investigation CI000399 on the dissolved methane concentration continued in 2017. Following the refusal of the Sanitary Authority to change the Emissions Limit Value, passive aeration of the leachate was continued in the lagoon. To enable a consultant to be procured to design the automation of recirculation of the leachate it was necessary to produce as-built drawings of the existing infrastructure and determine its condition. Fehily Timoney & Co services were engaged in August to provide this however difficulties were encountered in completing the survey such as 90 degree bends. FTC are still working with their CCTV subcontractor on an alternative solution to complete the survey.

Compliance Investigation CI000397 deals with the landfill gas infrastructure remediation. Following the installation of new monitoring borehole G45 in 2016, monitoring results recorded elevated methane levels. A number of actions to address the issue were undertaken throughout the year. Initially tracing works were carried out at Manifold 3 to identify each well & its location. Then repairs were carried out at a number of wells to ensure no oxygen ingress and to increase extraction in the area. A new horizontal well G15 was installed in two phases, first on the upper slope and then on the lower slope in the area leading to G45. Further re-balancing of Manifold 3 was also carried out however these works were unsuccessful in reducing the methane in G45. A geophysical survey of the area to try identifying possible sources of the methane at G45 was carried out in late 2017.

Works were also carried out on wells in the central area of the landfill to ensure gas extraction from this area was operational. Four wells previously connected to Manifold 7 were redirected to a new small manifold chamber and linked back into the extraction system via the gas pipe at well BPS 6. These wells are now monitored and balanced as usual.

11.2 Environmental Objectives and Targets for 2018

The schedule of environmental objectives and targets for 2018 will be as follows:

- Complete the leachate pipeline integrity;
- Progress the automation of the aeration of the leachate through the lagoon to resolve the issue of the continuous breach of Emission Limit Value for Dissolved Methane in the leachate released to sewer (Compliance Investigation CI000399);
- Work towards resolving the issues highlighted in Compliance Investigation CI000397 with the Gas Management Infrastructure – as per programme submitted to the EPA;
- Continue the environmental monitoring to identify any potential sources of pollution coming from the landfill and resolve them as they happen.

11.3 Communications Programme for Public Information

Public information can be viewed at the **Council's Headquarters** by prior appointment between 9.30 a.m. – 12.45 p.m. and 2.00 p.m. – 4.00 p.m. Monday to Friday (excluding public holidays), unless otherwise arranged.

Facilities for viewing information from a computer or files are provided by prior arrangement with the Landfill Manager.

The website (www.fingal.ie) informs that the remediation and restoration phase is now complete.

Site visits to **Dunsink Landfill** can be arranged by applying in writing to the Landfill Manager requesting a date and time for 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. Operational and security matters will take precedence and visits may be cancelled at short notice.

11.4 Management Structure

Table 11.1 overleaf comprises the management structure for Dunsink Landfill in 2017.

Table 11.1: Dunsink Landfill Management 2017

Title	Name	Base	Duties & Responsibilities	Qualifications	Experience
Director of Services	Gilbert Power	Blanchardstown Office, Grove Road, Dublin 15	Responsible for Environment and Water Services Department.	N/A	38 years LA experience.
A/ Senior Engineer, Environment Division	Mr James Walls	County Hall, Main Street, Swords, Co. Dublin	Responsible for Waste Management and Enforcement. Deputy Facility Manager in the absence of the Facility Manager.	B.Eng. in Civil Engineering. 1984 C Eng. MIEI Post Grad Diploma in Environment Protection 2016 MSc in Environmental Protection 2017	14 years Water Service experience. 18 years LA experience.
A/ Senior Executive Scientist	Mr Brian Reynolds	County Hall, Main Street, Swords, Co. Dublin	Responsible for Waste Infrastructure	MSc Environmental Science, 1997. MSc in Project Operations Management, 2004. C Eng. MIEI	17 years Waste Management and Water Pollution Control Experience in Local Authority
A/ Executive Scientist	Mr Alain Kerveillant	County Hall, Main Street, Swords, Co. Dublin and Dunsink Landfill	Facility Manager in respect of Waste Licence Compliance, Supervision of Scientific Monitoring, Reporting and Liaison with the Environmental Protection Agency.	MSc in Environment 2002 F.Á.S. Waste Management Training Course.	14 years' experience in waste management in local authorities.
Assistant Engineer	Mr Andrew Wall	County Hall, Main Street, Swords, Co. Dublin and Dunsink Landfill	Progress Engineering projects on the landfill Deputy Facility Manager in the absence of the Facility Manager	BAI in Civil, Structural & Environmental Engineering, 2004 BA in Mathematics 2004. Waste Management Training Programme	7 years Civil Engineering experience.
Senior Executive Officer	David Storey	Blanchardstown Offices	Manager for the Castleknock / Mulhuddart Operational Area	N/A	N/A
Inspector	Eamonn Brady	Coolmine Depot	Inspector	N/A	N/A

11.5 Staff Training

As activities at the landfill have gradually decreased since the closure and restoration phases during 2008 and 2009, training requirements have also decreased.

Andrew Wall attended the 12-day Waste Management Programme.

James Walls, Andrew Wall and Alain Kerveillant attended a 2-day course on The Practical Management and Control of Landfill Gas by CIWM.

12 RESOURCE USAGE

Resources consumed at Dunsink Landfill include diesel fuel, electricity and hydraulic oil. There were three main consumer entities operating on site in 2017:

- Fingal County Council (FCC)
- Contractors
- Bioverda Power Systems (BPS)

Quantities of the resources used by the above three consumer entities and their comparison with 2016 and 2015 quantities are presented in Table 12-1.

Table 12-1: Summary of resources used onsite during 2017

Resource	FCC	Contractors	BPS	Total 2017	Total 2016	Total 2015
Electricity (MWh)	25	Nil	39	64	35	38
Diesel (litres – for vehicles)	2500*	7,025	500*	10,025*	10,000*	9,885*
Hydraulic Oil (litres)	Nil	195	Nil	195	190	150
Lubricating Oil (litres)	Nil	64	2,110	64	3,410	1,360

* = estimates

12.1 Landfill Gas utilisation

Figure 12.1 shows the electricity production from landfill gas at Dunsink since 2009 and Table 12.2 shows the resources used and generated by the landfill gas utilisation plant.

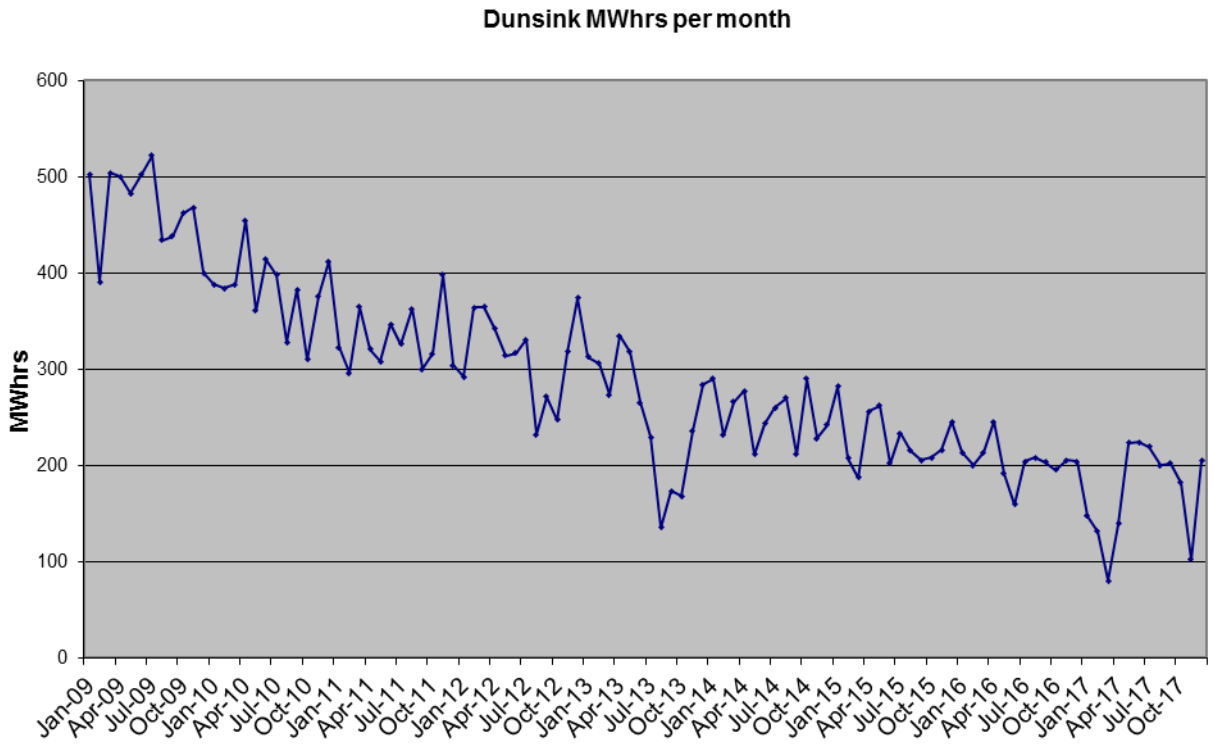


Figure 12.1: Dunsink Landfill Gas Utilisation Plant

Table 12.2: Landfill Gas Utilised Plant Resources Used and Generated

Dunsink	Units	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Total
Electricity Consumed	kWh	4,808	4,428	8,248	4,317	81	676	983	933	853	2,836	10,186	550	**38,899**
Oil (Lubrication)	litres		450		200	200	200	100	210	100	200	150	300	**2,110**
Landfill Gas	m^3	200,880	172,704	124,248	80,640	113,088	136,800	142,104	128,712	123,840	140,616	115,200	116,064	**1,594,896**
Average Monthly CH4	$\%CH_4$	52%	58%	50%	52%	49%	43%	45%	45%	46%	39%	45%	49%	
Electricity Exported	kWh	147,160	130,580	80,389	138,612	222,579	224,098	218,688	200,492	201,800	182,061	102,292	204,841	**2,053,593**

Source: Data compiled by Bioverda Power Systems Ltd.

13 ENVIRONMENTAL INCIDENTS & COMPLAINTS

13.1 Reported Incidents

Incidents reported during 2017 are recorded online on the EPA EDEN software. Incidents are defined by Condition 1.6 of the current waste licence (W0127-01).

There were 10 no. reported incidents in 2017 reported under condition 1.6 *c) Any trigger level specified in this licence which is attained or exceeded*; and *d) Any indication that environmental pollution has, or may have, taken place*. Four of these were notified to the Inland Fisheries Ireland (IFI) during 2017.

Table 13.1: Summary of reported incidents during 2017

Month	Surface Water	Landfill Gas	Other
January	1	2	1
February			
March			
April			1
May			
June			1
July			
August			
September	1		
October			
November			2
December			1
Total	**2**	**2**	**6**

Incidents from monthly inspections of surface waters and gas monitoring were notified to Fingal County Council, the EPA and the IFI where relevant. Exceedances of groundwater and dissolved methane were reported in the quarterly reports.

Surface water incidents were caused by elevated levels of ammonia and/or conductivity during Winter months particularly at the upstream monitoring stations (SW21 and SW18) and these reflected off site sources of contamination. Elevated pH was measured at one station during the summer. The September incident related to a car (joy-riders) stranded in the attenuation pond and the possibility of hydrocarbons contamination.

Gas incidents related to exceedances of trigger level for methane at well G45 throughout the year, and one incident of exceedances for CO_2 trigger level at a number of wells across the landfill and throughout the year.

Other incidents related to one event where gas extraction was down for a period exceeding 24 hours, and five incidents related to malfunction of the continuous emissions monitoring equipment at the gas utilisation engine.

The EPA was notified of all incidents. IFI was notified on all incidents pertaining to surface water and Dublin City Council continues to be informed in relation to Dissolved Methane.

13.2 Reported Complaints

Condition 10.4 of Licence 127-1 requires that the licensee shall maintain a written record of all complaints relating to the operation of the facility. No complaints were received by FCC during 2017.

It is considered that with the closure and completed restoration and improvements to landfill infrastructure since the end of 2009, the landfill is now less of an issue for its surroundings. This is a continuation of the trend in recent years. There were no complaints in recent years while in 2008 there were just two complaints, compared with five for 2004, one for 2005 and two for 2006.

14 WASTE SUMMARY

The landfill closed to waste acceptance in 2003.

104,183 m^3 of leachate was transferred off-site in 2017.

1,556,659 m^3 of landfill gas was captured on site for utilisation in the landfill gas engines.

14.1 Remaining Landfill Capacity

The landfill is closed to waste acceptance. There is no developed remaining capacity or undeveloped licensed capacity remaining.

15 METEOROLOGICAL MONITORING

Condition 8.6 and Schedule D.6 of the licence W0127-01 require daily monitoring of precipitation volume, temperature (min/max), wind force and direction, evapotranspiration, humidity and atmospheric pressure. This data is obtained from Met Éireann's Dublin Airport Weather Station and is available in full tabular format at the facility offices. Table 15.1 below shows the available monthly data – indicating a total rainfall of 660.7 mm.

Table 15.1: Dublin Airport Meteorological Data 2017 (Source: Met Eireann)

Year	Month	Mean Temperature (°C)	Total Rainfall (mm)	Mean Wind Speed (Knots)	Mean Evaporation (mm)	PE (mm)
2017	1	5.7	21.9	10.3	0.6	0.5
2017	2	6.2	41.6	13.2	1.1	0.8
2017	3	7.7	67.2	11.7	1.8	1.2
2017	4	8	10	9.6	2.5	1.7
2017	5	11.6	43.5	9.6	4	2.7
2017	6	14.4	86.4	11	4.2	2.9
2017	7	15	42.2	9.8	4.1	2.8
2017	8	14.6	73.2	10	3.2	2.3
2017	9	12.4	82.3	10.9	2.3	1.6
2017	10	11.2	47.8	12.1	1.3	0.9
2017	11	6.5	81.5	10.9	0.6	0.5
2017	12	5.3	63.1	12.4	0.5	0.4
Total			**660.7**			

16 SITE DEVELOPMENT WORKS

16.1 Work carried out during the reporting period 2017

The phased handover of the landfill and surrounding areas to the Parks (now Operations) Department was completed by December 2009.

The Environment Department continued with all monitoring obligations as set out in the landfill licence for 2017.

Tracing of the gas lines at Manifold No. 3 was carried out. Following this and the identification of the individual wells, repair works were carried out on three poorly performing wells. Additional horizontal gas extraction well G15 was put in place in two phases on the slope leading to G45.

A geophysical investigation survey was commissioned for the area surrounding G45.

In the central area of the landfill, to ensure gas extraction was operational, four wells previously connected to Manifold 7 were redirected to a new small manifold chamber and linked back into the extraction system via the gas pipe at well BPS 6.

Two surface VOC emissions surveys were commissioned.

A leachate pipeline integrity survey was commenced along with work to create as-built drawings of the existing leachate infrastructure.

Repair work was carried out on cracked leachate pipe adjacent to the flow meter and repairs were also carried out on drainage pipe in the area south west of Lagoon.

The Council continue to work closely with the Irish Horse Welfare Trust and local horse owners in Dunsink to address and regulate the situation with regard to the wandering horses in Dunsink. The Council, the Irish Horse Welfare Trust and the owners continue to operate the horse club, which regulates the numbers of animals on the site, all of the horses are now microchipped and passported, and traceable to their owners.

16.2 Works for next reporting period (2018)

Five new vertical gas extraction wells will be installed in the area near G45 to try to remove the gas detected at perimeter borehole G45.

Two surface VOC emissions surveys will be commissioned.

The leachate interceptor trench located West of the lagoon will be reinstated. It had been dug out in 2012 following flooding in the area and left as an open trench since. The works will seek to re-instate it to its original form.

Survey of leachate pipeline integrity will be completed in conjunction with works on pipeline to enable same.

Work towards resolving Compliance Investigation CI000399 on the dissolved methane concentration of the leachate released to sewer will continue. These will involve design and construction of an automated pumping system to aerate the leachate through the lagoon.

A lagoon integrity test will be carried out.

It is proposed to continue with the installation of internal paddocks to retain control of the equines on the site and to ensure the regular movement of the equines from one part of the site to another.

17 ANNUAL TOPOGRAPHICAL SURVEY

Fingal County Council sought approval from the Environmental Protection Agency on the 13th August 2009 (letter Ref FCC-127-1-2009-010) not to undertake a topographic survey in 2009. This was because there was no importation of soil into the restored landfill and no subsidence was anticipated. Approval was given by the EPA on the 20th August 2009 by telephone from Mr Eamonn Merriman. A telephone conversation with Mr Merriman on 28th January 2013 confirmed that an updated topographic survey was not required, and it is still considered that an updated survey would not be meaningful. Figure 17.1 below shows the topographic status of the landfill as established by the most recent topographic survey completed in 2007.

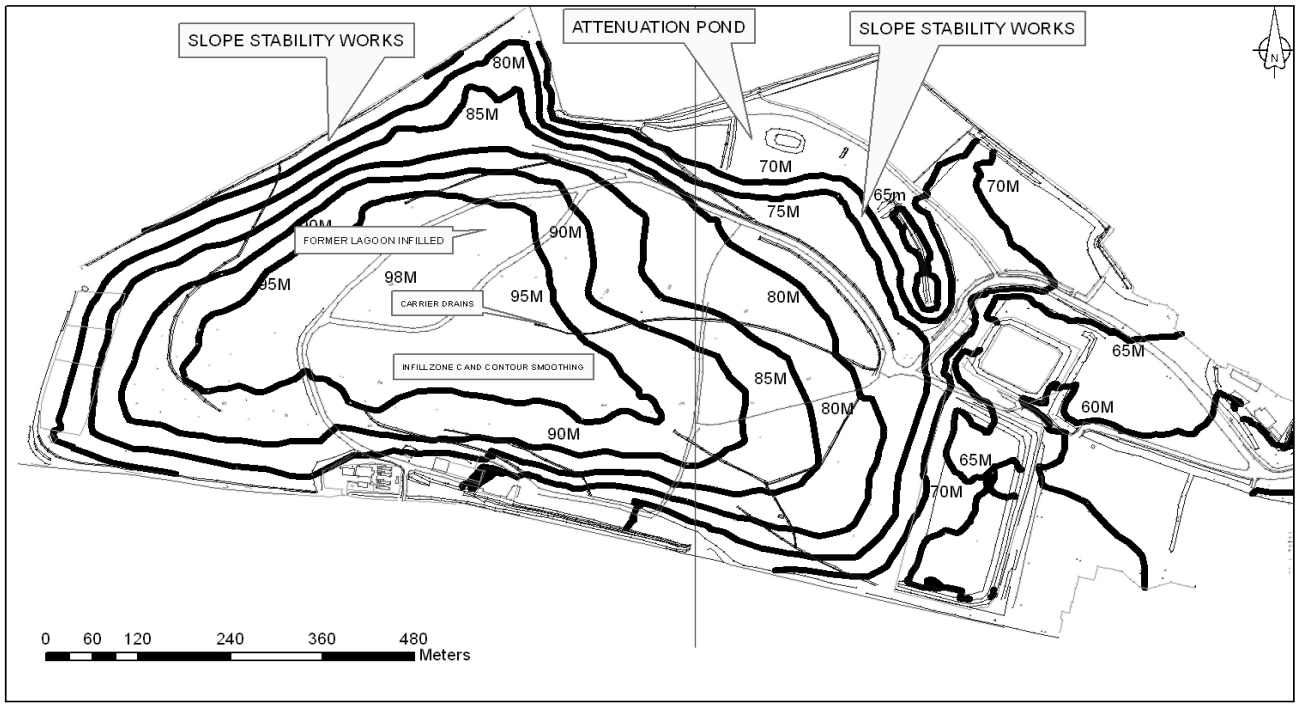


Figure 17.1: Simplified Topographical Map of Dunsink Landfill 2007

18 INTEGRITY TESTING

An integrity test was carried out on the leachate lagoon in 2015 and it passed the test. It will be re-tested again in 2018.

An integrity test was conducted during October 2007 on the oil bund in the IPS compound. The bund integrity was found to be good, it was watertight and found fit for its intended use. Oil is no longer stored in the compound – it is therefore proposed not to carry out further integrity test on the disused bund.

19 LEACHATE GENERATION

A flowmeter measuring volumes of leachate produced from the facility or volumes of leachate discharged off-site was installed with the new pump house in June 2005. However, during 2004 efforts were made to get estimates for leachate production in Dunsink to determine the appropriate capacity of current and proposed leachate infrastructure. It was considered important in view of the daily discharge limit of 1,400 m^3 imposed by the Sanitary Authority (Dublin City Council) to determine responses should this limit be breached.

19.1 Methods for Estimating Leachate Production

An annual water balance calculation was performed to estimate leachate production in Dunsink.

19.1.1 Water Balance Calculations

In calculating the water balance for Dunsink the formula used was taken from Environmental Protection Agency (EPA) guidelines (EPA 2000). The water balance calculation is shown in Table 17.1.

Inputs and Assumptions:

- Rainfall data from Dublin airport Meteorological station are used in this calculation.
- For Dunsink landfill, following the guidance given in the EPA guidelines the ER is taken as R.
- Given that the landfill is now restored 10% will be used as the infiltration rate through restored and capped areas.
- The total volume of waste has been calculated roughly, as 3.3 million m^3 based on the volumes of the three phases of landfilling. It has also been roughly estimated that approximately 5,000,000 tonnes of waste have been deposited in Dunsink based on figures available from 1994 for annual inputs to the site. On this basis, the estimated waste density is 1.5 t/m^3. This is very high and may be due to compaction by its overburden of subsoil or fill. The absorptive capacity of waste falls to negligible or none per tonne of waste at densities greater than 1.2 t/m^3.

Table 19.1: Annual Water Balance Calculation

Month	Rainfall	Evaporation	Effective Rainfall	Waste Input	Active Area	Intermediate Area (temporarily capped)	Fully Capped Area	Active Infiltration	Intermediate Infiltration *	Capped Infiltration	Lagoon	Active Leachate	In-Situ Predicted Leachate*	Cumulative Predicted Leachate	Leachate Discharged to Sewer
	(mm)	(mm)	(mm)	(tonnes)	(m^2)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Jan-17	21.9	0	21.9	0	0	0	623,000	-	-	1,364	131	-	1,100	2,596	7862
Feb-17	41.6	0	41.6	0	0	0	623,000	-	-	2,592	250	-	1,100	6,537	8616
Mar-17	67.2	0	67.2	0	0	0	623,000	-	-	4,187	403	-	1,100	12,227	14445
Apr-17	10	0	10	0	0	0	623,000	-	-	623	60	-	1,100	14,010	9739
May-17	43.5	0	43.5	0	0	0	623,000	-	-	2,710	261	-	1,100	18,081	8299
Jun-17	86.4	0	86.4	0	0	0	623,000	-	-	5,383	518	-	1,100	25,082	5675
Jul-17	42.2	0	42.2	0	0	0	623,000	-	-	2,629	253	-	1,100	29,064	5428
Aug-17	73.2	0	73.2	0	0	0	623,000	-	-	4,560	439	-	1,100	35,164	7013
Sep-17	82.3	0	82.3	0	0	0	623,000	-	-	5,127	494	-	1,100	41,885	4999
Oct-17	47.8	0	47.8	0	0	0	623,000	-	-	2,978	287	-	1,100	46,250	9353
Nov-17	81.5	0	81.5	0	0	0	623,000	-	-	5,077	489	-	1,100	52,916	6502
Dec-17	63.1	0	63.1	0	0	0	623,000	-	-	3,931	379	-	1,100	58,326	16252
Total	**660.7**	**0**	**660.7**	**0**	**0**	**0**	**623,000**	**-**	**-**	**41,162**	**3,964**	**-**	**13,200**	**58,326**	**104,183**

*Volume generation by waste in-situ

19.1.2 Sizing Infrastructure

The EPA guidelines (EPA, 2000) suggest a peak flow factor of 3 to 5 times the predicted average flow rate should be used when sizing plant / pipe work. Therefore, using 2017 rain data and allowing for the now completed restoration of Dunsink, an adequate pump station should be able to handle about (7 * 3) to (7 * 5) or 21 m^3/hr to 35 m^3/hr during wet weather flow. During 2017, the volume of leachate discharged to public sewer was 104,183m^3 which equates to 11.89m^3/hr.

Water balance calculations from EPA guidelines for Dunsink during peak wet conditions suggest that leachate production / discharge could be in the range of 504-840 m^3 /day.

The results presented above are estimates only. The results from this exercise (EPA model), indicate that Dublin City Council's discharge limit of 1,400 m^3/day would not be breached and the leachate lagoon would not ordinarily be needed to deal with any excess leachate generated. The lagoon has an approximate capacity of 5,000 m^3. The pump house design facilitates pumping a maximum of 20 litres/s or 72 m^3/hr or 1,728 m^3/day and the modelled leachate production is well below this.

19.1.3 Conclusion

The estimated monthly leachate production is significantly and substantially less than the actual volumes measured as discharged from site. There may be a groundwater influence in leachate generation at the site which accounts for this anomaly. The EPA water balance calculation is based on rainfall contribution to leachate generation.

Since 2006 a significant rise in leachate pumped off-site has occurred and it is considered that this is partially explained by the emplacement of two major leachate interception drains at the north and south of the facility. These leachate interception drains are obviously harnessing significant amounts of leachate and contributing to the leachate load at Dunsink.

The worst-case scenario for Dunsink from wet weather flows derived from previous estimates at 1,656 m^3/day exceeds this limit. In instances when the pump-house cannot pump away volumes as they are generated from the facility the system is self-regulating. During Wet Weather Flow, peak flows in excess of the limit are rare and short in duration. When they do occur, the automatic valve opens and closes to regulate the level of leachate in the sump and facilitate controlled discharge of leachate to public sewer or the lagoon. The lagoon has additional capacity of 5,000 m^3 and if empty would have capacity for 3+ days pumping to lagoon during wet weather flow. This contingency provides for scenarios whereby pumping to the public sewer would not be feasible for any reason.

The results suggest that the pump house design, in conjunction with the option to use the lagoon periodically provides sufficient capacity for dealing with the estimated leachate generated in the landfill.

19.2 Estimated Annual and Cumulative Quantity of Indirect Emissions to Groundwater

19.2.1 Emissions to Groundwater - Introduction

At present, there are no estimates for annual and cumulative quantities of indirect emissions of leachate to groundwater.

Inferences are made from estimates in Sections 5.1.1 (estimates of leachate going through leachate management infrastructure during Wet Weather Flow) and 5.1.2 (estimates of leachate generated at the facility based on water balance calculations). At the outset, it must be stated that this is an exercise fraught with difficulties in that these estimates are based upon many assumptions, which may or may not be correct. Furthermore, data from key variables such as depth of waste, proximity of groundwater table and effect of springs within the facility, is unavailable.

Nevertheless, the volumes of leachate discharged from the facility consistently and substantially exceed those estimated from water balance calculations.

19.2.2 Dry Weather Flow

The leachate infrastructure and discharge consents from Dublin City Council are more than adequate to deal with the volumes of leachate generated in Dunsink during dry weather flow. This suggests that there may be no indirect emissions to groundwater during Dry Weather Flow conditions.

19.2.3 Wet Weather Flow

The leachate infrastructure system seems to be "flashy" i.e. the amount of leachate going through the system rapidly increases following rainfall events. For all but the highest peaks in wet weather flow the leachate infrastructure and discharge consents from Dublin City Council are more than adequate to deal with the volumes of leachate generated in Dunsink and there is little risk of contamination of groundwater.

In instances when the pump-house cannot pump away volumes as they are generated from the facility the system is self-regulating. Peak discharges during Wet Weather Flow are rare and short in duration, the automatic valve opens and closes to regulate the level of leachate in the sump and facilitate controlled discharge of leachate to public sewer or the lagoon.

19.2.4 Bedrock Geology of the Site and Aquifer Status

The western half of the landfill is underlain by Waulsortian Limestones. The GSI classify the County Meath Waulsortian Limestones as 'Ll', bedrock which is moderately productive only in local zones and this can be assumed to be the case for Dunsink.

The central part of the landfill is underlain by the Tober Colleen formation. The thinly bedded mudstones of the Tober Colleen formation which underlie the Calp Limestone have been classified by the GSI as 'Pl', bedrock which is generally unproductive except for local zones.

The eastern part of the site is underlain by basinal limestones consisting of limestone turbidites with bioclastic and calcareous mudstones (Calp Limestone). The Calp Limestone of County Dublin has been classified in the GSI Groundwater Protection Scheme as a Ll aquifer, bedrock which is generally moderately productive only in local zones.

There is a minor faulting in the vicinity of the site and there is a minor fault running in a north-west south-east direction through the site.

The EPA designated flow regime is 'Poorly productive bedrock'.

A number of boreholes have been drilled into the bedrock on the site and a visual inspection of the drill chips from the monitoring boreholes indicated the site to be generally underlain by the soft black basinal (Calp) limestones and mudstones. These were recorded at all boreholes that were drilled to bedrock. The hardness and shade of the rock varied between boreholes and between different depths within the same borehole.

There is no site information available on the hydraulic conductivity of the bedrock units beneath the site. However, the GSI classification of Pl and Ll for the main geologic units at the site indicates generally low permeability. Published information for the Calp limestones of Dublin/Kildare/Meath indicated permeability ranging from 10-1 to 10-3 m/day (Creighton et al 1979; Cullen 1998). In addition, estimated yields from the wells drilled on site (flow estimates made at the time of drilling) indicated low productivity wells with well yields ranging from 1 m^3/day to 10 m^3/day. A slightly higher yield of 20 m^3/day was estimated at BH2. The monitoring well drilling programme confirmed the regional view that the area in the vicinity of Dunsink Landfill should be classified as a low to moderate yielding aquifer.

Groundwater levels from the deep bedrock boreholes showed confining conditions in many boreholes (e.g. BH16 & BH18 artesian) and this indicates an upward pressure on groundwater over much of the site. Where these conditions are present, leachate is prevented from percolating into the bedrock aquifer and indeed indicates that groundwater may be contributing to leachate production at the site (or at least at parts of the site).

19.2.5 Conclusion

On the basis that:

- The underlying geology and overburden have produced a localised classification of the aquifer as generally low to moderate yielding and that there are confining conditions present over much of the site,
- Measured volumes of leachate discharged from the facility are consistently and substantially higher than those calculated through water balance calculations.
- The groundwater monitoring programme indicates that groundwater around the facility is generally of good quality;

It is considered that indirect discharges to groundwater are not significant in volumes or effect.

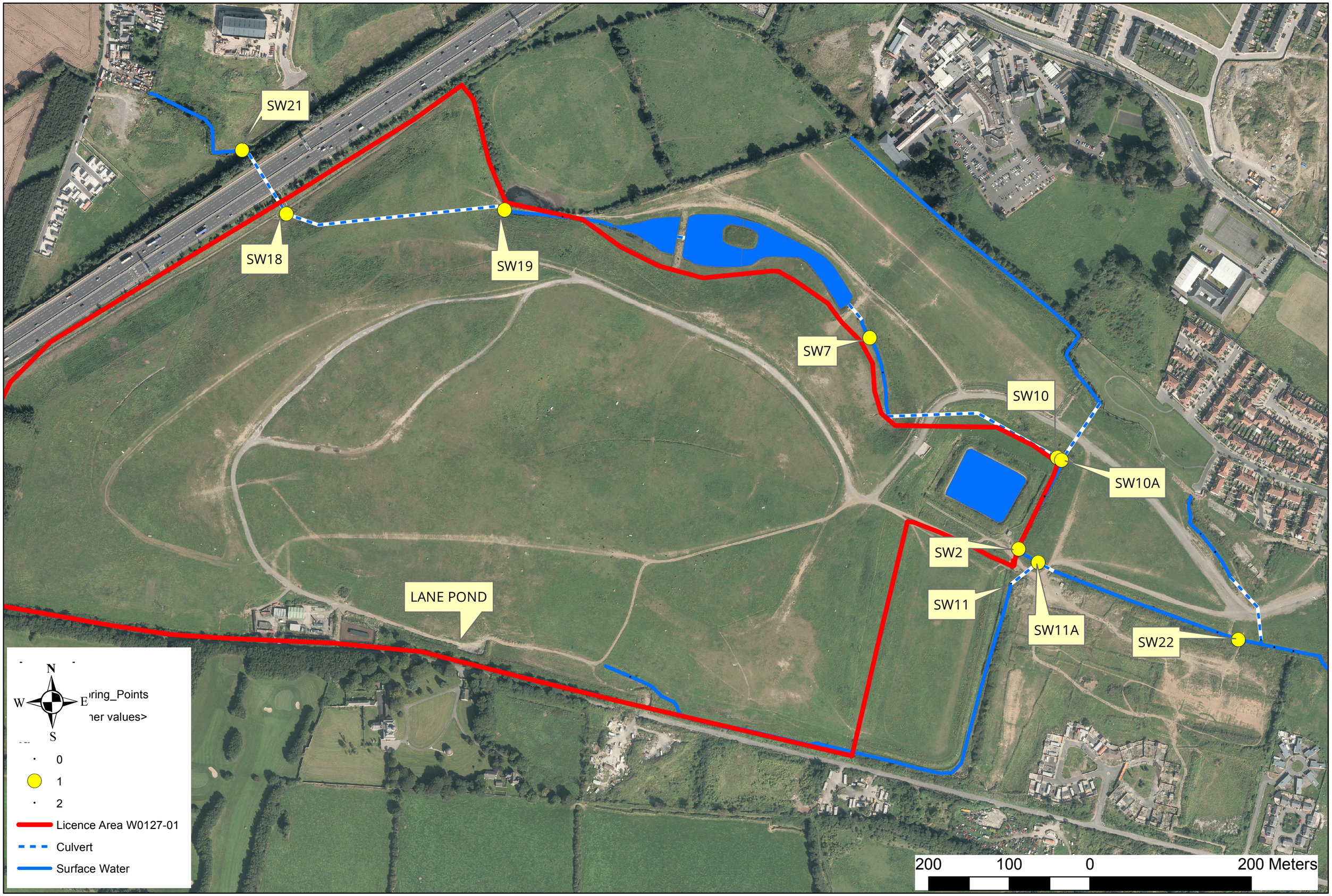
As per Technical Amendment to the Licence issued in January 2013, a hydrogeological Review / Technical Assessment Report has been prepared in accordance with the Guidance on the Authorisation of Discharges to Groundwater, and submitted to the Agency.

This concluded that the landfill was not having a significant effect on local groundwaters or surface waters and that the site is compliant with the objectives of the Water Framework Directive and the Groundwater Directive.

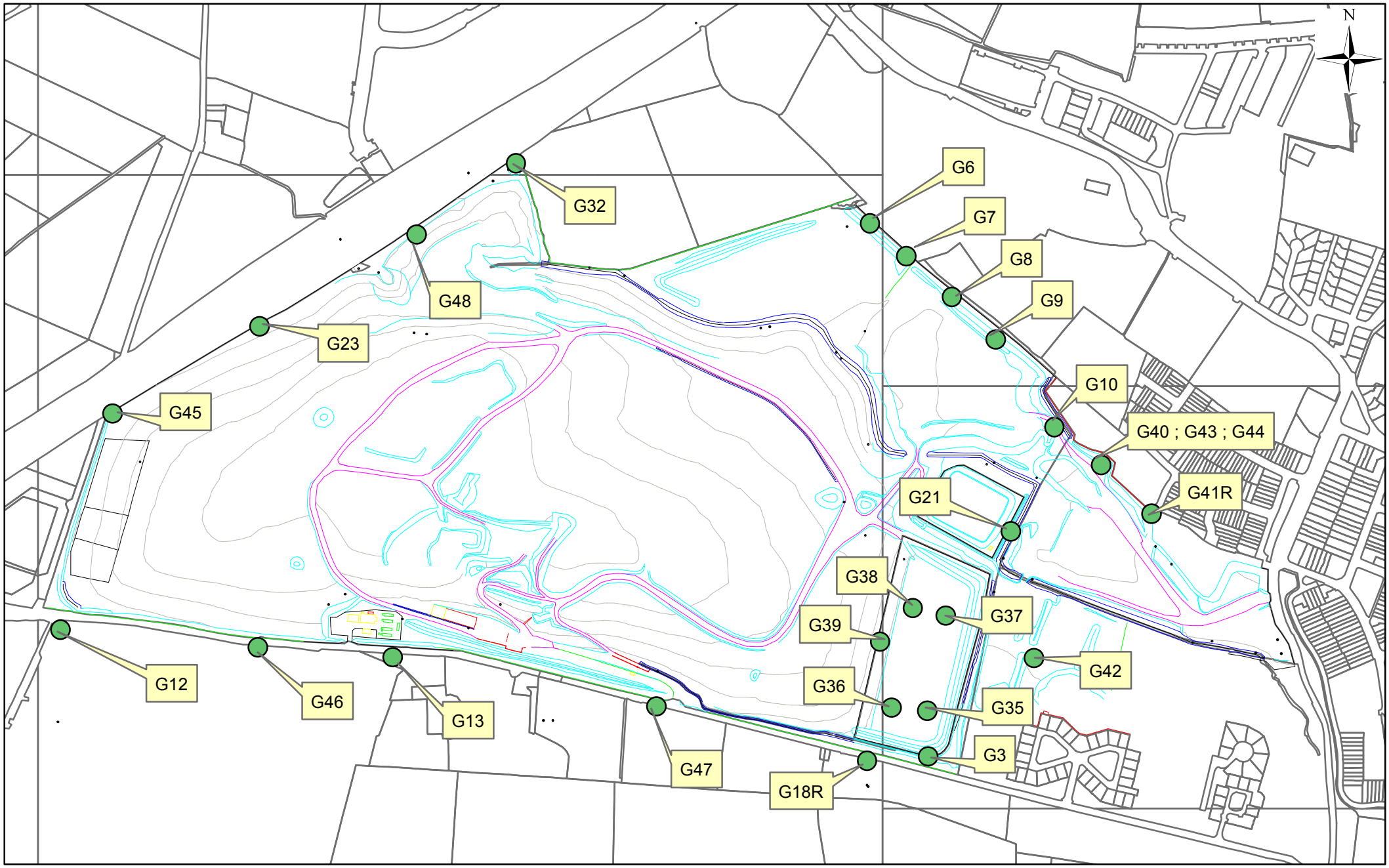
APPENDIX 1

MONITORING LOCATION DRAWINGS

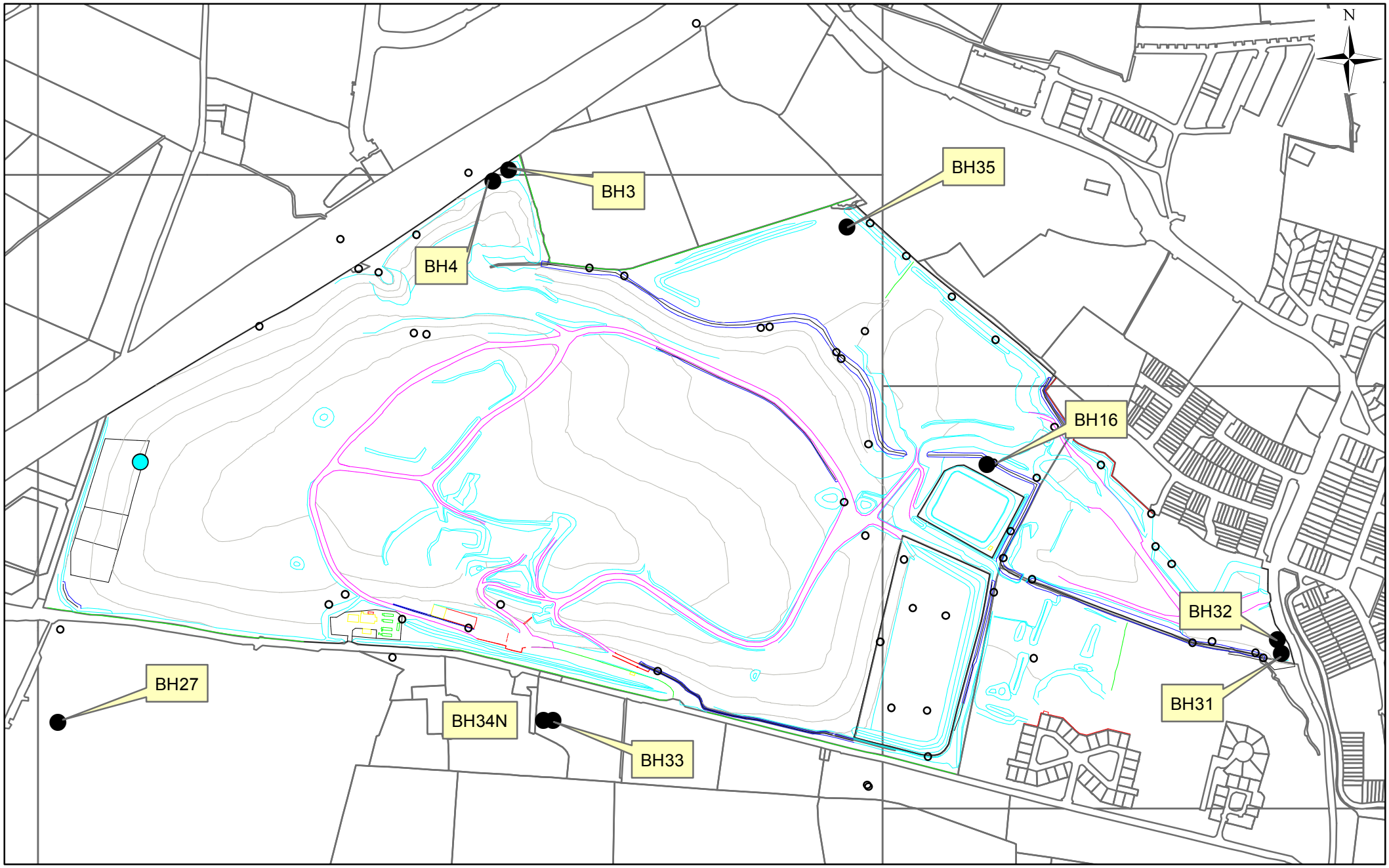
Surface Water Monitoring Locations at Dunsink Landfill



Dunsink Landfill Gas Monitoring Boreholes



Dunsink Landfill Groundwater Monitoring Boreholes



Leachate Monitoring Locations at Dunsink Landfill

Appendix 2

2017 PRTR

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2017

1. FACILITY IDENTIFICATION

Parent Company Name	Fingal County Council
Facility Name	Dunsink Landfill aka Dunsink Civic Amenity
PRTR Identification Number	W0127
Licence Number	W0127-01

Classes of Activity

No.	**class_name**
-	Refer to PRTR class activities below

Address 1	Dunsink Lane
Address 2	Finglas
Address 3	
Address 4	
	Dublin
Country	Ireland
Coordinates of Location	-6.33899 53.3903
River Basin District	IEEA
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Alain Kerveillant
AER Returns Contact Email Address	Alain.Kerveillant@fingal.ie
AER Returns Contact Position	A/Executive Scientist
AER Returns Contact Telephone Number	018708461
AER Returns Contact Mobile Phone Number	0879915832
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	1
User Feedback/Comments	Em to Air: Total capacity of flare and engine is in m3 LFG/hr. Net methane emissions declined as expected, predicted generation is on a decline as is capture. Leachate is discharged to sewer. Please note Section A PRTR pollutants does not allow entry of data (same probem as previously). Pollutant entered into Section B as previous years. CO2 is not reported this year as the calcuations show it it well below the reporting threshold.
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	**Activity Name**
50.1	General
50.1	General

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

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

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

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

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

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs				
POLLUTANT		METHOD			QUANTITY				
			Method Used		Flare	Engine			
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	2% of total captured methane is calculated as point source emission	1673.0	7216.0	840379.0	0.0	831490.0

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

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

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

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

Additional Data Requested from Landfill operators

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

Landfill: Dunsink Landfill aka Dunsink Civic Amenity

Please enter summary data on the quantities of methane flared and / or utilised

	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	1275947.0	E	Gassim		N/A	
Methane flared	81983.0	M	Measured at Flare		2500.0	(Total Flaring Capacity)
Methane utilised in engine/s	353585.0	M	Measured at Engine		600.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	840379.0	C	Predicted minus captured		N/A	

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	19 07 03	No	104183.0	landfill leachate other than those mentioned in 19 07 02	D9	M	Volume Calculation	Offsite in Ireland	Dublin City Council Waste Water Treatment Facility,D0034-01	.,Ringsend,Dublin 4,.,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