Comhairle Chontae Laois

Laois County Council

Annual Environmental Report
For Kyletalesha Landfill
Waste Licence W0026-03

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County Hall
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1. Introduction.

The contents of the report are based on Schedule H of the Waste License and the report format follows guidelines set in the "Draft Guidance on Environmental Management Systems and Reporting to the Agency" issued by the Environmental Protection Agency (the Agency). The proposed content and reporting format was discussed and agreed with the EPA before the preparation of the report.

This report discusses the findings of the monitoring events completed and reported on to the Agency since the last AER.

Laois County Council (the Council) operates the facility. The addressees of the facility and the operator are as follows: -

Landfill

Kyletalesha Landfill,
Portlaoise,
County Laois.

Operator

Laois County Council,
County Hall,
Portlaoise,
County Laois.

2. Reporting Period.

This is the 12th Annual Environmental Report (AER) for Kyletalesha Landfill, Clonsoughy, Kyleclonhobert, and County Laois. The AER covers the period from 1st January 2011 to the 31st December 2011 and was prepared in compliance with Condition 11.6.2 of Waste Licence Register Number (W0026-3).

3. Waste Activities carried out at the Facility.

Waste Disposal and Recovery operations are carried out at the site in accordance with the schedule of licensed activities. The site is licensed to accept the following categories of waste for disposal; household, commercial, construction & demolition and industrial non-hazardous wastes. The site also accepts wastes for recovery at the civic amenity area, which include glass bottles, car batteries, household batteries, light bulbs, gas cylinders, white goods, metal, aluminum cans, waste oil, waste oil filters, cooking oil, DVD, cd and video tapes, fridges, textiles, hard plastics, cardboard, tyres, plate glass, polystyrene, household hazardous waste and the WEEE facility.

4. Quantity and Composition of Waste Received, Disposed of and Recovered during the Reporting period and each previous year.

A summary of the total quantity of each type of waste land filled at the facility for the reporting period is presented in ***Table 1.0*** as specified in Schedule A.1 of Waste License (W0026-3 ***Table 1.0***.

Table 1.0

WASTE TYPE	Tonnage
Household	16598.64
Commercial	19998.79
Industrial Non-Hazardous Solids	53.40
Construction & Demolition	20.62
Total	**36671.45**

A full breakdown of waste land filled at the facility is presented in ***Table 1.1*** and a full breakdown of waste recovered at the Civic Amenity Facility is presented in ***Table 1.2***.

Table 1.1

Waste Type	Tonnes	Waste type (As per Schedule A.1)	Land filled	Re-Used
BUILDERS RUBBLE 170107	1145.04	Reused		1145.04
BUILDING WASTE 170107	20.62	Construction & Demolition	20.62	
COMMERCIAL WASTE 200301	353.80	Commercial	353.81	
COVERING MATERIAL 170504	5749.80	Reused		5749.80
DOMESTIC WASTE 200301	3957.16	Household	3957.16	
ILLEGAL DUMPING 200303	148.32	Other	148.32	
INDUSTRIAL WASTE 200301	53.4	Industrial	53.4	
MUNICIPAL WASTE 200301	17052.5	Commercial	17052.5	
STONE 170107	374.78	Reused		374.78
BIOSTABILISED FINES 19 12 12	25.74	Reused		25.74
STREET SWEEPINGS 200303	175.66	Other	175.66	
TRANSFER STATIONS 20 03 01	12641.48	Household	12641.48	
SRF 19 12 10	2268.50	Commerical	2268.50	
Total Tonnage			**36671.45**	

Table 1.2

Waste Type	Tonnes
200140 ALUMINUM	27.12
200133 HOUSEHOLD BATTERIES	0.87
200101 CARDBOARD	182.56
030103 CAR TYRES	19.70
200339 PLASTIC BOTTLES	113.86
130204 OIL FILTERS	0.56
200201 HEDGE TRIMMINGS	124.22
200339 HARD PLASTICS	98.02
200101 NEWSPAPERS	251.19
200102 PLATE GLASS	21.14
080121 PAINTS	51.18
200102 BOTTLE GLASS	173.27
200140 SCRAP METAL	165.44
200111 TEXTILES	35.04
200136 W.E.E.E.	186.19
200136 HOUSEHOLD APPLIANCES	27.10
130204 WASTE ENGINE OIL	11.18
Total Tonnage	**1387.52**

The total quantity of waste received for 2011 is recorded as being 36671.45 tonnes exclusive of that material recovered for landfill cover and maintenance.

The total quantity of waste received for 2010 is recorded as being 44597.48 tonnes exclusive of that material recovered for landfill cover and maintenance

The total quantity of waste received for 2009 is recorded as being (42,446.66 + 638.03) = 43,084.69 tones exclusive of that material recovered for landfill cover and maintenance.

The total quantity of waste received for 2008 is recorded as being (49,362.60 + 546.50) = 49909.10 tonnes exclusive of that material recovered for landfill cover and maintenance.

The total quantity of waste received for 2007 is recorded as being (41727.71 + 454.73) =

42182.458 tonnes exclusive of that material recovered for landfill cover and maintenance.
The total quantity of waste received for 2006 is recorded as being (47550.47 + 747.74) = 48298.213 tonnes exclusive of that material recovered for landfill cover and maintenance.
The total quantity of waste received for 2005 is recorded as being (47974.20 + 430.10) = 48404.3 tonnes exclusive of that material recovered for landfill cover and maintenance.
The total quantity of waste received for 2004 is recorded as being 49835.90 tonnes exclusive of that material recovered for landfill cover and maintenance.
The total quantity of waste received for 2003 is recorded as being 34870.10 tonnes exclusive of that material recovered for landfill cover and maintenance.
The total quantity of waste received for 2002 is recorded as being 40510.80 tonnes exclusive of that material recovered for landfill cover and maintenance.

5. Calculated Remaining Capacity of the Facility and year in which Final Capacity is expected to be reached.

It was originally anticipated that the site would have a waste capacity of 1,060,000 tonnes. Based on estimates and records of waste inputs, approximately 430,876 tonnes was deposited to 10th May 2002. A further 24, 434.7 tonnes was deposited to 31st December 2002. In total 430, 876 + 24,434.7 = 455,310.7 tonnes were deposited to 31st. December 2002. The total quantity of waste received since 31st December 2002 is recorded as being (34870.1 + 49835.9 + 48404.3 + 48298.21 + 42182.458 + 49,909.10 +43,084.69 +44597.48 + 36671.45) = 397853.68 tonnes exclusive of that material recovered for landfill cover and maintenance. This leaves a remaining capacity of (1,060,000 – 455,310.7 – 397853.68) = 206835.62 tonnes. At a maximum filling rate of 47,100 tonnes per annum and maintaining the proposed final profile levels this leaves approximately 4 years capacity.

It is previously recorded that approximately 47,600 m^2 of the landfill has been filled with waste since 1996 comprising of Cells 1, 2, 3, 4 & 5.
It is estimated that the total plan area for Cell 12 is 9,562 m^2.
It is estimated that the total plan area for Cell 13 is 19,006 m^2.
It is estimated that the total plan area for Cell 14 is 25,000 m^2.
It is estimated that the total plan area for Cell 15 A &B is 14,000 m^2.

6. Methods of Deposition of Waste.

Waste is normally deposited at the top of a waste face. The waste is placed in layers not greater than 0.5m thick and a waste face with an average gradient not steeper than 1:3 is maintained. A steel wheeled landfill compactor is used to level and compact the waste. Any large articles or hollow containers, likely to cause voids, are crushed and buried to a depth of not less than one meter from the surface of the waste and two meters from the flanks and face.

Volumetric surveys of the active cell are regularly undertaken to determine the remaining capacity and the performance of the compaction equipment.

The waste face is covered daily with a soil material. The soil weekly cover material is applied in 150mm thick layers and is free draining to prevent the development of perched water within the waste body. Sufficient stockpiles of soil are maintained on-site to meet all daily and weekly operational requirements.

Only one working face is operated at any time. The working face is maintained at less than 25 meters wide x 50 meters long and 2.5 meters in height after compaction with a slope of no greater than 1 in 3, as per Condition 5.4 of the Waste License.

7. Summary Report on Emissions.

The Council carries out a comprehensive environmental monitoring programme in compliance with license conditions to assess the significance of emissions. The monitoring programme includes Surface Water Quality, Groundwater Quality, Landfill Gas, Leachate Level and Quality, Noise and Dust.

The full details of the monitoring were routinely submitted to the Agency during the reporting period and an overview of the monitoring results is presented in Section 8. The results are discussed in the context of the impact of the emissions on the environment and compared with available data on background and or ambient conditions.

8. Summary of results and interpretation of environmental monitoring.

Since July 2004 monitoring results for the landfill facility have been inputted into the Labinfo Database as supported by the Local Government Computer Services Board.

Appendix I gives the six-digit grid reference for each monitoring location. Monitoring locations labeled G relate to Groundwater, monitoring locations labeled L relate to Leachate, monitoring locations labeled M relate to Landfill Gas, monitoring locations labeled S relate to Surface Water.

Groundwater Monitoring

In accordance with Waste Licence (W0026-3) the Council monitor's groundwater quality at monitoring boreholes (G001, G002 & G008) down-gradient of the attenuation landfill. The Council also conducts groundwater monitoring at locations G012, G013 and G015. Groundwater monitoring began at G013 in March 2003 in order to obtain baseline data for the northern end of the site, i.e. down gradient of new-engineered Cells 12, 13,14 & 15. G012 and G015 are also located down-gradient of these engineered cells and were constructed during September 2010.

Monitoring is conducted by the EPA at quarterly intervals in accordance with licence conditions and includes in situ and laboratory analysis at EPA laboratory, Kilkenny. The Council also carries out groundwater monitoring where analysis is carried out by an Environmental technician in Laois County Council. The range of analysis is as specified in Schedule D.5 of Licence (W0026-3) includes pH, electrical conductivity, temperature, chloride, ammonia, total organic carbon (TOC), nitrate and orthophosphate. Other parameters as required by the license are performed by the EPA.

The sampling and analysis is carried out in accordance with recognised quality standards. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency during the reporting period and can also be viewed on the attached compact disc.

Groundwater level monitoring undertaken in the shallow bedrock indicates a groundwater divide trending east west across the site. Groundwater in the northern portion of the site flows to the northwest while groundwater in the southern portion of the site flows to the southeast.

Monitoring locations G001, G002 and G008 are all located in the catchment which drains to the southeast towards the River Triogue. This catchment contains the unlined historic fill areas of the facility. G012, G013 and G015 are located in a separate catchment, which drains to the northwest towards the River Blackwater. This catchment contains the current active fill area Cell 15 and lined Cells 12, 13 and 14.

Monitoring locations G001 & G008 are located in the forest to the south of and down gradient of the active landfill. Monitoring location G002 is located on Mr. Pat Smiths turf plot down gradient of the landfill. In compliance with Waste Licence W0026-03, Condition 8.7.1, the council conducts annual private well monitoring at one locations that is within 250m of the facility boundary (Mr Denis Whelan).

Groundwater Levels

Groundwater levels are measured at each of the groundwater monitoring stations and contained in the Quarterly Monitoring reports.

Table 8.1 below shows the groundwater levels recorded for the reporting period.

Table 8.1 Groundwater depth (m) (water column)

Date	ID	Depth (m)	Date	ID	Depth (m)	Date	ID	Depth (m)
06/01/11	G001	17.2	01/03/11	G002	23.9	19/01/11	G012	16.7
01/02/11	G001	17.3	21/06/11	G002	23.1	21/06/11	G012	16.4
01/03/11	G001	17.4	20/09/11	G002	22.8	28/09/11	G012	16.4
04/05/11	G001	17.0	08/04/11	G015	15.9	19/01/11	G013	6.6
14/09/11	G001	16.9	29/06/11	G015	15.7	04/05/11	G013	6.5
21/06/11	G002	23.1	26/09/11	G015	15.8	20/09/11	G013	6.1
20/09/11	G002	22.8	16/12/11	G015	16.9	16/12/11	G013	6.6

Groundwater Quality

Chloride is a conservative ion which remains in the aqueous phase, unaffected by subsurface geochemical transformations. This ion occurs at high concentrations in landfill leachate and is used as a tracer to disseminate potential leachate migration. At all monitoring locations the chloride level complied with the trigger limit of 250 mg l^{-1} and generally complimented the EPA Guide Value of 30 mg l^{-1} for background groundwater levels nationally. Additionally, all other parametric trigger limits were conformed to at the groundwater monitoring wells. A more detailed account of groundwater quality is provided in the Quarterly Reports available on the disc attached.

Table 8.2 Ground water chloride levels

Lab No.	Date	ID	Chloride mgl^{-1}	Licence Trigger Limit	EPA Guide
0017	06/01/11	G001	58	250	30
0107	01/02/11	G001	40	250	30
0228	01/03/11	G001	49	250	30
0528	04/05/11	G001	48	250	30
1123	14/09/11	G001	46	250	30
0229	01/03/11	G002	7	250	30
0735	21/06/11	G002	3	250	30
1177	20/09/11	G002	6	250	30
0268	08/03/11	G008	10	250	30
0751	22/06/11	G008	5	250	30
1124	14/09/11	G008	9	250	30
0067	19/01/11	G012	14	250	30
0736	21/06/11	G012	13	250	30
1216	28/09/11	G012	21	250	30
0068	19/01/11	G013	12	250	30
0529	04/05/11	G013	15	250	30

1178	20/09/11	G013	20	250	30
1593	16/12/11	G013	13	250	30
0269	08/03/11	G015	8	250	30
0432	08/04/11	G015	7	250	30
0781	29/06/11	G015	4	250	30
1202	26/09/11	G015	10	250	30
1592	16/12/11	G015	6	250	30

Surface Water Quality Monitoring

The Council monitors surface water quality at 15 locations (S001, S002, S003, S004, S005, S007, S008, S009, S010, S011, S012, S028, S029, S030 & S031). S001, S002, S003 & S007 are located on the Tip Stream. S004 is located on a surface water drain on the landfill site. S012, S011 and S008 are located upstream of the former leachate discharge point to the River Triogue. The leachate treatment plant was decommissioned in May 2007, and no leachate had been discharged from the plant since June 2006. S009 and S010 are located downstream of the former leachate discharge point. Surface water monitoring began at S030 in March 2003 in order to obtain baseline data for the northern end of the site, i.e. down gradient of new-engineered Cells 12, 13 and 14. Additional monitoring stations, S031, S029 & S028 were established during this reporting period following direction from the Agency.

The monitoring is to be conducted at quarterly intervals in accordance with Licence conditions and includes in situ and laboratory testing. The range of analysis is as specified in Schedule D.5 of Licence (W0026-03) and includes dissolved oxygen, pH, electrical conductivity, and organic and inorganic parameters. The agency conducts surface water monitoring and analysis on a quarterly basis. Laois County Council carries out surface water quality monitoring and analysis in excess of licence requirements.

The sampling and analysis is carried out in accordance with recognized quality standards. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency during the reporting period .

Biological Assessment

Under the requirements of Condition 8.12 of the Licence, Laois County Council must carry out an annual biological assessment on the River Triogue. Details of assessment are given in Appendix V1.

Leachate Quality

Leachate sampling from the inspection chambers on Cells 1-5 (at monitoring locations L021, L023, L025 and L026), Cell 12 (at monitoring location L016), Cell 13 (at monitoring location L018) Cell 14 (at monitoring location L019), Cell 15A (at monitoring location L015A) and active Cell 15B is required as part of the annual EPA monitoring for the site. The samples are analyzed for a range of organic and inorganic parameters defined in the Waste Licence. Leachate is also sampled at the lined lagoon (at monitoring location L017), the unlined lagoon (at monitoring location LT50), and the new storage tank (at monitoring location L028) and in historically filled areas outside cells 1-5 (at monitoring locations L003 and L004). In addition to annual EPA leachate monitoring, the council conducts analysis in excess of licence requirements. This data will be used to model changes in leachate characteristics in relation to rainfall levels, seasonal temperature variations, age of waste, and type of waste, depth of fill and effectiveness of capping. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency during the reporting period and can also be viewed on the attached compact disc.

The onsite leachate treatment plant was decommissioned on the 21st of May 2007; therefore treated leachate quality monitoring is no longer required. Discharge of treated leachate to the River Triogue has not taken place since June 2006.

Leachate Levels

Leachate levels are currently monitored manually in Cells 1-5 (at monitoring locations L021, L023, L025 and L026). Levels are continuously monitored in fully lined and capped Cells 12, 13, 14, 15A and active cell 15B (at monitoring locations L016, L018, L019, L015A, L015B).

All elevated leachate levels are reported to the agency as an incident and entered in to the relevant quarterly monitoring reports. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency during the reporting period and can also be viewed on the attached compact disc.

Toxicity

Under the requirements of Condition 8.8.2 of the Licence, Laois County Council must carry out a bi-annual toxicity assessment on the treated leachate discharge. Following consultation with the EPA Licence Inspector, this assessment is no longer required due to the decommissioning of the onsite leachate treatment plant.

Landfill Gas

The Council currently monitors landfill gas at 11 monitoring locations on a monthly basis around the perimeter of the landfill. The monitoring locations are positioned both inside and outside the landfill cells.

In compliance with condition 3.20.1(b) of Waste Licence (W0026-3), a permanent landfill gas monitoring system has been installed in all site buildings and in compliance with condition 3.19.2(e) the data gathered from this system is recorded. The monitoring includes methane, carbon dioxide, oxygen, atmospheric pressure, and temperature. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency during the reporting period and can also be viewed on the attached compact disc.

Carbon dioxide concentration greater than 1.5% v/v was measured in trial pits M001, M002, M003, M004, M006, M015 and M016 during the monitoring period. Elevated gas levels in trial pits are, at the request of the agency on the 11/09/2001, treated as an incident. In all cases, Corrective Action Procedure CAP 5 was applied and the agency was notified.

Monitoring locations M001 to M004 & M007 are located within the body of waste. Monitoring locations-M008 & M009 are located in the south western area of the site, while M015 & M016 are located in the northwestern area of the site. M014 is situated in the northeastern section. Site investigations involving excavation in the respective surrounding areas showed that all five locations are located in peat, which naturally emits CO_2. “Report on Landfill Gas Monitoring at Laois County Council Kyletalesha Landfill Site” was submitted to the agency on 23/10/2002 and states that carbon dioxide levels above the trigger limit values

in landfill gas monitoring locations outside the body of waste are attributable to natural background levels from the natural decay of peat. Monitoring locations M001 to M004 are located inside the body of waste where carbon dioxide and methane levels above Exceedance Limit Values are expected and therefore are not a non-compliance issue.

Landfill Gas Control

In accordance with condition 3.14.1 of Waste Licence (W0026-3), infrastructure for the collection and flaring of landfill gas from Cells 1 to 5 and Cells 12, 13, 14 and 15A have been installed. The horizontal gas extraction system is currently being installed in cell 15B. This is carried out with each lift of waste.

Noise Monitoring

Noise monitoring is carried out at four locations, N1 to N4 in accordance with Schedule C.1 of Waste Licence (W0026-3). Full details of analysis may be found in the quarterly monitoring reports as submitted to the Agency and can also be found on Appendix V11

Dust Monitoring

In accordance with schedule D.3.1, dust monitoring was carried out at monitoring locations D1, D2, D3 and D4. Full details of analysis may be found in the quarterly monitoring reports as submitted to the Agency and can also be found on the attached compact disc. Dust monitoring was performed in accordance with Standard method VDI2119 - Determination of Dust fall using the Bergerhoff Instrument (German Engineering Institute). As outlined in Schedule D Table D.1.1 of the licence dust measurements are undertaken at four specified locations D1-D4 three times annually. Full details of analysis may be found in the quarterly monitoring reports submitted to the Agency and can also be found on the attached compact disc.

Parameter Exceedances

In 2011 an estimated 400 samples for perimeter landfill gas, groundwater, surface water, and leachate, noise and dust deposition were taken and analyzed by either independent laboratories or the Council laboratory. This figure is exclusive of the comprehensive continuous monitoring which takes place on site. The maximum parameter values are those

referred to in Schedule C of Waste Licence (W0026-3). Details of parameter exceedances are presented in ***Table 8.2.***

Table 8.2 Parameter Exceedances (Schedule C)

Date	Code	Description
08/02/11	080211	Elevated CO_2 levels in LFG monitoring wells
07/04/11	070411	Elevated CO_2 levels in LFG monitoring wells
01/06/11	010611	Elevated CO_2 levels in LFG monitoring wells
07/10/11	071011	Dust emissions
01/11/11	011111	Elevated CO_2 levels in LFG monitoring wells

9. Resource and energy consumption summary.

The following resources were used on-site during the reporting period: -

• Electricity

24683 kWhr. Of electricity was used onsite throughout the reporting period

• Water

Surface Water Lagoon:

Dust Suppression using a 2500 gallon tanker, 8 weeks at 4 days per week at 3 passes per day
= **240,000 gallons of water**

Metered:

A total of 1570m^3 was used from the mains supply throughout the reporting period.

• Diesel,

Approximately 25,000 liters were used throughout the reporting period for onsite machinery.

• Stone

A total of 535 tonnes was used for landfill roads throughout the reporting period

10. Proposed development of the facility and timescale of such development.

For the work undertaken in 2011 and work due for completion in 2012 please refer to chapter 12. There are no details available present for development works proposed for beyond the next reporting period.

11. Volume of leachate produced and volume of leachate transported / discharged off-site.

The historically filled areas, including Cells 1 to 5, and lined Cells 12, 13and 14 have been permanently remediated. Incident rainfall on historical filled areas is now diverted to surface water source. Incident rainfall on the active fill area Cell 15 is collected via the leachate drainage blanket and pumped to on-site lined leachate storage lagoon prior to treatment at council wastewater treatment plant and discharge to surface water. Other potential sources of leachate such as groundwater and surface water run-off are prevented from entering the waste fill areas by cell design. Leachate collected from each unlined landfill cell is directed to the leachate storage tank located in the eastern area of the landfill. Leachate is tankered off site to waste water treatment plants for treatment. **Table 11** identifies the volume of leachate tankered off site for treatment during the reporting period.

The onsite leachate treatment plant has been decommissioned since the 21st of May 2007; therefore discharge of treated leachate to the River Triogue is no longer taking place. The last discharge of treated leachate took place in June 2006. A new leachate storage tank has been installed near to the unlined lagoon and is now fully commissioned. The unlined lagoon will be decommissioned over a phased period.

Table 11.0 – Volume of Leachate Tankered Off-Site

Mass of Leachate Removed (Tonnes)	Month
862.44	Jan
957.84	Feb
1981.56	March
182.32	April
743.42	May
547.28	June
22.82	July
273.70	Aug
825.64	Sept
1080.96	Oct
1285.08	Nov
2931.94	Dec
11,695	**Grand Total**

12. Report on development works undertaken during the reporting period and a timescale for those proposed during the coming year.

Developments Undertaken in 2011:

1. In compliance with condition 4 of waste licence W0026-3 works on the capping of mini cell 15 (a) commenced in 2011.

   In December 2011 Laois county council Landfill staff undertook the job of capping cell 15 a , The capping works commenced in December and it was anticipated that the works would be complete by early January however due to bad weather and a shortage of clay for capping the works continued in to January and February of 2012.

2. In compliance with condition 3.14.3 of waste licence W0026-3 landfill gas extraction wells were installed by Dempsey Drilling and supervised by Laois County Council Landfill staff into the lined Cell 15a in November 2011. A total of 3 vertical well were constructed by drilling to a depth of approximately 10m using a 600mm auger. Perforated HDPE pipes of 160mm diameter were placed in the borehole and

backfilled with a suitable pea gravel material. The top of the well consists of a 160mm solid HDPE pipe which is connected to a well head. The boreholes were sealed with a bentonite material to prevent passive venting of landfill gas. Each well head is connected to the main gas line using a 125mm solid HDPE pipe.

3. In compliance with condition 3.5.1 of waste licence W0026-3 site roads were provided and maintained to ensure the safe movement of vehicles within the facility. The main access road through the landfill was resurfaced on a regular basis from a location past the wheel wash to the lined lagoon.

4. The upgrade of the public tipping area was completed in April 2011 this included the building of a new reinforced wall and base to contain the tipping trailers. The wall was completed with a steel frame allowing easy access for the public for disposing of the rubbish. An updated signage system was put in place outlining what is and is not accepted at the landfill.

5. In august 2011 a second flare was installed on Kyletalesha Landfill. The flare is a Uniflare Flare, with a capacity to burn 750m^3 per hour of gas. It was installed on the northern end of the site near cell 14; it is connected to the main Gas line that runs along the top of cells 12, 13 & 14. It runs in conjunction with the old flare and at present provides full backup to the old flare.

6. Horizontal landfill gas extraction wells were provided in cell 15a these works were carried out to the requirements of condition 3.14.3 of the waste license (W0026-3).

7. The Development of Cell 15 C&D commenced in June 2011 It commenced with the development of the Haul Road around the proposed new Cell. The removal of Peat and silt to formation level. Pumping of surface water. The remainder of the development will continue in 2012.

Proposed Development work for 2012

1. Commence Capping of mini Cell 15(b) to the requirements of condition 4.3 of the waste licence (W0026-3) before year end, exact date will depend on waste supply

2. Complete construction of cells 15c &d (2011 AER referred to this as cell 11) to the requirements of condition 3.12 and 3.16 of the waste license (W0026-3).

   Which include an upgrade of the Scada system and the Leachate system.

3. Horizontal landfill gas extraction wells to be provided in cell 15b, these works will be carried out to the requirements of condition 3.14.3 of the waste licence (W0026-3).

4. Site road resurfacing to the requirements of condition 3.5.1 of the waste licence W0026-3 will be ongoing throughout 2011

5. Permanent landfill gas extraction wells to be provided in the active cell 15(b) to the requirements of condition 3.14.3 of the waste licence (W0026-3) again exact date will depend on waste supply

6. Servicing of boundary tree line will take place in accordance with maintenance contract.

7. Decommission the unlined lagoon subject to EPA approval.

13. Report on Restoration of Completed Cells

In compliance with condition 4 of waste licence (W0026-3) final capping of cell 15(a) commenced in December 2011 and due for completion in Feb 2012, the capping of cell 15(b) shall commence in 2012. Cells 12, 13 and 14 a,b and c are now fully capped and restored.

14. Site survey showing existing levels of the facility at the end of the reporting period. :

Site Survey can be viewed in **Appendix 1V**

15. Estimated annual and cumulative quantities of landfill gas emitted from the facility.

Landfill Gas Volumes

The Council prepared a report entitled "Proposal for Utilisation of Landfill Gas as an Energy Source" which was submitted and accepted by the Agency in compliance with Condition 4.17.7 of the waste licence 26-1. This report estimated that approximately 1,941 m^3 of landfill gas would be generated on-site in the year 2000. The results of this assessment indicated that the feasibility for utilisation of landfill gas as an energy source in the short to medium term (10 years) was not viable.

In 2011 Tobin Consulting Engineers were commissioned to prepare a Landfill Gas assessment report for Kyletalesha Landfill, assessing Gas utilization, the results will be available in early to mid 2012

The exceedances recorded in Table 15 are due to the fact that trial pits M001, M002, M003 and M004 & M07 are situated in waste which was historically deposited at the edge of the site. M015 and M016 are located in peat, which naturally emits CO_2. A gas assessment report was submitted to the Agency in October 2002 to confirm this entitled "Report on Landfill Gas Monitoring at Laois County Council Kyletalesha Landfill Site".

In addition to the 2002 report Laois County Council commissioned Odour Monitoring Ireland Ltd to investigate the source of elevated CO_2 levels at monitoring points M015 and M016.Their report on 14/10/2011 which was submitted to the Agency revealed the source was biogenic and landfill gas migration was not contributing. Subject to EPA approval Laois county council propose to relocate M001, M002, M003 and M004 & M07 in to lands owned by coilite and out of the waste body. Agreement has been reached with Coilite for same.

15: Average Landfill Gas Concentrations for 2011.

ID	Avg CO_2 %	Avg CH_4%	Avg O_2%	Pressure (mb)
M001	1.3	0.0	17.0	1005
M002	1.9	0.0	16.7	1005
M003	2.3	0.0	16.5	1008
M004	3.7	0.6	15.8	1008
M005	0.6	0.0	18.0	1008
M006	0.3	0.0	18.2	1008
M007	0.4	0.0	18.2	1005
M008	0.3	0.0	18.1	1005
M009	0.5	0.0	18.1	1005
M014	0.0	0.0	18.7	1008
M015	7.9	0.0	11.4	1008
M016	3.6	0.0	16.2	1008

16. Estimated annual and cumulative quantity of indirect emissions to groundwater.

The historically filled areas, including Cells 1 to 5, and lined Cells 12,13 &14 have been permanently restored and vegetated. Incident rainfall on the active fill areas is collected in the leachate collection drains and treated in a council waste water treatment plant.

The landfill is designed to utilise the natural ground conditions to mitigate environmental impacts associated with leachate. The design incorporates leachate collection facilities using internal and perimeter drains to direct leachate and leachate contaminated surface water to the on-site leachate lagoon.

The peat and the underlying boulder clays have a low permeability, which inhibits the percolation of leachate downward to limestone bedrock beneath the site. A comprehensive site investigation at the site completed in 2000 established that the thickness of the peat ranges from 3 - 7 m and the boulder clay from 7.5 - 10 m across the site. The permeability of the peat ranges from 1.9×10^{-9} m/s to 9.8×10^{-10} m/s. The underlying till has variable permeability depending on composition. In some sand and gravel zones permeability of

$1x10^{-4}$ m/s can be expected. The till is however, more silt dominated and in these areas permeabilities ranging from $2.41x10^{-8}$ m/s to $4.78x10^{-10}$ m/s have been recorded.

The groundwater level monitoring indicates that the bedrock aquifer is confined by the overlying boulder clays and peats across much of the site. These conditions also inhibit the percolation of leachate to the bedrock due to differences in pressure head.

There is the potential for the indirect discharge of leachate to groundwater in the bedrock aquifer either by percolation through the underlying peat and boulder clay, or through recharge by contaminated surface water.

Using Darcy's equation which calculates groundwater flow and assuming a permeability of $1.9x10^{-9}$ m/s, an average depth of 5 m of underlying peat, a 1 m head of leachate and a fill area of 186,600 m^2, it is estimated that the theoretical potential percolation through the basal peats and boulder clays is approximately 48.54 m^3/acre/year which is less than 1.5% of the total annual rainfall. The calculation does not take into consideration the pressure head in the bedrock aquifer, which would inhibit the discharge to the bedrock aquifer.

The peat has a proven capability, as demonstrated in the leachate treatment plant, to effectively reduce the concentration level of contaminants in the leachate. Any leachate that does percolate to groundwater will have undergone significant attenuation. This is confirmed by the groundwater quality monitoring at the site which shows that the landfill is not impacting on groundwater quality.

17. Annual water balance calculation and interpretation.

The water balance calculations are based on the methodology specified in the EPA's Landfill Site Design Manual. The calculation used is as follows:

Lo = [ER(A) + LW + IRCA +ER(l)] – [aw]

Lo	leachate produced (M3)
ER	effective rainfall (m) (Use actual rainfall (R) for active cells)
A	Area of cell (M2)
LW	liquid waste (also includes excess water from sludges) (M3)
IRCA	infiltration through restored and capped areas (m)
l	surface area of lagoon (M2)
a	absorptive capacity of waste (m^3/t)
W	weight of waste deposited (t/a)

The meteorological data used was from the Johnstown castle, Co kilkenny weather station. The meteorological reports for both the Birr and Mullingar weather stations can be found in ***Appendix III***. The landfill areas included in the calculations were the active fill area and the temporary restored area of Cell 15. The calculations in ***Table 17.0*** are based on the Actual Rainfall and do not allow for Evapotranspiration. An absorptive capacity of 0.06 m^3 per tonne was assumed based on a compacted waste density of 0.85 tonnes/m^3**.** ***Table 17.1*** compares Leachate produced and Leachate tankered off site for treatment.

Table 17.0: Water Balance Calculations

Cell	**15a for 0.85 of 2011 &15b for 0.15 of 2011**
ER	0.839
Area of cell (A)	6000 cell 15 a & 8000 cell 15b
Area Infiltration (ER x A)	**15a = 5034** 15b= 6712
Liquid Waste (LW)	0m3 (2)
l	200m2
a	0.06 (m^3/t)
W	33671.45 tonne
Absorptive Capacity	33671..45 x 0.06 = 2020.29m3
	Lo = [ER(A) + LW + IRCA +ER(l)] – [aw]
Leachate Produced Lo	**11,493.62m^3**

Table 17.1 Leachate produced and Leachate Tankered Offsite

Leachate Tankered Off site	**11,659.00m3**
Estimated Leachate Volumes	**11,493.62m^3**

18. Report on the progress towards achievement of the Environmental Objectives and Targets contained in previous year's report are available in Appendix V111

19. Schedule of Environmental Objectives and Targets for the forthcoming year.

See appendix VIII: for a schedule of environmental objectives and targets for 2012

20. Full title and a written summary of any procedures developed by the licensee in the year which relates to the facility operation.

- Closure Restoration and Aftercare Management Plan for Kyletalesha Landfill See appendix IX.
- BMW Testing procedures and results Appendix XI1

21. Tanks and bund testing and inspection report.

In Compliance with condition 3.11.5 of Waste Licence W0026-3 the integrity and water tightness of all the bunds and leachate/contaminated waste storage tanks were carried out in 2012,with the exception of the oil bund in the civic amenity site as it was relined in June 2010 and is not due for testing until June 2013.

See Appendix X

22. Report on the performance and compatibility of the septic tank (and associated percolation area) with the Agency's Wastewater Treatment manual: Treatment Systems for Single Houses.

The new site facility office has been connected to the existing septic tank which has proven to be in good working order

23. Reported incidents and Complaints summaries.

The Council maintains a comprehensive register of incidents and complaints received in accordance with Condition 3.13 of the waste licence. ***Table 23*** lists the incidents and complaints throughout the reporting period.

Table 23: Incident and Complaints for 2010

12/01/11	120111	Flare temporarily not operating
07/02/11	070211	Leachate depth in Cell 15A exceeded 1m.
08/02/11	080211	Elevated CO_2 levels in LFG monitoring wells
07/04/11	070411	Elevated CO_2 levels in LFG monitoring wells
01/06/11	010611	Elevated CO_2 levels in LFG monitoring wells
20/06/11	200611	Flare shutdown
24/06/11	240611	Flare shut down
05/08/11	050811	Scada system shut down
07/10/11	071011	Dust emissions
01/11/11	011111	Elevated CO_2 levels in LFG monitoring wells
12/01/11	120111	Flare temporarily not operating
07/11/11	Received by EPA	Odour Complaint

24. Review of Nuisance Controls.

Condition 7.1.

To control landfill odours, vermin, dust, litter and noise in compliance with condition 7.1 of Waste Licence W0026-3 the following is carried out.

- Each evening once work completes, a layer of soil or Hessian material is placed over the entire working face of the active cell to reduce odour emissions and littering.
- At the end of each week a layer of 150mm minimum of soil is place on the working face.
- The use of Rentokill for vermin control.

- During the dry weather water is sprayed continuously on the road way to reduce dust levels
- Netting is placed around the active cell to reduce littering
- Daily litter patrols are carried out around the site.
- Installation of the flaring system.

Condition 7.3.4.

In compliance with condition 7.3.4 :
Litter nets are installed and maintained around the perimeter of the active cell area.
Litter control infrastructure is inspected on a daily basis.
Loose litter is removed in accordance with condition 7.3.3.
Also in co-operation with the Waste Enforcement Section of Laois County Council the use of CCTV is utilised in identifying vehicles from which litter is emanating due to poor or lack of covering.

Condition 7.6.1.

In compliance with condition 7.6.1 the use of Falcons has proven to be a significant factor in bird and vermin control.

25. Reports on financial provision made under this licence, management and staffing structure of the facility, and a programme for public information.

Management and Staffing Structure:

Grade	Name	Responsibility
Executive Engineer	B Cuddy	Landfill Manager
Exec. Technician	K. Farrell	Executive Technician
Technician Grade 1	M. Chawke	Monitoring Technician
Gen. Services Supervisor	N. Farrell	Overseer
Ganger	L. Dunne	Domestic Waste Area
Light Equip. Operator	M. Brennan	Nuisance Control
General Operator	D. O'Rourke	Weighbridge Operator
General Operator	P. Thompson	Civic Amenity Site / Public tipping area

Public Information:

- School and community tours held on an ongoing basis.
- Seasonal public informational campaigns to encourage reusing, reduction and recycling.
- Deliver national waste programmes at local level e.g. Race Against Waste.
- Public Information File kept at Landfill Site Office for public viewing which contains Monitoring Results, Waste Licence, Complaints and Environmental Incidents.
- Regular Monitoring Committee Meetings with local residents.

Budget for 2011:

Reduction in Capital Balances	€340,000
Loan Charges/Transfer Capital	€254,000
Aftercare/reinstatement Fund	€100,000 additional money will be added to average €200,000 per year for future operating period of the landfill

26. Report on Training of Staff:

Details of training undertaken in 2011 are given in ***Table 27.0***. All operatives hold Safepass cards.

Table 26.0 Training of Staff

Name	Grade	Course Description	Start	Finish
Michael Brennan	Light Equip. Operator	Work place safety training	July 2011	2011
Ned Farrell	Supervisor	Work place safety training	2011	2011
Ken Farrell	Facility manager	Work place safety training	July 2011	2011
Patsy Thompson	General Operative	Work place safety training	July 2011	2011
Liam Dunne	Ganger	Work place safety training	July 2011	2011
Brenda Cuddy	Landfill manager	Managing safely in construction	October 2011	2011

27. Certification:

The Annual Environmental Report for the monitoring period 2011 has been certified by the undersigned.

Brenda Cuddy

_____

Ms. Brenda Cuddy
Landfill Manager

Ken Farrell

_____

Mr. Ken Farrell
Facility Manager

Brendan Condron

_____

Mr. Brendan Condron
S.E.E. - Waste Management

Appendix I:

Monitoring Locations

KYLETALESHA LANDFILL MONITORING LOCATIONS

SURFACE WATER

Station ID	Easting	Northing	Identity
S001	245453	202776	TIP STREAM
S002	245488	202588	TIP STREAM
S003	245588	202468	TIP STREAM
S004	245208	202058	WESTERN DRAINAGE CHANNEL
S005	245482	202574	DRAINAGE CHANNEL ENTERING TIP STREAM
S007	246217	202046	TIP STREAM
S008	246287	202035	TRIOGUE RIVER
S009	246299	202084	TRIOGUE RIVER
S010	247830	197111	TRIOGUE RIVER
S011	246377	200609	TRIOGUE RIVER
S012	247471	204178	TRIOGUE RIVER
S028	245020	203364	EXCAVATED POND
S029	245128	203990	NORTHERN DRAINAGE CHANNEL
S030	245082	203792	NORTHERN DRAINAGE CHANNEL
S031	245101	203727	NORTHERN DRAINAGE CHANNEL

DRINKING WATER

DENIS WHELAN***	244643	203970	NORTH WEST OF CONTAINMENT LANDFILL

*** Laois County Council is required to conduct an annual drinking water quality assessment of all private water supplies used for potable purposes located within 250m of the site.

GROUNDWATER

G001	245276	202051	DOWNGRADIENT ATTENUATION LANDFILL
G002	245494	202652	DOWNGRADIENT ATTENUATION LANDFILL
G004	245020	203144	UPGRADIENT ATTENUATION LANDFILL
G008	245831	202293	DOWNGRADIENT ATTENUATION LANDFILL
G012	244915	203751	DOWNGRADIENT CONTAINMENT LANDFILL
G013	245143	203758	DOWNGRADIENT CONTAINMENT LANDFILL
G014	245202	203356	UPGRADIENT CONTAINMENT LANDFILL
G015	245223	203650	DOWNGRADIENT CONTAINMENT LANDFILL

LANDFILL GAS

M001	245279	202153	WITHIN ATTENUATION LANDFILL
M002	245339	202233	WITHIN ATTENUATION LANDFILL
M003	245418	202308	WITHIN ATTENUATION LANDFILL
M004	245434	202642	WITHIN ATTENUATION LANDFILL
M005	245122	202738	PERIMETER OF ATTENUATION LANDFILL
M006	245130	202621	PERIMETER OF ATTENUATION LANDFILL
M007	245176	202119	WITHIN ATTENUATION LANDFILL
M008	245180	202342	WITHIN ATTENUATION LANDFILL
M009	245192	202378	WITHIN ATTENUATION LANDFILL
M015	244874	203667	PERIMETER OF CONTAINMENT LANDFILL
M016	244835	203783	PERIMETER OF CONTAINMENT LANDFILL

LEACHATE

L003	245225	202577	WITHIN ATTENUATION LANDFILL
L004	245303	202657	WITHIN ATTENUATION LANDFILL
L014	245374	202972	WITHIN ATTENUATION LANDFILL (SUMP)
L015A	245165	203696	CONTAINMENT CELL 15A
L015B	245195	203165	CONTAINMENT CELL 15B
L016	244835	203783	CONTAINMENT CELL 12
L017	244969	203754	LINED LAGOON
L018	245079	203581	CONTAINMENT CELL 13
L019	245087	203701	CONTAINMENT CELL 14
L020	245123	202834	WITHIN ATTENUATION LANDFILL
L021	245136	202906	WITHIN ATTENUATION LANDFILL
L022	245372	203006	WITHIN ATTENUATION LANDFILL
L023	245246	202930	WITHIN ATTENUATION LANDFILL
L024	245255	202886	WITHIN ATTENUATION LANDFILL
L025	245254	202832	WITHIN ATTENUATION LANDFILL
L026	245166	202812	WITHIN ATTENUATION LANDFILL
L028	245404	202684	LEACHATE STORAGE TANK
L050	245354	202706	UNLINED LEACHTE LAGOON

DUST/NOISE

DN1	245413	202706	ADJACENT OLD OFFICIES
DN2	245412	202304	ADJACENT KYLEATALESHA ROAD
DN3	245056	202713	ADJACENT N80
DN4	245085	203068	SOUTH OF CONTAINMENT CELL 12

Appendix II:

Volumetric Survey

2012.01.20 14:44

VOL_Base_15B_ - Top15B_

AREA AND VOLUME CALCULATION

Volume between current survey : VOL_TOP_15B_ - Top15B_
and other survey : VOL_BASE_15B_ - Base15B

Volumes by surface feature in the current survey :

Surface	Description	Cut area (m^2)	Cut volume (m^3)	Fill area (m^2)	Fill volume (m^3)	Total area (m^2)	Net volume
None		67.623	-15.940	5409.911	25448.907	5477.534	25432.967
	(Undetermined :				55.874	n/a)	
Grand total :		67.623	-15.940	5409.911	25448.907	5477.534	25432.967
	(Undetermined :				55.874	n/a)	

Note : "FILL" when the CURRENT survey is above the OTHER. All areas are plan areas.

*** WARNING *** no volume determined for the following areas :

Current survey valid, outside other : 55.874

Other survey outside current : 3267.141

Appendix III:

Weather Data

Monthly values for Mullingar 2011

Total rainfall in millimeters for Mullingar 2011

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2011	47.1	119.0	36.1	35.0	67.6	65.1	60.3	65.1	122.1	133.0	106.2	87.8	944.4

Mean temperature in degrees Celsius for Mullingar

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2011	2.9	6.3	6.0	10.5	10.6	11.6	14.1	13.1	13.3	11.0	8.9	5.1	9.5

Monthly values for Oak Park 2011

Total rainfall in millimeters for Oak Park

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2011	50.6	121.9	16.0	19.5	51.2	72.7	46.4	25.5	93.9	93.9	89.2	55.5	736.3

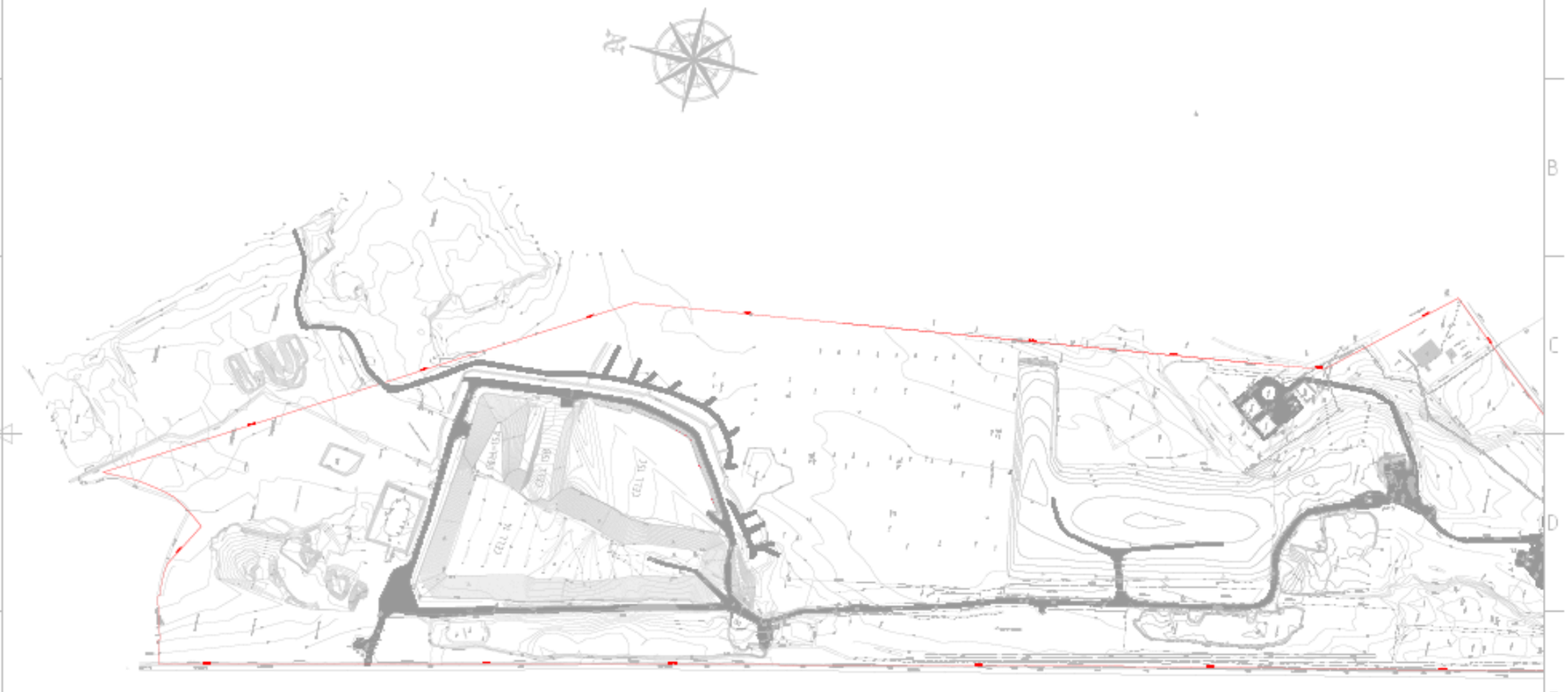
Mean temperature in degrees Celsius for Oak Park

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2011	3.2	7.2	6.7	10.8	11.3	12.3	14.7	13.9	13.9	11.9	9.7	5.9	10.1

Appendix IV

Site Survey

Rev No	Revision note	Date	Signature	Checked



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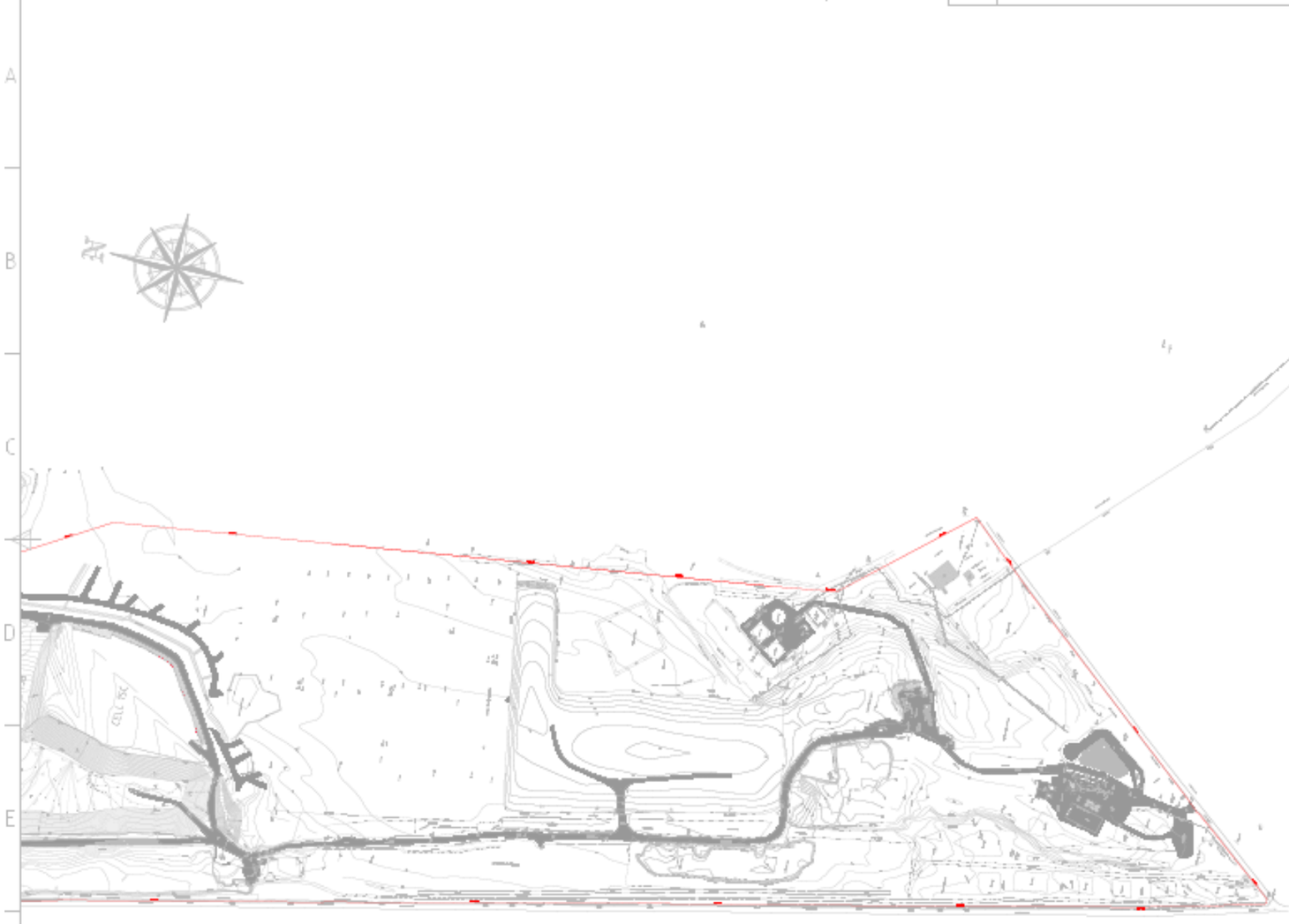
CLIENT LAOISE COUNTY COUNCIL	Independent Land & Mineral Surveys Ltd		KYLETALESHA		
			KYL2011	Edition 1	Sheet 1/2

RevNo	Revision note	Date	Signature	Checked



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SURVEYED_BY INDEPENDENT LAND & MINERAL SURVEYS LTD		Approved by – date B.CUDDY	File name KYL_SITE	Date 19-01-2012	NTS SCALE
CLIENT LAOISE COUNTY COUNCIL		Independent Land & Mineral Surveys Ltd	KYLETALESHA		
			KYL2011	Edition 1	Sheet 2/2

Appendix V

Slope stability Test

Independent Land & Mineral Survey Ltd.
04 January 2012 14:51:12
PROJECT: Documents\Jobs\Portlaoise\CSV\Stabilisation2.pro

Point Coordinates Listing

Point	East	North	Elev	Name
1101	244983.62014	203690.85587	89.963	C14N
1102	244931.41408	203647.13208	90.002	C14W
1103	244964.18110	203500.45506	90.955	C13W
1104	244994.20809	203392.66504	91.454	C12W
1105	245025.67512	203352.01697	90.710	C12S
1106	245048.35918	203499.94712	88.994	C13E
1107	245042.40311	203399.65715	89.992	C12E
1108	245268.10505	202948.10307	88.347	C5S
1109	245362.61706	202986.84404	86.415	C5E
1110	245218.67403	202983.03907	89.120	C5N
1111	245106.78312	202922.35703	87.701	C5W
1112	245241.67808	202930.05007	87.752	C4E
1113	245119.70188	202855.43786	87.323	C4W
1114	245137.25008	202765.45802	87.572	C3W
1115	245260.63222	202831.00031	88.094	C3E
1116	245154.93800	202693.95300	88.126	C2-1W
1117	245276.43200	202701.42400	88.942	C2-1E

Independent Land & Mineral Survey Ltd.
05 August 2011 11:28:01
PROJECT: Documents\Jobs\Portlaoise\CSV\Stabilisation2A.pro

Point Coordinates Listing

Point	East	North	Elev	Name
1101	244983.62114	203690.81587	89.964	C14N
1102	244931.41908	203647.18208	90.004	C14W
1103	244964.18810	203500.43506	90.957	C13W
1104	244994.20109	203392.61504	91.456	C12W
1105	245025.67112	203352.09697	90.711	C12S
1106	245048.35118	203499.94712	88.996	C13E
1107	245042.40811	203399.63715	89.994	C12E
1108	245268.10905	202948.11307	88.349	C5S
1109	245362.61106	202986.84404	86.418	C5E
1110	245218.67303	202983.06907	89.123	C5N
1111	245106.78812	202922.31703	87.702	C5W
1112	245241.67208	202930.05907	87.753	C4E
1113	245119.70788	202855.43086	87.325	C4W
1114	245137.25908	202765.45802	87.572	C3W
1115	245260.68222	202831.00031	88.096	C3E
1116	245154.91800	202693.94300	88.127	C2-1W
1117	245276.49200	202701.48400	88.942	C2-1E

21 Beech

Biological Monitoring Report
Appendix VI

Laois County Council
Áras an Chontae, Portlaoise, Co Laois

Laois County Council Landfill Site (Waste Licence Register No. W026-03)

Biological Monitoring Report

Compiled by: Mr. Marc Chawke BSc MScEng
Environmental Technician, Laois County Council

Report Date: **June 2011**

1.0 Summary

In accordance with Condition 8.12 of Waste Licence Register No. W026-03, Laois County Council is required to undertake an annual biological quality assessment at Kyle Bridge (B-2) and Two Mile Bridge (B-3) located along the River Triogue. These locations are situated upstream and downstream repectively of Tip Stream which transmits surface water from the southern section of Kyletalesha landfill to the River Triogue. Previously landfill leachate was discharged following treatment with a peat filtration system to the Triogue River. This practice has ceased since May 2007. The results of in-situ physico-chemical determinations indicated favourable chemical water quality along the stretch of the Triogue River. The overall bio-diversity of macroinvertebrate samples collected was poor both upstream and downstream of the discharge point from Kyletalesha Landfill. The upstream monitoring location at Kyle Bridge (B-2) received a rating of Q1-2 and the downstream location at Two Mile Bridge (B-3) similarly received a rating of Q1-2. Both B-2 and B-3 were dominated by organisms from Group E, which are species that are classed as most tolerant to organic pollution. No organisms considered sensitive to organic pollution (Group A) were identified at any of the sampling locations.

2.0 Introduction

In accordance with the monitoring requirements of Waste Licence Register No. W026-03, an annual biological assessment is to be carried out on the River Triogue. Environmental personnel from Laois County Council visited the river stretch on the 23rd June 2011 for the purpose of conducting a benthic macroinvertebrate survey. In addition to macroinvertebrate identification physio-chemical parameters were measured in-situ namely temperature, pH, dissolved oxygen and conductivity. in coherence with AWWA Standard Methods for the Examination of Water and Wastewater (1989). Biological assessment was performed based on the EPA Q-Rating system for the assessment of streams and rivers. This report details the sampling methodologies and subsequent taxonomic procedures followed. Results are related to established numerical scales of values (Biological Indices) and are discussed.

3.0 Methodology

Sample Locations

A sampling protocol was designed in order to assess the impact of surface water discharge from Kyletalesha landfill on the surrounding catchment. In order to give a representative indication of surface water quality of the main surface water body in the vicinity of the discharge two sampling locations are regularly monitored. Table 1 describes the sampling locations and the map overleaf illustrates their geographical relationship.

TABLE 1 : Location of assessment points		
Sample Point	**Location**	**Justification**
B-2	Kyle Bridge	To assess quality of watercourse prior to Tip Steam discharge
B-3	Two-Mile Bridge	To assess quality of watercourse after Tip stream discharge

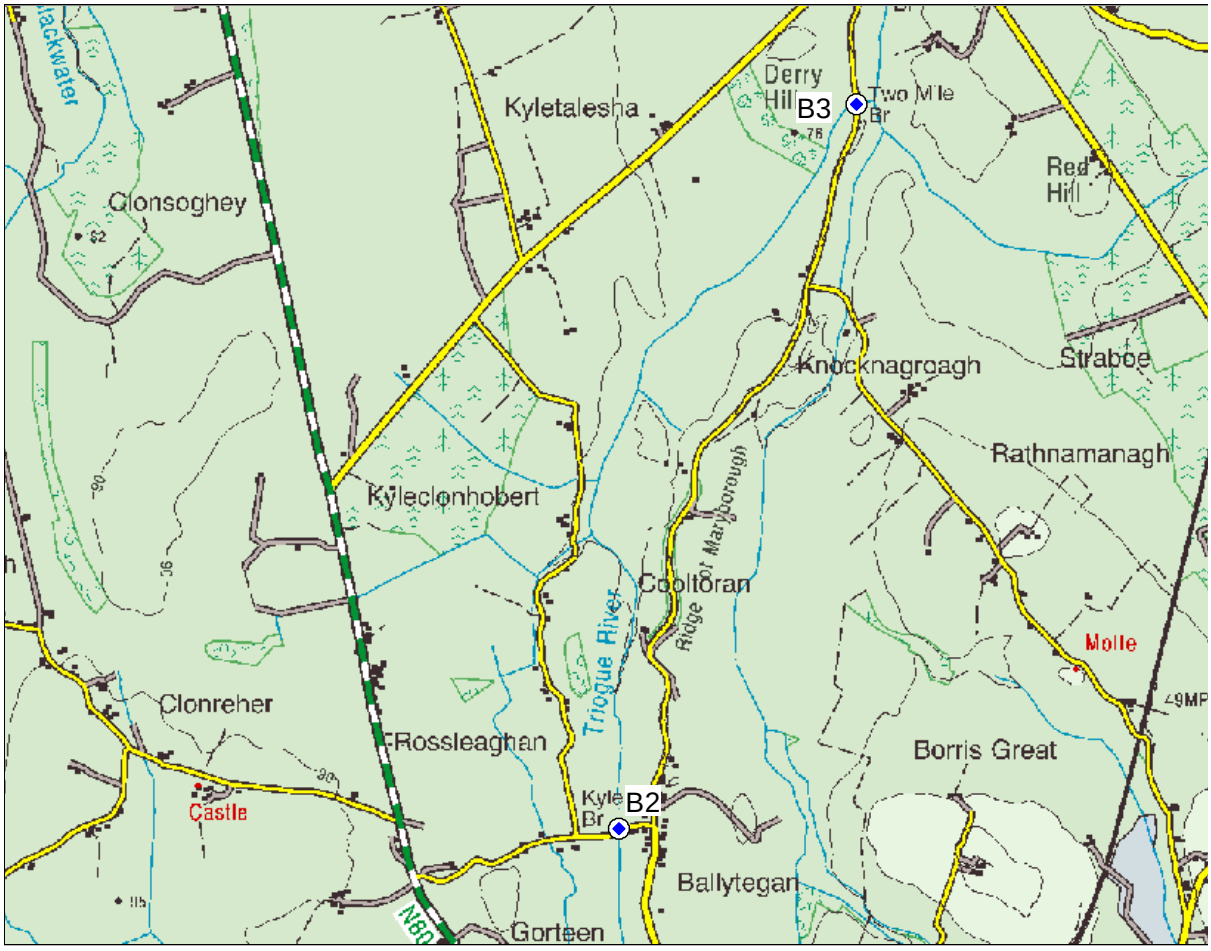

Fig 1 **Biological Monitoring stations**

In-situ Physio-Chemical Assessments

In-situ measurements of pH, conductivity, and temperature were taken with a WTW portable Schott multi-meter. Dissolved oxygen was measured using a WTW portable Oxi 330 meter. All measurements were in coherence with AWWA Standard Methods for the Examination of Water and Wastewater (1989).

Biological Field Sampling Procedures

Field sampling procedures were conducted in accordance with the USEPA 'Revision to Rapid Bioassessment Protocols for Use in Streams and Rivers (1997)' in addition to procedures detailed in S.I No. 258 of 1998, an amendment to the Local Government (Water Pollution) Act, 1977. A D-frame dip net was used to sample benthic macroinvertebrates at the three sampling locations. Dimensions of the frame were 0.3 m square and shaped as a "D" where the frame attaches to a long pole. The net has a cone shape for capture of organisms. A kick sample was taken at each location for a two-minute period. Each collected sample was assessed after collection. Habitat, as structured by in-stream and surrounding topographical features, is a major determinant of aquatic community potential. Both the quality and quantity of available habitat affect the structure and composition of resident biological communities. As such, on site habitat characteristics were recorded and referenced to results obtained from the individual sampling locations.

Biological Quality Rating (Q-Rating)

This is a Pollution Rating Index, which has been developed to measure the response of certain key macroinvertebrate species or groups to pollution. The Q Rating system has been implemented by the Environmental Protection Agency in Ireland as the standard means to assess the quality of any part of a river based principally on the composition of macroinvertebrate communities/faunal groups present and their general sensitivity to organic pollution. The Biological Quality Rating forms part of S.I No. 258 of 1998, an amendment to the Local Government (Water Pollution) Act, 1977. The rating system recognises five macroinvertebrate groups ranging from A to E (i.e. most sensitive to most tolerant) and relates their relative abundance, from a standard 2 minute sample, to a quality rating known as a Q Index. The part of the

stream or river surveyed may subsequently assigned a Q rating from 5 to 1 (i.e. pristine, unpolluted to gross polluted). Table 2 below presents Part I of the

Table 2 Biological Quality Rating: indicator groups

GROUP A	GROUP B	GROUP C	GROUP D	GROUP E
Perlidae Chloroperlidae Capniidae Perlodidae Heptageniidae Siphlonuridae Margaritiferidae	Leuctridae Nemouridae Taeniopterygidae Baetidae Leptophlebiidae Ephemerellidae Ephemeridae Potamanthidae Cased Trichoptera ***Excluding*** Limnephilidae Hydroptilidae Glossosomatidae Odonata (***not*** Coenagriidae) Aphelocheirus *Rheotanytarsus*	Tricladida Ancylidae Neritidae Unionidae Astacidae *Gammarus* Caenidae Limnephilidae Hydroptilidae Glossosomatidae Uncased Trichoptera Coleoptera Sialidae Tipulidae Simuliidae Hemiptera *excluding* Aphelocheirus Hydracarina	Hirudinea Mollusca ***excluding*** Ancylidae Margaritiferidae Neritidae Unionidae *Asellus* Chironomidae ***excluding*** *Chironomus* *Rheotanytarsus*	Tubificidae *Chironomus*

4.0 Results

The results of physio-chemical analysis and biological assessment are detailed in Tables 3, 4 & 5 below.

Table 3 Physio-chemical characteristics

Sample Location	pH (pH units)	Conductivity (μS/cm)	BOD (mg/l)	Dissolved Oxygen (mg/l)	Ammonia (mg/l)	Ortho-P (mg/l)	Temp (°C)
S-2	8.3	894	2	14.0	0.04	0.024	14.9
S-3	8.4	862	1	11.0	0.04	0.021	15.6

Table 4 Macroinvertebrate taxa

Invertebrate Taxa	S-2 (Kyle Bridge)	S-3 (Two Mile Bridge)
Coeleoptera	*	
Mollusca	*	*
Tipulidae	*	*
Asellus	*	*
Chironomus	*+	*+
Gammarus	*	
Hirudinea	*	*
Glossosomatidae	*	*
Limnephilidae	*	*

* = present + = dominant

Table 5 Q-Rating

Monitoring Station	Biological Quality Rating (Q- Rating)
B-2 (Kyle Bridge)	Q1-2
B-3 (Two Mile Bridge)	Q1-2

5.0 Discussion

The chemical properties of the Triogue River at both Kyle Bridge and Two Mile Bridge are broadly similar. They exhibit no indications of chemical pollution. B-2 located at Kyle Bridge received a rating of Q1-2. Faunal groups from Group C, D and E only were present within the macroinvertebrates collected. Organisms within Group D are classified as very tolerant to organic pollution while organisms from Group E are classified as the most tolerant to organic pollution. Group E was dominant and Group D was present in high abundances. B-3 located at Two-Mile Bridge received a rating of Q1. Group E was dominant and overall the kick sample yielded a low diversity. Group D was the only other group represented in the sample and these were in very low abundance. B-2 and B-3 had a similar river habitat. The River at each location was wide (7-10m) with a good flow. Both sampling locations had suitable riverbed substrata to support macroinvertebrates assemblages. There was evidence that each site is under strain from bank erosion caused by livestock. Bank erosion has caused siltation but is not severe in either locations. The overall bio-diversity noted within this stretch of the River Triogue was poor.

Appendix VII:

Noise Survey

Laois County Council
Áras an Chontae, Portlaoise, Co Laois

Laois County Council Landfill Site
Waste Licence Register No. W026-03

Noise Monitoring Report

Compiled by: Mr. Marc Chawke BSc MScEng
Environmental Technician, Laois County Council

Report Date: December 2011

1.0 Summary

In accordance with Waste Licence Register No. W026-02, Laois County Council are required to carry out an annual assessment of noise levels at four locations (i.e. N1-N4) on the landfill facility at Kyletalesha.

In accordance with the waste licence, onsite activities shall not give rise to noise levels, at noise sensitive locations, which exceed the Leq (30minutes) 55dB(A) during day-time hours, and 45dB(A) during night-time hours. The facility does not operate during night-time hours (taken to be from 22:00hrs to 08:00hrs as per EPA guidelines) therefore only day-time monitoring is required.

An Environmental technician from Laois County Council carried out the survey on the 21st of December 2011.

Overall, the results show no contravention of the licence limit (55dB(A)) at monitoring locations N1, N2, N3 and N4 during the noise survey.

2.0 Introduction

In accordance with the monitoring requirements of Waste Licence Register No. W026-03, an annual noise assessment is to be carried out at Kyletalesha landfill, Portlaoise, County Laois. The survey was carried out by an Environmental technician from Laois County Council on the 21st of December, 2011, and this report contains a description of the methodology and the survey results.

3.0 Sampling Methodology

Sampling Locations

The four monitoring locations are described in Table 3.1 below.

Table 3.1: Sampling Locations for Noise Assessment

Sample Location	Description
N1	New leachate storage tank area
N2	Civic amenity center Entrance
N3	Western boundary adjacent to N80
N4	North of cells 1-5

Weather Conditions

During monitoring the weather was calm (wind speed <1m/s), with no rainfall during the monitoring period and an average temperature of 12°C.

Sampling Methodology

The in-situ measurements are described in Table 3.2 below:

Table 3.2: In-situ Measurements		
Parameter	**Monitoring period**	**Equipment used**
$L(A)_{eq}$	30 minutes	Bruel & Kjaer 2250 serial no. 2567681 Integrating Sound Pressure Meter
$L(A)_{10}$		
$L(A)_{90}$		

The noise survey was carried out in accordance with ISO 1996/1/2/3 – Acoustics – Description and Measurement of Environmental Noise, and the Guidance note for Noise in Relation to Scheduled Activities issued by the EPA.

The meter was fixed to a tripod 1.5 meters above ground level and the microphone was protected using a windshield. The microphone cartridge type was BK4189, serial number 02560621 with open circuit sensitivity level of 51.3 mV per Pa.

The meter was calibrated onsite using a Bruel & Kjaer acoustic calibrator serial no. 2564287 at 94dBA before and after the monitoring event.

4.0 Results

The results of the noise assessment carried out at the 4 no. monitoring locations which took place on the 26th of November 2007 are presented below in Table 4.1 below.

Table 3 : Noise Monitoring Results

Sample Location	Monitoring Period	$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$	Noise sources
N2	09:32 – 10:02	53.5	58.6	43.3	Vehicles entering and exiting the civic amenity site and the weighbridge area for the main landfill site. Frequent traffic from Kyletalesha Road adjoining the N80 and the landfill entrance. Glass bottles and metal being emptied into containers and white goods being dispatched. JCB and compactor operating. People conversing in the recycling area.
N4	10:26 – 11:56	48.5	54.0	36.2	Traffic flow on the N80 route. Trucks delivering waste to the active cell passing adjacent to N4 also audible.
N3	12:14 – 12:44	54.3	59.7	46.4	This location is within in close proximity of the N80 providing a continuous traffic flow. Farm machinery detectable in the distance. HGVs operating on the northern section of the site recognisable.
N1	13:05 – 13.35	48.9	51.6	44.2	The predominant noise source was machinery operating in the animal rendering facilities nearby (AES Ltd.). Machinery signalling from this site was recognised intermittently.

5.0 Discussion

The results of the noise assessment carried out on December 21st 2011 at Kyletalesha landfill facility are displayed in Table 4.1. The emission limit stipulated for noise emissions (Leq) in Waste Licence W0026-03 for Kyletalesha landfill facility is 55dB (A) during daytime hours. This limit was complimented at the four monitoring locations.

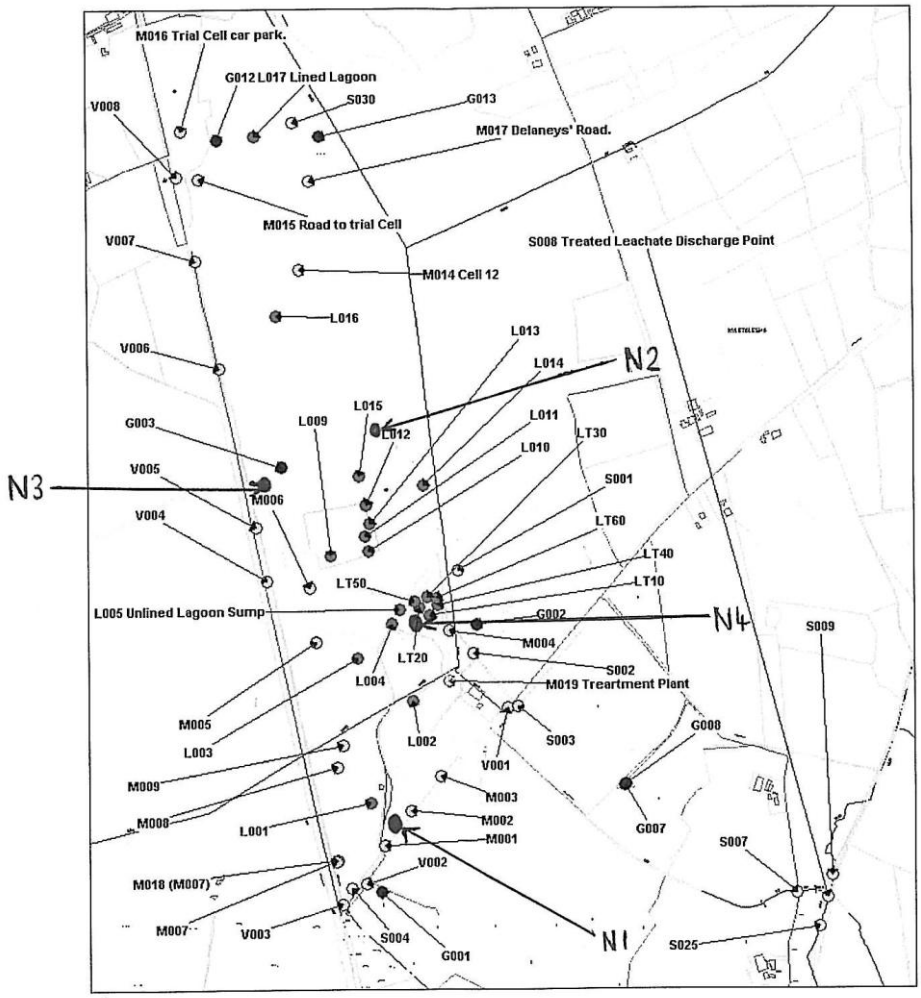

Fig 1 Noise monitoring locations (N1, N2, N3 & N4)

Appendix VIII:

Objectives and Targets

Objectives and Targets

Under section 2.3.2.1 of the waste licence, Laois "*shall prepare and maintain a Schedule of Environmental Objectives and Targets. The schedule shall, as a minimum, provide for a review of all operations and processes, including an evaluation of practicable options, for energy and resource efficiency, the use of cleaner technology (including emissions prevention/reduction), and the beneficial recovery/recycling of waste in subsequent landfill engineering operations. The schedule shall include time frames for the achievement of set targets and shall address a five-year period as a minimum. The schedule shall be reviewed annually and amendments thereto notified to the Agency for agreement as part of the Annual Environmental Report (AER)".*

This register of environmental objectives and targets has been prepared in accordance with Laois County Council's environmental management system (EMS) as required by Condition 2 of waste licence W0026-03.

This register provides a schedule of the facility's objectives and targets highlighting areas for work on a year by year basis. It also allows for the tracking and checking of a wide range of management and site issues. The register should be referenced quarterly to check the targets to be achieved and alert the relevant parties. It should also be referenced at the end of each quarter to ensure that tasks have been completed. Anything not completed should be carried on to the next target phase.

The register details the following information:

Objective -

An environmental objective is an overall environmental goal, arising from the environmental policy, that an organisation sets itself to achieve, and which is quantified where practicable.

Target –

An environmental target is a detailed performance requirement, quantified where practicable, applicable to the organisation or parts of thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

Tasks –

These outline the means by which the targets are going to be met. These provide step by step instructions which should be followed to ensure that the objectives and targets are met.

Responsibility -

This column designates where the landfill manager or other staff member is designated with overseeing that a particular task has been completed.

Target Date –

This sets out the date by which the target should be met. Targets that are not met by the target date should be re-assessed and the date re-adjusted to accommodate completion.

Extent to Which Targets are Achieved –

This is a scoring system and outlines the level to which the target has been achieved.

The landfill manager should strive to complete tasks to a high degree i.e. 5. The scoring system is rated from a level of 1 – 5 where 1 is rated as not carried out at all to 5 where the task has been totally completed to a high level.

Comments –

The comments section allows the landfill manager to make additional notes as required for the specific task.

Sign –

This is the system which is used to indicate that the tasks have been adequately carried out. The Facility Manager or relevant party signs off the tasks once they have been completed.

(Empty pages are left at the end of each month so that the Facility Manager can add any additional objectives and targets as they arise.)

Additional objectives and targets may be identified during team meetings, as a result of audits, non-compliances or instruction from the Agency.

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
01	Staff Training & Environmental Awareness	Refresher training for site staff on: - Acceptable Wastes - New BMW Regs. - Housekeeping - Site Safety	Arrange 1-hr course over lunchtime with staff.	Landfill Manager	June 30th 2011	Ongoing		
02	Communication	Website update	- acceptable wastes - monitoring reports			Ongoing		
03	Site records	Keep bound copies of monitoring reports in library folder and 1 copy in EPA correspondence folder`	Copy and bind all monitoring reports submitted to EPA and file on site.	Landfill Manager	December 31st 2010	Quarterly monitoring reports submitted to EPA and copy retained in library		
04	Communication	Review and update waste acceptance procedures.	New acceptance procedures to be drafted with reference to limits on BMW content of waste accepted at site.	Landfill Manager	December 31st 2010	Ongoing		

[1] **(Score 1-5; 5=absolutely, 1=not at all)**

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
05	Groundwater protection: Licence Compliance, (Condition No. 3.11)	To carry out testing to determine the integrity of the waste oil tank bund	1. Bund testing 2. Submit report to the EPA on findings	Landfill Manager		Being submitted as part of the 2011 AER		
06	Accident Prevention Policy (Licence Condition 9.5)	Prepare Accident Prevention Policy to address potential accidents that could have an environmental impact.	1. Identify on-site hazards 2. assess the controls required for the prevention of site accidents 3. Report to the agency in AER	Landfill Manager	March 31st 2011	On going		
07	Landfill Environmental Management Plan Review (Licence Condition 2.3.2.2)	Review and update the existing environmental management plan	1. Prepare environmental management plan with reference to EPA guidance manual on "*Landfill Operational Practices"*	Landfill Manager	March 31st 2011	Ongoing, being updated as part of the AER		
08	Environmental Liabilities Risk Assessment (Licence Condition 12.2)	Prepare a costed report on environmental liabilities on site.	Prepare ELRA with reference to EPA guidance document entitled *Environmental Liabilities Risk Assessment and Residual Management Plan*	Landfill Manager	March 31st 2011	Completed in 2011		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
09	Meteorological Monitoring Licence Compliance (Condition No. 8.8)	Meteorological monitoring	1. Tabulate and record data – report as part of AER.	Landfill Manager	March 31st 2011	Will be reported as part of the AER		
10	Monitoring: Licence Compliance, Schedule D	To complete dust monitoring at four locations three times per year (twice between May and September)	1. Monitor 2. Report to the Agency	Monitoring Technician / Landfill Manager	March 31st 2011 June 30th 2011 Sept. 30th 2011	Achieved		
11	Monitoring: Licence Compliance, Schedule D	To complete quarterly and annual leachate monitoring and sampling.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	March 31st 2011 June 30th 2011 Sept. 30th 2011 Dec. 31st 2011	Achieved		
12	Monitoring: Licence Compliance, Schedule D	To complete quarterly and annual groundwater monitoring and sampling.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	March 31st 2011 June 30th 2011 Sept. 30th 2011 Dec. 31st 2011	Achieved		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
13	Monitoring: Licence Compliance, Schedule D	To complete continuous monitoring of landfill gas in site buildings and monthly monitoring in site wells and boreholes.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	End of each month.	Achieved/ ongoing		
14	Monitoring: Licence Compliance, Schedule D	To complete annual noise monitoring.	1. Monitor 2. Report to Agency	Monitoring Technician / Landfill Manager	December 31st 2011	Achieved/ reported as part of AER		
15	Reporting & Communication, Licence Compliance, (Condition No. 11.4)	AER completed by the end of March	1. Compile and collate 2010 site works and monitoring results. 2. Report to the EPA	Landfill Manager	31st March 2011	On Target		
16	Increase Public Awareness on Waste Minimisation and Recycling and BMW.	Encourage waste reduction, reuse and recycling in accordance with the Waste management Plan for the Midland Region	Reduce volumes of recyclable and BMW material being landfilled.	Landfill Manager	June 30th 2011	On Target		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
17	Improvements to site infrastructure	Installation of a telemetry system for the recording of all specified monitoring data as per licence condition 3.19.2 (c.).	Installation and maintenance of new on-site camera system	Landfill Manager	March 31st 2011	On target		
18	Improvements to Site Infrastructure.	Review of wastewater treatment system. Construction of Cell 15 Continued upgrade of scada system Improvement to existing Haul Road	Prepare cell 15 site for liner installation	Landfill Manager / Executive Technician		On target		
19	Landfill Gas Management	To ensure that preventative maintenance is completed on the gas flaring system.	Monthly balancing of the flare system to ensure optimum performance and reduced downtime due to breakdown.	Landfill Manager / Executive Technician	Recorded at the end of each month.	ON target		
20	Landfill Site Restoration	To complete phased closure on completed waste cells.	Complete cap system on sub-cell 14c	Landfill Manager / Executive Technician	October 31st 2010	Complete		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
21	To prevent contamination of ground / surface water	To ensure that the silt traps and oil / water separator is clean and working efficiently	1. To inspect the silt traps and Oil/ water separator. 2. To clean if necessary	Executive Technician	June 30th 2011	Ongoing		
22	Review site operational procedures.	Ensure that all procedures are up to date and accurately reflect the site operations.	Review site operational procedures and edit / reformat to include any relevant updated procedure tasks or regulatory requirements.	Landfill Manager	March 31st 2011	Ongoing		
23	Waste Recovery Report (Licence Condition 11.3)	To assess further waste recovery options at the landfill site to meet EU waste policy recovery targets	1. Review Waste Acceptance Procedures 2. Complete Waste Characterisation Assessment 3. Submit report to the EPA as part of the AER	Landfill Manager	31st March 2011	Ongoing		
24	Introduce quarterly safety assessments on site	To ensure that site staff, contractors and customers are operating and working in a safe manner.	Observation of site operations and completion of Site Audit sheet on Quarterly basis with feedback.	Landfill Manager	March 31st 2011 June 30th 2011 Sept. 30th 2011 Dec. 31st 2011	Updated on a regular basis with our health and safety officer		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
25	Complete Calibration of Site Weighbridge	Ensure that weights of all vehicles crossing site weighbridge are accurately recorded	Have Precia Molen Group complete weighbridge calibration and provide report	Landfill Manager	December 31st 2010	complete		
26	To prevent contamination of groundwater or surface water through oil or other spillages	Ensure that containment booms / adsorbents are adequate	1. Conduct on site inspection 2. Order replacements where required	Landfill Manager	Jan 31st 2011	complete		
27	To maintain site security	Ensure that site is secure to prevent unauthorised access.	1. Carry out an inspection of site boundaries and liaise with security contractor on any possible improvements	Landfill Manager	June 30th 2011	ongoing		
28	Prevent the contamination of ground / surface water through spills / leakages from inadequate tank and drum storage	Ensure that tanks and drums are stored safety and that spills will be contained	1. Conduct an inspection of storage areas and ensure drums etc. are labelled correctly	Landfill Manager	June 30th 2011	ongoing		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
29	Site Topographical Assessment for Licence Compliance, (Condition No. 8.10)	Carry out annual topographical assessment at the site	1. Conduct a topographical survey at the site 2. Report to the Agency	Landfill Manager	December 31st 2010	complete		
30	Encourage management commitment to environmental improvement	Ensure that management are aware of their roles and responsibilities	1. Carry out a review of the management structure 2. Complete updates where required	Landfill Manager	June 30th 2011	complete		
31	Improve site operations and minimise nuisance to neighbours	To ensure that complaints are dealt with satisfactorily	1. Conduct a review of all complaints to ensure that there are no outstanding issues	Landfill Manager	March 31st 2011	On target		
32	Assess the Biodegradeable Municipal Waste content of waste deposited at the Public Disposal Area.	Ensure that the BMW content conforms with limits set in Condition 5.14.1 of the Waste Licence	1. Complete Waste Characterisation and BMW content assessment	Landfill Manager		complete		

2010 / 2011								
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [1]	**Comments**	**Sign**
33	To prevent any accidents caused by instability of site slopes (Condition No. 8.14)	Carry out annual stability assessments at the site	1. Conduct annual slope stability assessment 2. Report to the Agency	Landfill Manager / Executive Technician	Dec. 31st 2010	complete		
34	To ensure comprehensive monitoring of groundwater	Ensure that monitoring infrastructure is in order	1. Inspect monitoring infrastructure 2. Repair where necessary	Monitoring Technician	Quarterly	complete		
35	To prevent legislative non compliances at the site	Ensure that the site is complying with all relevant and up to date legislation	1. Review the register of legislation	Landfill Manager	Dec 31st 2011	ongoing		
36	Update Site EMS (Licence Condition 2.3.1)	Update the current EMS to include update objectives and targets, corrective action procedures and awareness programme training.	1. prepare outline for submission to EPA for approval. 2. Update EMS based on EPA approval	Landfill Manager	June 30th 2011	ongoing		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
01	Staff Training & Environmental Awareness	Refresher training for site staff on: - Acceptable Wastes - New BMW Regs. - Housekeeping - Site Safety	Arrange 1-hr course over lunchtime with staff.	Landfill Manager	June 30th 2012		
02	Communication	Website update	- acceptable wastes - monitoring reports		December 31st 2012		
03	Site records	Keep bound copies of monitoring reports in library folder and 1 copy in EPA correspondence folder`	Copy and bind all monitoring reports submitted to EPA and file on site.	Landfill Manager	December 31st 2012		
04	Communication	Review and update waste acceptance procedures.	New acceptance procedures to be drafted with reference to limits on BMW content of waste accepted at site.	Landfill Manager	December 31st 2012		

[2] **(Score 1-5; 5=absolutely, 1=not at all)**

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
05	Groundwater protection: Licence Compliance, (Condition No. 3.11)	To carry out testing to determine the integrity of the waste oil tank bund	1. Bund testing 2. Submit report to the EPA on findings	Landfill Manager	Refurbished in 2010, due for retesting in 2013		
06	Landfill Environmental Management Plan Review (Licence Condition 2.3.2.2)	Review and update the existing environmental management plan	1. Prepare environmental management plan with reference to EPA guidance manual on "*Landfill Operational Practices"*	Landfill Manager	March 31st 2012	Ongoing, being updated as part of the AER	
07	Environmental Liabilities Risk Assessment (Licence Condition 12.2)	Prepare a costed report on environmental liabilities on site.	Prepare ELRA with reference to EPA guidance document entitled *Environmental Liabilities Risk Assessment and Residual Management Plan*	Landfill Manager	Review in 2013		
08	Meteorological Monitoring Licence Compliance (Condition No. 8.8)	Meteorological monitoring	1. Tabulate and record data – report as part of AER.	Landfill Manager	March 31st 2012		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
9	Monitoring: Licence Compliance, Schedule D	To complete dust monitoring at four locations three times per year (twice between May and September)	1. Monitor 2. Report to the Agency	Monitoring Technician / Landfill Manager	March 31st 2012 June 30th 2012 Sept. 30th 2012		
10	Monitoring: Licence Compliance, Schedule D	To complete quarterly and annual leachate monitoring and sampling.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	March 31st 2012 June 30th 2012 Sept. 30th 2012 Dec. 31st 2012		
11	Monitoring: Licence Compliance, Schedule D	To complete quarterly and annual groundwater monitoring and sampling.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	March 31st 2012 June 30th 2012 Sept. 30th 2012 Dec. 31st 2012		
12	Monitoring: Licence Compliance, Schedule D	To complete continuous monitoring of landfill gas in site buildings and monthly monitoring in site wells and boreholes.	1. Monitor / Sample 2. Report to Agency	Monitoring Technician / Landfill Manager	End of each month.		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
13	Monitoring: Licence Compliance, Schedule D	To complete annual noise monitoring.	1. Monitor 2. Report to Agency	Monitoring Technician / Landfill Manager	December 31st 2012		
14	Reporting & Communication, Licence Compliance, (Condition No. 11.4)	AER completed by the end of March	1. Compile and collate 2010 site works and monitoring results. 2. Report to the EPA	Landfill Manager	31st March 2013		
15	Increase Public Awareness on Waste Minimisation and Recycling and BMW.	Encourage waste reduction, reuse and recycling in accordance with the Waste management Plan for the Midland Region	Reduce volumes of recyclable and BMW material being landfilled.	Landfill Manager	June 30th 2013		
16	Improvements to Site Infrastructure.	Review of wastewater treatment system. Construction of Cell 15 Continued upgrade of scada system Improvement to existing Haul Road	Prepare cell 15 site for liner installation	Landfill Manager / Executive Technician	31st Dec 2012		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
17	Landfill Gas Management	To ensure that preventative maintenance is completed on the gas flaring system.	Monthly balancing of the flare system to ensure optimum performance and reduced downtime due to breakdown.	Landfill Manager / Executive Technician	Recorded at the end of each month.		
18	Landfill Site Restoration	To complete phased closure on completed waste cells.	Complete cap system on sub-cell 15b	Landfill Manager / Executive Technician	April 2013		
19	To prevent contamination of ground / surface water	To ensure that the silt traps and oil / water separator is clean and working efficiently	1. To inspect the silt traps and Oil/ water separator. 2. To clean if necessary	Executive Technician	June 30th 2012		
20	Review site operational procedures.	Ensure that all procedures are up to date and accurately reflect the site operations.	Review site operational procedures and edit / reformat to include any relevant updated procedure tasks or regulatory requirements.	Landfill Manager	March 31st 2013		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
21	Waste Recovery Report (Licence Condition 11.3)	To assess further waste recovery options at the landfill site to meet EU waste policy recovery targets	1. Review Waste Acceptance Procedures 2. Complete Waste Characterisation Assessment 3. Submit report to the EPA as part of the AER	Landfill Manager	31st March 2013		
22	Complete Calibration of Site Weighbridge	Ensure that weights of all vehicles crossing site weighbridge are accurately recorded	Have Precia Molen Group complete weighbridge calibration and provide report	Landfill Manager	December 31st 2012		
23	To prevent contamination of groundwater or surface water through oil or other spillages	Ensure that containment booms / adsorbents are adequate	1. Conduct on site inspection 2. Order replacements where required	Landfill Manager	Jan 31st 2012		
24	To maintain site security	Ensure that site is secure to prevent unauthorised access.	1. Carry out an inspection of site boundaries and liaise with security contractor on any possible improvements	Landfill Manager	June 30th 2012 Dec 2012		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
25	Prevent the contamination of ground / surface water through spills / leakages from inadequate tank and drum storage	Ensure that tanks and drums are stored safety and that spills will be contained	1. Conduct an inspection of storage areas and ensure drums etc. are labelled correctly	Landfill Manager	June 30th 2013		
26	Site Topographical Assessment for Licence Compliance, (Condition No. 8.10)	Carry out annual topographical assessment at the site	1. Conduct a topographical survey at the site 2. Report to the Agency	Landfill Manager	December 31st 2012		
27	Encourage management commitment to environmental improvement	Ensure that management are aware of their roles and responsibilities	1. Carry out a review of the management structure 2. Complete updates where required	Landfill Manager	June 30th 2013		
28	Improve site operations and minimise nuisance to neighbours	To ensure that complaints are dealt with satisfactorily	1. Conduct a review of all complaints to ensure that there are no outstanding issues	Landfill Manager	March 31st 2013		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
29	Assess the Biodegradeable Municipal Waste content of waste deposited at the Public Disposal Area.	Ensure that the BMW content conforms with limits set in Condition 5.14.1 of the Waste Licence	1. Complete Waste Characterisation and BMW content assessment	Landfill Manager	April 2012 Sept 2012		
30	To prevent any accidents caused by instability of site slopes (Condition No. 8.14)	Carry out annual stability assessments at the site	1. Conduct annual slope stability assessment 2. Report to the Agency	Landfill Manager / Executive Technician	Dec. 31st 2012		
31	To ensure comprehensive monitoring of groundwater	Ensure that monitoring infrastructure is in order	1. Inspect monitoring infrastructure 2. Repair where necessary	Monitoring Technician	Quarterly		
32	To prevent legislative non compliances at the site	Ensure that the site is complying with all relevant and up to date legislation	1. Review the register of legislation	Landfill Manager	Dec 31st 2012		

Objectives and Targets for the coming year 2011 / 2012							
Ref No.	**Objective**	**Target**	**Tasks**	**Responsibility**	**Target Date**	**To what extent have you achieved targets?** [2]	**Comments**
33	Update Site EMS (Licence Condition 2.3.1)	Update the current EMS to include update objectives and targets, corrective action procedures and awareness programme training.	1. prepare outline for submission to EPA for approval. 2. Update EMS based on EPA approval	Landfill Manager	June 30th 2013		

Appendix IX

CLOSURE RESTORATION AND AFTERCARE MANAGEMENT PLAN FOR KYLETALESHA LANDFILL

CLOSURE RESTORATION AND AFTERCARE MANAGEMENT PLAN FOR KYLETALESHA LANDFILL (WASTE LICENCE N0. W0026-03)

Prepared for:

LAOIS COUNTY COUNCIL

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Appendix III: Estimated Closure Plan Costs

ISSUE/REVISION INDEX

Revision				Pages Revised	Remarks
#	Prep.	Rev.	Date		
PA	JR		18-01-2011		Issue Draft for Internal Review
PB	JR		25-01-2011	All	Issue Draft for Client's Review
PC	JR	TT	21-07-2011	All	Issue Draft for Final Internal Review
PC	JR	TT	16-09-2011	All	Issue Final Document

Prepared by : John Rea, B.Sc.

Reviewed by : Ted Taylor, P. Eng.

INTRODUCTION

SNC-Lavalin Environment (SLE) was retained by Laois County Council (Laois) to develop a Closure Restoration and Aftercare Management Plan (CRAMP) for their landfill site located at Kyletalesha, Co. Laois. Under Condition 4 of the site EPA waste licence W0026-03 (waste licence) *"The licensee shall restore the facility on a phased basis. The licensee shall develop and maintain a Restoration and Aftercare Plan for the facility to reflect the requirements of this licence. This plan shall address the restoration of deposited wastes in both the lined cells and all historically landfilled areas, and should include a schedule detailing the various stages of restoration, including timescales, for the facility".*

This document sets out a framework for the restoration and aftercare of the landfill site. 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 W0026-03. This plan is a working document and should be reviewed and revised as required.

Objectives

The objective of the CRAMP is to provide a site manual for use in the restoration and aftercare of the landfill. The objectives of implementing this CRAMP are as follows:

- To ensure that the restoration and aftercare procedures completed on site provide an environmentally sound and safe area that can be utilized for the designated post-closure land use;
- To create a site that will be suitable for future use as fallow ground;
- To protect the surrounding environment; and,
- To integrate the site with the surrounding landscape.

Regulatory Framework

The EU Landfill Directive on Waste (1999) introduced the requirement for landfill closure and aftercare procedures. Article 13 of the Directive requires that once a landfill has been closed, the site operator shall be responsible for maintenance, monitoring and control in the after-care phase for as long as may be required by the competent authority, 'taking into account the time during which the landfill could present hazards'. The Landfill Directive requires the costs of closure and after-care of the site for a period of at least 30 years to be covered by the prices charged by the site operator. Although the term 'closure' is not defined in the Directive, Article 13(a) states that a landfill or part of it will start the closure procedure:

i. 'When the relevant conditions stated in the permit are met; or
ii. Under the authorisation of the competent authority, at the request of the site operator; or
iii. By reasoned decision of the competent authority'

The Landfill Directive also requires the site operator to notify the competent authority of any significant adverse environmental effects revealed by the control procedures in the after-care phase. Article 13(b) states that 'a landfill or part of it may only be considered as definitely closed after the competent authority has carried out a final on-site inspection, has assessed all the reports submitted by the site operator and has communicated to the site operator its approval for the closure'.

Under national legislation, the Waste Management Act, 1996 designates the EPA as the licensing authority for significant waste management facilities, and sets criteria which must be adhered to for a waste licence to be issued, retained and surrendered. In accordance with the Waste Management Act 1996, Laois will be responsible for the aftercare management of Kyletalesha Landfill up until the date when the EPA accepts the surrender of the site's Waste Licence. As set out in Section 48(7) of the Act: 'if the Agency is satisfied that the condition of the relevant facility is not causing or likely to cause environmental pollution, it shall accept the surrender of the Waste Licence, but otherwise shall refuse to accept the surrender of the Waste Licence'.

Site DEScription & BACKGROUND

The Kyletalesha Landfill is a non-hazardous, municipal waste landfill located approximately 5 kilometres north of Portlaoise, Co. Laois. The landfill site has been in operation since 1959 when domestic and commercial waste was first disposed at the site. The site consists of a civic amenity area (for waste diversion and recovery by members of the public) and a landfill site for the disposal of municipal solid waste by the public and private commercial waste operators. The landfill site covers an area of approximately 79.3 hectares in total.

A Waste Licence for Kyletalesha Landfill (Reg. No. W0026-01) was issued to Laois County Council by the Environmental Protection Agency on May 11th 2000 for the operation of the facility and subsequent reviews of the licence were completed in 2003 (Reg. No. W0026-0226-02) and 2010 (Reg. No. W0026-03).

The landfill can be mainly divided into older and newer landfill areas. The older area (i.e. waste cells 1, 2, 3, 4 and 5) has been filled and capped without the benefit of current engineering standards, but has been partially retrofitted to allow leachate and landfill gas extraction and treatment. The waste cells in the newer area of the landfill (i.e., waste cells 12, 13 and 14) have been fully designed and constructed to meet current engineering standards, with the inclusion of a liner system and leachate and landfill gas collection systems. To date waste cells 1, 2, 3, 4, 5, 12, 13 and 14 have been capped.

A covered and lined leachate lagoon is located in the northern area of the landfill site. Leachate is pumped to the holding lagoon for subsequent transport to the Portlaoise wastewater treatment plant. Landfill gas is pumped to the landfill gas flare (located in the northern section of the site) for destruction.

Site Boundaries and Topography

The site topography is generally level, typical of bogland, with the waste mound creating a raised section in the centre of the site. The site is bounded to the west by the N80 roadway, to the north by cutaway bog land, to the east by virgin bog land and to the south by an unnamed road that leads to Kyletalesha woods.

Site Geology

Based on an historical site investigation completed in 2000, the thickness of the underlying peat ranges from 3 - 7 m and the underlying boulder clay till varies in thickness from 7.5 - 10 m across the site. The underlying clay till has variable permeability depending on composition and alluvial and glacial intrusions, and overlies limestone bedrock. The limestone bedrock is described by the Geological Survey of Ireland (GSI) as a dark grey fossiliferous, muddy limestone with intermittent shale of the Ballysteen formation.

Site Life Span

The original site calculation for the landfill site was for a capacity of approximately 1,060,000 tonnes of municipal solid waste (MSW). Records of waste inputs indicate that approximately 455,310 tonnes was deposited in the landfill up to the end of 2002 with an estimated remaining tonnage capacity of 604,690 tonnes. Between 2002 and 2009, 316,585 tonnes of MSW was deposited at the landfill resulting in an estimated remaining landfill capacity for 288,105 tonnes.

Assuming a maximum filling rate allowable under the EPA waste licence of 47,100 tonnes per annum and maintaining the proposed final site topographical profile (i.e., maximum height of 93m OD), waste Cells 15 and 11 have the capacity to receive waste for an additional 4 to 5 years (i.e., Cell 11 reaching capacity in 2015).

RESTORATION

Phased restoration work is being undertaken and will continue at Kyletalesha Landfill following the filling and capping of each waste cell. Upon completion of the restoration work for all phases of the landfill, the aftercare plan to establish and maintain the aftercare of the site shall be implemented, as outlined in section 6 of this report.

Final restoration shall involve the placement of the final soil profile and carrying out landscaping works as described in the following sections. Although the timing of restoration works will continue to be influenced by site operations, waste settlement and seasonal variations (e.g., the ability to complete physical restoration work and planting of vegetation due to wetter or drier seasonal conditions), the site has been divided into a number of phases and will continue to be progressively restored as each area exhausts its waste acceptance capacity. The capping work that has been completed to date and a schedule of anticipated dates for future capping follows:

- Waste cells 1 through 5 and 12 were capped in 2006;
- Waste Cell 13 was capped in 2007/2008;
- Waste Cell 14 will be fully capped in 2011;
- Waste Cell 15A will be fully capped by the end of 2011;
- Waste Cell 15B will be fully capped by the end of 2012; and,
- Waste Cell 11 will be fully capped by the end of 2015 or early 2016.

Restoration of the site in phases will minimise visual amenity impacts imposed by the site. As some areas are closed and restored, they will allow the site to better blend into the surrounding landscape and become less identified with waste management. A feature of the restoration plan includes integrating the following pollution control systems across the site, to ensure that environmental protection is maximized:

1. Capping system;
2. Landfill gas management system;
3. Leachate management system;

4. Surface water management system; and,
5. Long-term monitoring plan, including identification of frequency and locations.

Both the ability of the proposed pollution control systems to meet after use requirements and accessibility for monitoring and maintenance purposes were considered prior to recommending the optimum pollution control systems to be implemented. On completion of landfilling and restoration for each phase, Laois will implement the aftercare plan, which is detailed in Section 6 of this report. The key design elements of the restoration phase are provided below.

Restoration Design

The objective of the landfill restoration design is to produce an integrated programme for pollution control, restoration and aftercare and to ensure the protection of the environment and human health. As outlined in the EPA Manual for "Landfill Restoration and Aftercare", 1999 (EPA Manual), the parameters which mainly affect restoration and aftercare design of a landfill site include:

- Site ecology;
- Land use and soil resources;
- Landscape;
- Gradients;
- Hydrology and hydrogeology;
- Pollution control systems; and,
- Site after use.

The main areas outlined above that need to be considered as part of the restoration design are discussed in the following sections of the plan.

Ecology

A flora and fauna (ecological) impact survey was completed by the Aquatic services Unit of University College Cork as part of an environmental impact statement required for the initial waste licence application in 1998. The survey brief was to complete an

enumeration of vegetation, birds, mammal and amphibians that existed or would potentially use the site. The results of the site survey indicated that the site consisted mainly of embankments, roadways, active landfill, water bodies, virgin bog, and scrub vegetation. For the purposes of the field survey, the site was divided into seven main areas, including:

- Southern site Boundary & Active landfill Area;
- Eastern site Boundary
- Virgin Raised Bog
- Cutaway Bog;
- North/Northeast area - birch scrubwood has developed in the northern/northwestern areas of the site over former areas where peat cutting had been completed.
- Northern Boundary; and
- Western boundary.

The results of the survey indicated that the site cover was mainly heath in the bog areas and birch scrubwood which has developed in the northern/northwestern areas of the site. The ecological diversity of the site was considered to be low with no identified protected species frequenting the site. The restoration plan will allow the site to revert back to a natural state and encourage indigenous plant species to become re-established. The establishment of a natural secure area will encourage bird and mammal species to frequent the site and potentially increase the ecological diversity of the area.

Landuse and Soil Resources

Due to the nature of the site geology (i.e., raised bogland) the volume of available soil on site for use as site engineering material was limited, necessitating that off-site soil had to be imported to the site and stored at the northern section of the site. As part of the management plan, soil management was completed by taking account of the following:

- Assessment on the volume of soils available on site;
- Assessment on the volume of soil required to be imported to the site;
- Conservation and best use of soil resources; and,
- Planning and supervision of soil handling operations by on-site management.

Laois imports soil from a number of sources (e.g., building site excavations and roadway developments). All soil entering the landfill site for re-use as cover material must be inert, originate from an approved source (i.e., no contaminated site excavation material) and contain low concentrations of potential contaminants of concern.

Soil Requirements

Table A summarises the soil required to cap completed waste cells, and the projected soil volumes to cap future waste cells (i.e., cells 15 and 11) at the landfill. The total quantities are approximate.

Table A – Volume of Soil Used for Site Capping

Landfill Phase	Surface Area (m^2)	Topsoil (0.3 m depth)	Subsoil (0.7 m depth)	Total (m^3)
Completed Cells				
Cell 1	8,804	2,641	6,163	8,804
Cell 2	10,560	3,168	7,392	10,560
Cell 3	4,544	1,363	3,181	4,544
Cell 4	8,804	2,641	6,163	8,804
Cell 5	16,470	4,941	11,529	16,470
Cell 12	14,300	4,290	10,010	14,300
Cell 13	19,500	5,850	13,650	19,500
Cell 14	23,400	7,020	16,380	23,400
Subtotal	*106,382*	*31,914*	*74,468*	*106,382*
Cells to be Capped in Future				
Cell 11	21,120	6,336	14,784	21,120
Cell 15	14,784	4,435	10,349	14,784
Subtotal	*35,904*	*10,771*	*25,133*	*35,904*
TOTAL	**142,286**	**42,686**	**99,600**	**142,286**

As soil resources are limited on-site, Laois will continue to assess options to source suitable materials elsewhere and/or use recycled materials where appropriate (e.g., construction and demolition waste) including suitable soil received for disposal. This material can be assessed

(i.e., analysed to ensure the soil quality is acceptable), segregated, stockpiled and recorded for use in the restoration phase.

Section 4.7 of the EPA Manual recommends that imported soils ‘should be of a loamy texture, be relatively stone free and fertile. Soils with a high clay content should be avoided as these are difficult to handle and vegetation establishment can be slow and poor’. The source of any soil entering the site will be recorded by the landfill manager. The EPA Manual advises that the site operator undertake the following in the situation where the source of soil is known:

- Undertake an *in situ* soil survey at the source, if possible, to identify soil properties.
- Identify soil types and volume of topsoil, subsoil and parent material at the source. In general, the more consistent the soil type the easier and more successful the restoration results.
- Assess the stone content.

The site manager shall ensure that imported soils have been stripped when the soil is in a reasonably dry condition to minimise soil structure damage and that stockpiles contain sufficient volume of capping materials to meet the requirements of capping operations. All imported soil shall be stored in designated stockpile areas.

Soil Storage

Section 4 of the EPA Landfill Manual outlines the requirements for soil storage on site. The site operator should complete the following:

- Supervise all soil handling operations and make staff, particularly machine site operators aware of the need to minimise soil damage.
- Segregate, record and stockpile separately all excavated soils in locations so that they can be replaced in the correct sequence on completing restoration.
- Stockpile all soils in mounds 2 m to 3 m in height. Those to be stored for lengthy periods of time will be sown with grass to help minimise the effects or erosion and to maintain structure in the surface layers. Stockpiles will be built as loosely as possible to minimise compaction.
- Undertake regular soil checks in the form of structure assessment and measurements of density, soil moisture and permeability.
- Only machinery used for stockpiling will be allowed on soil mounds.

Soil Placement

Section 4 of the EPA Landfill Manual outlines the requirements for soil placement on site. The site operator should have regard for the following:

1. Machinery with low ground bearing pressure will be used to deploy restoration layers thereby minimising damage to soils and environmental pollution control systems.

2. When soils are in a suitable physical condition (i.e. dry), they should be removed from stockpiles and replaced in the correct sequence to specified depths.

3. Soils should be placed in lifts over the drainage layer and loosened after each placement by rippers. The EPA Manual recommends the following;

   - Ripping should be carried out only when the surface of the land is dry enough;
   - A spacing of about 1.5 times the working depth is normally recommended with the intervals between rips not exceeding 1000 mm; and,
   - Subsoil ripping should be carried out at a clearance of a least 75 mm above the drainage and filter layer.

4. Soils should be placed in layers, the width of the layers will be determined by the site machinery. Works should start at the furthest point from the stockpiles/entrance gate to minimise impact on soils already in place.

5. Soils should be loaded from the stockpile into dump trucks and transported to the restoration area. From the surface of the waste body, the soil should then be spread and levelled using a tracked excavator/wide bucket.

6. Where possible imported soils should be applied directly to the area being restored to avoid the need for stockpiling and minimise soil handling operations.

Landscaping & Surrounding Landuse

The site is located in a raised bog area, the surrounding area is used mainly for agriculture and peat extraction purposes. The second most obvious land use in the area is that of the existing landfill site with its on-going filling operations. Adjacent to the landfill site to the west is the N80 road linking Portlaoise with Tullamore. The site is located approximately 5 km north of Portlaoise which is the largest local urban area. There are some single-family residential properties in the general vicinity of the landfill site, the closest being approximately 400 m west of the northern fill area, west of the N80.

Site landscaping is completed to ensure that the site is suitable for the proposed afteruse, to integrate the restored site into its surroundings and to provide screening where required. As part of the site management, landscaping has been completed on site at areas of the site that have

been previously capped and similar landscaping is intended for future capped sections of the landfill.

The proposed final profile for the completed areas of the landfill site, as shown in Appendix I, allows for the integration of the site into the surrounding landscape and mitigation against any potential detrimental visual effects of the site closure. The landfill will be shaped to mimic a natural landscape. The resulting form will consist of hill-like forms with gently sloping sides. The high point located towards the centre of the site will have a maximum summit level of approximately 93 m OD, Malin Head.

Visual impact mitigation will also be achieved through the establishment of vegetation on the closed site cap. The vegetation ground-cover for the capped site will be grassland, with the mix of wild grasses designed to support birds and mammals. The initial ground cover may be Lolium perenne (Perennial Ryegrass) which will act as a host species for other wild grasses, such as Agrostis.

The visual impact of the grass-covered hill may be further mitigated through mixed tree and shrub planting at the base of the landfill body (i.e., trees will not be planted on the cap to ensure the cap integrity) to provide an improved natural aspect to the site by further visually softening the contours of the cap hills by acting as a visual break. The mixed planting at the site may include Prunus spinosa (Blackthorn), with some Betula pubescens (Birch), Quercus spp. (Oak) some Acer pseudoplatanus (Sycamore), and Salix Viminalis (Willow). An existing surface water pond at the north end of the site will be left as a natural feature of the site that attracts wild fowl. The site landscaping and end use as fallow land will enhance the final use of the area for ecological diversity.

Landscaping Works

Site landscaping will be completed in a similar fashion as has been completed for Cells 1, 2, 3, 4, 5, 12 and 14. The topsoil on the cell cap will be allowed time to settle and recover from the effects of movement, storage and replacement. Following this period, Laois will plant the cap with native wild flowers and grasses. The vegetation density will be monitored to successfully

vegetate and stabilise the cell cap and restore the site to its intended afteruse. Timing of landscaping works will be influenced by a number of factors, including; settlement rates for each cell, installation of environmental pollution control systems and seasonal conditions. Landscaping is initiated following the completion of capping works at each cell.

Gradients

The final contours for the restored landfill are shown on Figure 1.2 (Appendix I). These contours reflect the requirement of Condition 4.2 of the Waste Licence that the finished level of the landfill does not exceed 93 m OD. The contours on the drawing indicate the post-capping, post-settlement contours for completed waste cells.

The final profiles for the restored facility will produce dome shapes to merge with the local landscape and provide adequate runoff to adjacent surface water control systems. It is anticipated that waste cell areas remaining to be capped (i.e., Cells 11 and 15) will be completed to similar elevations and grades for the areas of the site that have had capping completed (i.e., Cells 1 through 5 and Cells 12 and 14).

Hydrology and Hydrogeology

Historical groundwater monitoring indicated that the groundwater is confined by the overlying till and peat across much of the site. There is the potential for the indirect discharge of leachate to groundwater in the bedrock aquifer either by percolation through the underlying peat and boulder clay, or through recharge by contaminated surface water. Using Darcy's equation it was estimated that the theoretical potential percolation through the basal peats and boulder clays was approximately 48.54 m^3/acre/year which is less than 1.5% of the total annual rainfall, indicating limited percolation potential to the underlying aquifer. It has not been established if the pressure head in the aquifer would produce an upward groundwater flow. If an upward groundwater flow were present it would eliminate the potential percolation of impacted shallow groundwater to the aquifer. All historic and future waste cells constructed on site are underlain by the clay till material which provides protection to the groundwater aquifer beneath.

Groundwater level monitoring completed during previous site monitoring programmes indicates

a shallow groundwater divide is present that trends east-west across the site. Groundwater in the northern portion of the site flows to the northwest while groundwater in the southern portion of the site flows to the southeast.

The shallow groundwater table on site is mainly contained within the upper peat layer underlying the site. Surface water and/or shallow leachate permeating through the site subsoils will be confined by the peat and underlying clay till to reduce any potential impacts to groundwater. A comprehensive site investigation completed at the site in 2000 indicated that the thickness of the underlying peat ranges from 3 - 7 m and the underlying boulder clay varies in thickness from 7.5 - 10 m across the site. The hydraulic conductivity of the peat layer ranges from 1.9×10^{-9} m/s to 9.8×10^{-10} m/s. The underlying clay till has variable permeability depending on composition and alluvial and glacial intrusions. In some sand and gravel zones, permeability of 1×10^{-4} m/s can be expected. The till is however, more silt dominated and hydraulic conductivity typically ranges between 2.41×10^{-8} m/s to 4.78×10^{-10} m/s.

Pollution Control Systems

The main environmental pollution control measures that will be maintained at the Kyletalesha landfill site are detailed below.

Leachate Management System

The cell design ensures that the potential migration of leachate from the engineered cells is minimized to reduce impacts to the environment. The leachate extraction system prevents the build up of leachate head within the landfill and allows for appropriate collection, storage and transport for off-site disposal.

The containment lining system of each engineered waste cell consists of a 1.0 m thick engineered clay liner overlain by a 2 mm thick high density polyethylene (HDPE) flexible membrane liner (FML) and a protective geotextile. The engineered clay liner material is tested for shear strength, density and moisture content prior to being approved for installation in the cell. A 500 mm thick aggregate leachate drainage layer (i.e., 20 to 40 mm gravel) is installed across the basal area of the cell where leachate collection pipework is installed that is directed to a purpose built leachate collection chamber. The cell design ensures the minimal potential for the migration of

leachate from engineered cells and minimal impact on the environment. The installed leachate extraction system reduces the build up of leachate within the landfill and allows for appropriate collection, storage, transport and off-site disposal.

All completed and newly constructed waste cells within the landfill have a leachate collection and management system that directs leachate to the covered site leachate collection lagoon. The leachate management system at the landfill is being continually monitored to ensure that any failure of the system is detected and repaired as soon as possible. The system is connected to a supervisory control and data acquisition (SCADA) system that alerts the site executive technician (or designate) by text message of any failure in the system. Any failures in the system (e.g., seal or pump failures) are reported automatically to the landfill site management and repairs to the system are completed as soon as possible to avoid loss or build-up of leachate in the cell.

The landfill is designed to utilise the natural ground conditions to mitigate environmental impacts associated with leachate. The design incorporates leachate collection facilities using internal and perimeter drains to direct leachate and leachate contaminated surface water to the covered on-site leachate lagoon.

Visual checks of the landfill areas and site slopes are completed to determine if visible leachate seeps are observed that might indicate a problem with the leachate collection system due to lateral migration of leachate from the landfill area. Similarly, groundwater monitoring wells in the vicinity of waste deposition areas are monitored and sampled on a quarterly basis to assess groundwater quality and assess vertical and lateral migration of leachate.

Leachate collected in the leachate lagoon is transported off site for treatment at Portlaoise waste water treatment facility. The lagoon acts only as a storage areas and it has not been investigated if the storage of leachate in the lagoon reduces the concentration of certain contaminants in the leachate.

Landfill Gas Control

All completed and newly constructed waste cells within the landfill have been integrated with the

landfill gas collection and management system that pipes landfill gas to the site gas flare system and controls landfill gas migration and emissions. In accordance with condition 3.14.1 of Waste Licence (W0026-3), infrastructure for the collection and flaring of landfill gas from Cells 1 to 5 (un-lined) and Cells 12 , 13 and14 (engineered lined cells) have been installed.

Boreholes are advanced to an average depth of 10 m below ground surface (i.e., from top of landfill cell) and landfill gas collection pipes consisting of perforated HDPE pipes of 160 mm diameter are placed in completed boreholes and backfilled with a suitable pea gravel material. The top of the well consists of a 160 mm solid HDPE pipe which is connected to a well head. The boreholes were sealed with a bentonite material to prevent passive venting of landfill gas around the annulus. Each well head is connected to the main gas line using a 125 mm solid HDPE pipe and is then directed to the gas flaring system. The landfill gas extraction system is balanced on a weekly basis to prevent overdraw and avoid oxygen being drawn into the landfill body.

Surface Water Control

A series of surface water ditches along the boundaries of the site directs surface water away from the main landfill body towards the Triogue River. The system of surface water ditches aids in diverting surface water away from the landfill waste cells and preventing surface water ingress to the waste cells. The ditches also divert surface run-off from capped areas. The surface water drainage ditches are designed and constructed to minimise erosion, stagnation and under capacity. The surface water control system is outlined on Drawings MDR0615DG0401 and MDR0615DG0402 in Appendix II. A naturally occurring surface water pond is present in the northern area of the site, however it is not directly linked to the surface water control system.

Restoration and Aftercare Implementation Programme

The restoration and aftercare programme has been implemented in a series of stages. The fundamental principal of the closure process is that final cover will be placed and sown or planted in a phased basis as waste cells are filled to completion. There may be some seasonal constraints on both capping works and landscape planting depending on site conditions.

Site Afteruse

Laois proposes to allow the site to return to fallow field grasslands following restoration. As previously described, the landfill will be seeded with grass to allow for stabilisation of the landfill cap and reduce erosion on the landfill slopes. The use of grasses will allow the site to be vegetated with shallow rooted plants that will not impact on the integrity of the landfill cap system. Following site closure the landfill yard and CA site area will continue to be owned and used by Laois for equipment storage. The leachate lagoon will be emptied and filled with clean soil to surface grade to blend with the existing site.

Laois County Council will appoint a competent person with relevant landfill/restoration experience to oversee the implementation of the plan and the landfill manager will be responsible for the supervision of all works. Once implemented, Laois will be responsible for the long-term aftercare of the facility. This will involve vegetation management i.e. mowing, soil aeration, drainage maintenance, weeding, general repair work, site security etc. Laois will meet all financial costs associated with the restoration, aftercare and annual maintenance of the site in accordance with Condition 12 of the Waste Licence. Details on site afteruse are provided in Section 6 of this report.

Introduction

As part of the site closure plan, environmental protection will remain a priority for Laois, and environmental impact control mechanisms will continue to be maintained after the site has finished accepting waste and the landfill cells are capped. An outline of the current and proposed environmental controls by Laois post closure, are outlined below.

Capping

The final capping system for waste cells conforms with the requirements set out under section 4.3 of the waste licence. All capping systems installed on site are pre-approved by the EPA prior to installation. The cap system design indicates that the hydraulic conductivity of the cap is expected to be low (i.e., less than 1×10^{-9} cm/s) which significantly controls the potential for infiltration of precipitation and leachate generation at the landfill.

Based on the expected compaction and hydraulic conductivity, the final cap will act as a low permeability layer reducing surface water infiltration to the landfill thereby minimizing leachate production.

Surface water drainage ditches surrounding the landfill will be maintained to reduce surface water infiltration into the landfill area.

Surface water management ditches and storm water drains are provided and maintained at the landfill facility. A system of surface water ditches aids in diverting surface water away from the landfill waste cells and preventing surface water ingress to the waste cells. The ditches also divert surface run-off from capped areas. The surface water drainage ditches are designed and constructed to minimise erosion, stagnation and under capacity.

Drawings showing the direction of surface water flow and the location of on-site controls are provided in Appendix II.

Landfill Gas Management

The generation of landfill gas is controlled to minimise the emission and migration of toxic and greenhouse gas emissions to the environment. Factors that affect the quantity of landfill gas produced include climatic conditions, landfill configuration, age and composition of waste and conditions within the landfill. Landfill gas extraction volumes are continuously recorded on-site and reported to the agency.

The main impacts from landfill gas include; migration of toxic and greenhouse gas emissions to the environment and combustion of gas within the landfill causing fire. To prevent issues from uncontrolled gas migration from the landfill or gas build up within the landfill, Laois have installed a landfill gas collection and flaring system. The landfill gas extraction system is balanced on a weekly basis to prevent overdraw and avoid oxygen being drawn into the landfill body.

All waste cells at Kyletalesha landfill will have a landfill gas extraction system designed and implemented. The landfill gas flare / utilisation plant will continue to flare landfill gas as long as the quality and quantity of gas produced is sufficient. The flare system will continue to be monitored by the SCADA system and on-going preventative maintenance of the flare system will be completed.

Leachate Management

The generation of leachate from the landfilled waste is controlled to ensure that nearby surface water and groundwater resources are protected. Factors that affect the quantity of leachate produced include climatic conditions, landfill configuration, hydrogeological conditions beneath the landfill, and distance to receptor.

Precipitation and evaporation are the primary climatic conditions that influence the quantity of leachate produced. Local climatic conditions determine the amount of precipitation that falls directly onto the landfill. Seasonal and annual variations in precipitation influence leachate generation were considered when determining the most effective leachate control measures. Based on the climatic conditions and the history of the site, the potential for leachate production is considered high and will require on-going management after site closure.

The cap system design indicates that the hydraulic conductivity of the cap is expected to be low (i.e., less than 1 x 10^{-9} cm/s) which significantly controls the potential for infiltration of precipitation and leachate generation at the landfill.

All new waste cells at Kyletalesha landfill will have a leachate collection system constructed as in completed waste cells. The leachate collection system will continue to pump leachate to the holding lagoon as long as the quantity of leachate produced is sufficient. The collection system will continue to be monitored by the SCADA system and on-going preventative maintenance of the system will be completed.

Removal and treatment of leachate produced in the landfill, post-closure, will continue until approval has been received from the EPA that volumes and quality of leachate produced within the landfill are at a level whereby pumping and treatment is no longer required.

Surface Water Management and Erosion Control

Surface water drainage will be managed at the landfill by directing surface water runoff around the landfill area using existing drainage ditches and soil berms. The drainage system will reduce surface water infiltration into the landfill material and reduce the potential for erosion of the cap surface.

To reduce the potential for erosion after closure, the sides of each landfill cell has been contoured to maintain a suitable side slope. A layer of topsoil is spread across the completed landfill cap surface and seeded with a non-invasive seed mixture. This vegetation cover will help to stabilise the landfill cap and reduce potential erosion issues. Surface water runoff is segregated from potentially leachate impacted water through a dedicated on-site drainage ditch system, see Appendix II. The clean surface water flows off site to the Triogue River at two locations (east and north of site), these outflow locations are monitored to ensure surface water quality leaving site does not impact the water quality within the Triogue River.

Site Stability

Municipal waste landfilling can lead to differential settlement due to the heterogeneous nature of the material. Settlement within the landfill can result in surface water ponding, surface erosion,

slippage and potential failure of the cap system. All landfill cell caps and side slopes will be visually assessed on a monthly basis for the first three years post closure to determine surface condition (e.g., any visible evidence of slumping, erosion, cracks or slippage). The results of site observations will be recorded on site observation sheets. If after three years no visible issues are encountered it is proposed that visual inspection frequency be reduced to an annual basis.

A topographical survey of the landfill will be completed annually to assess the level of settlement and any slippage in side slopes on site. If areas of the landfill cap require remedial work, these will be reported to the Agency prior to work being completed.

Site Aftercare

Introduction

Laois will be responsible for the aftercare management of Kyletalesha Landfill in accordance with the Waste Management Act 1996 up until the date when the EPA accepts the surrender of the site Waste Licence.

Section 4 of the EPA Manual outlines the operations required post capping to bring the land to the required standard for afteruse. The aftercare operations required at Kyletalesha landfill include:

1. Development of the site for the proposed afteruse;
2. Environmental monitoring; and
3. Site maintenance.

Afteruse Design

The final contours of the landfill area will not create a visual impact to the surrounding environment. Following closure and restoration of the landfill site it will be planted with native wildflowers and grasses and allowed to develop into a grassland area for use by wildlife. The site will continue to be owned by Laois and access to the site will be limited to authorised personnel only. The final restoration of Cell 11 is expected to be completed in 2016/2017 and the site will provide a sanctuary for wildlife in the area.

The yard area at the site entrance (including the CA site) will continue to be owned by Laois and will be used by the Council for equipment storage.

Environmental Monitoring

Aftercare monitoring will be completed in accordance with the *EPA Landfill Manual, Landfill Restoration and Aftercare, 1999.* Aftercare monitoring will be required to assess groundwater and surface water quality from leachate migration and to assess air quality from landfill gas

emissions. The aftercare monitoring program will include monitoring and sampling leachate, groundwater and landfill gas at existing monitoring locations in the vicinity of the landfill as outlined in Schedule D of the waste licence. Table B outlines the minimum aftercare monitoring requirements as outlined in the EPA Manual on Landfill Monitoring (2003). The site operator will ensure that monitoring at the locations shown on Drawing MDR0403/DG0006 (Appendix III) shall continue as required by the Waste Licence. Aftercare monitoring will be completed on the schedules noted below (unless other schedules are developed in consultation with the EPA) until the potential contaminants from the landfill site are at a concentration that surrender of the waste licence is accepted by the EPA.

Table B – Aftercare Environmental Monitoring

Monitoring Requirement	Monitoring Frequency
Surface Water	Bi-annually
Biological Assessment	Annually
Groundwater Level and Composition	Quarterly
Leachate Level and Composition	Quarterly
Landfill Gas	Bi-Annually
Landfill Gas Flare	Weekly
Topography and Site Stability	Annually
Odour	Annually

All analytical results will be reviewed on an annual basis. The data review will allow for re-assessment of the monitoring programme and potential changes (either reductions or increases) to monitoring requirements including locations, specific parameters or frequency of monitoring that is completed on site, at the discretion of the EPA.

In addition to analytical monitoring, it is proposed that site inspections of the landfill also be completed to assess reclamation progress and identify any settlement or erosion concerns that require maintenance. A summary of post-closure inspection and monitoring scheduling is provided in Table C.

TABLE C: Post Closure Inspection and Monitoring Schedule

Activity	Objective	Schedule
Initial Site Inspection	Monitor post-closure conditions for signs of erosion, vegetation growth, drainage system integrity, and maintenance issues.	Monthly for the first 3 years post capping
Annual Site Inspection	Monitor post-closure conditions for signs of erosion, vegetation growth, drainage system integrity, and maintenance issues.	Annually after the first 3 years up to licence surrender.

Topographical Assessments & Site Stability

A topographical survey will be completed on an annual basis for the first five years of post closure restoration to assess the settling behaviour within the landfill mound. Following the five year period Laois will liaise with the EPA to assess the results of the topographical surveys and determine if it is appropriate to change the frequency of future surveys.

In addition, stability assessments will be completed to assess the structural integrity of the landfill mound. The site operator shall have regard to the conditions of Waste Licence W0026-03 and section 10.3 of the EPA Manual on Landfill Monitoring (2003) on the completion of topographic and stability assessments.

Site Maintenance

The pollution control systems as described in Section 5 of this report will be operated and maintained by Laois until it has been assessed that conditions at the landfill site have stabilised and that the environmental controls are no longer required. Ongoing monitoring of environmental emissions is required during the site aftercare. As part of the aftercare it will be essential that all pollution control systems and all monitoring locations as shown on Drawing MDR0403/DG0006 (Appendix III) are maintained in good order. If remedial works are required then Laois shall ensure that these works are completed, preferably during the interim restoration phase and not after full restoration has occurred. However, if maintenance or remedial works are required after full restoration has been completed, the following measures should be implemented to ensure minimal impact on the site:

- Inspection of maintenance operations to minimise damage to the restored site. Work should progress only when site conditions are suitable.

- Use the minimal working area to reduce site disturbance.
- Use machinery and plant that will result in minimal soil rutting and compaction.
- Construction records of all underground utilities will be filed on site for reference purposes.
- When pollution control systems are exhausted, redundant equipment and ancillary structures will be removed.

Leachate Management System

Monitoring and maintenance of the leachate management system shall include regular checks of the leachate monitoring points, pumping systems and the leachate lagoon. The installed SCADA system will identify when issues arise and where maintenance works are required. Any remedial work required to wells and pipework shall be carried out in a manner with minimal impact on the proposed site afteruse.

Once leachate extraction is exhausted, decommissioning and removal of redundant pipework and structures shall take place. All work in relation to leachate management shall be carried out in an environmentally safe manner and shall not adversely impact the afteruse of the site.

Landfill Gas Management System

Monitoring and maintenance of the gas management system shall include regular monitoring of landfill gas monitoring wells and monitoring of the flare stack for combustion efficiency and emissions. On-going preventative maintenance of the gas flare system will be completed by Laois including regular balancing of the system. The installed SCADA system will identify when issues arise and where maintenance works are required. Any remedial work required to wells and pipework shall be carried out in a manner with minimal impact on the proposed site afteruse.

Once gas extraction is exhausted decommissioning and removal of redundant structures shall take place. All work in relation to gas management shall be carried out in an environmentally safe manner and shall not adversely impact the afteruse of the site.

Surface Profile & Capping System

If maintenance of the capping system is required, Laois will ensure that all repairs are completed to ensure that the cap is appropriately sealed to prevent the ingress of water and the various layers re-laid. The effectiveness of the drainage system shall be monitored and any remedial works to the drainage layer or surface water collection system shall be completed if required.

Regular inspections on the cap surface will identify any depressions through settlement of the landfill body and/or erosion of the cap surface from surface water or poor vegetation density.

Annual topographical assessments and slope stability assessments will determine the settlement rate of the landfill body and the stability of the site and the landfill cell slopes.

Surface Water Control

All drainage ditches and outfalls carrying run-off from the site shall be regularly inspected to ensure effective surface water flows are being maintained. Any depressions on the landfill mound created through cap settlement shall be re-profiled to ensure efficient surface water runoff is maintained.

Vegetation

The long-term aftercare of the site will require vegetation management including; weeding, mowing and fertilising (as necessary) depending on the final afteruse at the site. Laois will ensure that persons with appropriate landscape experience shall undertake such maintenance work.

Site Infrastructure

All roads, pathways, access points, buildings and equipment associated with the afteruse of the site shall be inspected on a regular basis to ensure their integrity. Maintenance works shall be completed when required.

Security

To ensure only authorised access to the site, Laois will ensure that the security fencing and gates are maintained for the aftercare phase at the site. A security firm will continue to complete site surveillance through site visits and CCTV.

Annual Reporting

Within the closure plan, Laois will prepare an annual post-closure monitoring and inspection report that will summarize the environmental monitoring data, site inspections and any proposed revisions to the monitoring and inspection programme.

Closure Plan Costing

The costs for the closure, restoration and aftercare management of the landfill site is based on known works that have been outlined in this CRAMP document. Table D outlines the tasks (and their estimated associated costs) required to be completed to ensure compliance with the EPA Guidance on closure and aftercare at the Kyletalesha landfill. A number of the works required for site closure (i.e., building demolition) are one-off costs. The cost of maintenance and site monitoring is based on a 30 year post closure period. Details of the site closure costs are provided in Appendix IV.

Table D: Estimated Closure Plan Costs

CRAMP Task	Estimated Total Cost – assuming a 30 year post closure plan
Completion of Landfill Cap and Vegetation Planting for Cells 15 and 11	€500,000 one off cost
Installation of Landfill Gas and Leachate Controls in Cells 11 and 15.	€500,000 one off cost
Termination of Underground Utilities (pipework, electrical and sewerage)	€5,000 – one off cost
Demolition of Site Structures	€0
Removal of Waste Quarantine Area and Sump	€0
Removal of Wheel Wash	€0*
Road and Yard Maintenance	€111,000
Decommission of Leachate Lagoon	€20,000
Leachate Removal, Transport and Disposal	€425,000**
Maintenance of Leachate Control System (replacement of pumps etc.)	€180,000
Maintenance of the Landfill Gas Control System	€792,663
Maintenance of the Landfill Gas Flare System	€540,000
Site Security (site patrols etc.)	€300,000
Landfill Gas Monitoring	€150,000
Leachate Monitoring and Analysis	€156,000
Surface Water Monitoring and Analysis	€135,000
Topography and Slope Stability Assessment	€75,000
Odour Assessment	€37,000
Landfill Cap Inspection	€27,600
Ongoing Repairs to Landfill Cap	€69,000
Annual Reporting	€90,000
Upkeep of SCADA system / CCTV	€210,000
TOTAL	**€4,323,263**

* Considered cost neutral – it was considerd that the sale of the cleaning unit would cover the cost of removal

** - cost for 5 years based on current cost for transport and disposal. Annual costs will vary depending on the annual volume of leachate produced post closure

The costs assume that a full site monitoring and maintenance program will be completed for a 30 year period. The remaining landfill cap and environmental control system will be completed prior to site closure which will reduce the costed liability for the site by €1,000,000. It is anticipated that as the site matures, post closure, the volume of monitoring will decrease as the site stabilises (i.e., full monitoring for only the first five years post closure) and pending assessment of concentration trends for leachate, landfill gas and groundwater quality.

It is proposed that sampling positions that indicate concentrations of contaminants of concern do not exceed applicable standards for 3 consecutive years will have the monitoring programs subsequently reduced in either frequency or number of parameters analysed. Annual reviews of the site closure plan will be completed to include any updated information and/or revision of closure costs for the site.

Up to the end of 2010 Laois have set aside €400,000 for site closure and have committed to setting aside €200,000 per year until the site closes.

Appendix X

Integrity of Liquid Containment Systems

Kyletalesha Landfill

Report on the
Integrity of Liquid Containment Systems

Date: March 2012

Landfill Side Bund Integrity Tests

Introduction:

In Compliance with condition 3.11.5 of waste licence 26-3 the integrity and water tightness of all the bunds and leachate/contaminated waste storage tanks was assessed.

Integrity of Liquid Containment Systems:

Integrity testing of liquid containment systems was carried out in March 2012. Details of individual integrity test dates for each containment system are presented in ***Table 1***
A total of 7 liquid containment systems ware assessed for integrity and water tightness. These containment systems are as follows.

1. Green waste area leachate drainage sumps (A, B & C)
2. Waste quarantine area sump
3. Waste inspection sump
4. Civic Amenity Site waste oil bund.
5. Leachate storage tank.
6. Lined leachate lagoon- See attached report from **SNC-Lavalin Inc**

The methodology used for the integrity assessment of each containment systems 1,2 &3 was the same. Each storage container was emptied and then filled with clean water using the onsite bowser to a depth recorded in ***Table 1*** from the top of the containment vessel. Each containment system was then covered to prevent ingress of rainwater. All outlet and inlet valves were closed. The liquid level within the containment system was then monitored over a 48 hour period.

Results:

The results of the surveys carried out can be seen in ***Table 1***.

Table 1 – Integrity Test Results

Containment System Number	Integrity Test Start Date	0 Hour	1 Hour	4 Hour	8 Hour	24 Hour	48 Hour
1A	12/3/12	262	264	265	265	265	265
1B	12/3/12	193	193	194	194	195	195
1C	12/3/12	142	143	144	144	145	145
2	12/3/12	355	357	357	357	357	357
3	12/3/12	497	497	497	497	497	497

All containments systems assessed are concrete structures.

It can be seen from ***Table 1*** above that over the test period the liquid level dropped between 1mm and 4mm over a 48 hour period. After the 48 hour period it is evident that the liquid level had stabilized. This loss of liquid in the initial stage of the test is attributed to absorption by the concrete and once the concrete had reached its absorption capacity the liquid loss had ceased or reduced dramatically.

Once the integrity testing was complete the containment vessels were emptied of water and returned to use.

Conclusion:

The results of the integrity and water tightness assessment of liquid containment systems indicate that there is no loss of liquid from any of the containments systems.

The civic amenity site oil bund:

The oil Bund in the civic amenity site was relined in June 2010 by covex lining and was issued with a 10 year warranty, therefore in accordance with the licence is not due for testing until June 2013.

Storage Lagoon (Beside the old Treatment Plant)

Bund Testing:

The Storage Lagoon is fitted with a level sensor connected to our scada system; I took readings on a range of days from the 2nd February to the 5th of February:

The readings are as follows:

This test was carried out while all pumping and tankering was cancelled:

Date	Time	Level
2nd Feb. 2012	1.09am	2.580
3rd Feb. 2012	1.10am	2.580
4th Feb 2012	1.00am	2.580
5th Feb 2012	1.00am	2.580

Conclusion,

As the readings outline the level in the lagoon has remained constant over a period of 4 days.

SNC LAVALIN
Environment

SNC-LAVALIN ENVIRONMENT

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March 16, 2012 Project 509687

Laois County Council
Áras an Chontae
Portlaoise
Co. Laois

ATTENTION: Ms. Brenda Cuddy, Executive Engineer

REFERENCE: **Integrity Assessment of Leachate Lagoon Liner, Kyletalesha Landfill (Waste Licence No. 26-03), Portlaoise, Co. Laois**

SNC-Lavalin Inc., Environment Division (SLE) was retained by Laois County Council (Laois) to complete an assessment of the liner integrity for the leachate lagoon associated with the Kyletalesha landfill, Portlaoise, Co. Laois, The lagoon integrity assessment was completed to fulfill the requirements of Section 3.11.5 of the site waste licence (Reg. No. W0026-03) issued by the Environmental Protection Agency (EPA) in March 2010.

Description of Leachate Lagoon

The leachate lagoon at the Kytelalesha Landfill receives leachate collected from the underdrain system that forms part of the landfill containment system. The 860m^2 leachate lagoon is a lined pond situated above the local groundwater table. The lagoon is equipped with a floating cover to intercept and reduce precipitation accumulation within the lagoon, as well as reduce evaporative losses from the lagoon. Leachate levels within the lagoon are constantly monitored using calibrated pressure transducers mounted in the water column. The monitoring system has a precision of less than 1mm and includes high and low alarms to notify operators when leachate levels have accumulated to the point where leachate transfers from the system are required for processing at Portlaoise waste water treatment plant. The configuration of the lagoon is provided in Drawing MDR0403/DG0006.

Available information sources

Information from a number of sources to provide a number of lines of evidence that the lagoon liner integrity is maintained. The information included:

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1. Review of automated leachate level monitoring system results for the period of August 27-31.

2. Review of calibration records regarding the sensitivity and accuracy of pressure system.

3. Weather records to confirm precipitation and barometric conditions during the trial period and to assess potential evaporation loss.

4. Review of lagoon liner efficiency based on changes in liquid levels and evaporation rates during the assessment period.

Based on the information provided, SLE discusses the various factors that may have influenced the level readings to determine if liner integrity meets required specifications.

Methodology

For the assessment, SLE used a 'water balance' approach to determine the liner performance. To simplify the assessment, a 5-day study period of dry weather was selected where no direct flows were discharged into or out of the lagoon. In this case, any losses from the liner detected by the water level pressure transducers could be attributed to: (i) evaporative losses; and (ii) liner leakage losses.

To make the determination, the leachate monitoring results for the study period were reviewed. In addition, calibration records regarding the sensitivity and accuracy of the pressure sensors were reviewed to confirm the reliability of the data. Fluctuations in the leachate levels over the study period were studied to determine the overall variability of the measurements for different time intervals within the study period to ensure fluctuations were attributed to actual declines in water level, as opposed to other influences such as barometric pressure, and other diurnal factors. This information provided an indication of the average change in leachate volume during the study period.

Evaporative losses were estimated using climate data from the study period applied to the formula derived by Penman (1948). This formula utilizes readily available climate information that was retrieved from a nearby weather station for the study period. The floating cover minimizes evaporative losses, but a small amount of free water (an estimated 1% of the lagoon pond surface area) was exposed to ambient air to allow evaporation to occur.

The balance of the lagoon leachate losses were attributed to seepage through the liner. The lagoon is situated above the regional groundwater table such that hydrostatic gradients are present across the lagoon liner area within the wetted area of the lagoon. Under these conditions, any defect of the lagoon liner below the wetted area would result in leaks from the lagoon to groundwater that would be evident by a decline in the recorded liquid elevation. An overall infiltration rate was determined and then the effective hydraulic conductivity through the liner based on the hydraulic head and assumed gradient on the liner was determined.

Leachate Lagoon Assessment

In 2007 Laois commissioned the installation of an automated leachate level monitoring system by Shaw Automation (Shaw) of Ballymena, Co. Antrim to monitor the leachate elevation within the holding lagoon. Shaw installed a Kps1 pressure sensor beneath the floating cover to measure leachate depth within the leachate lagoon to determine when leachate elevations have

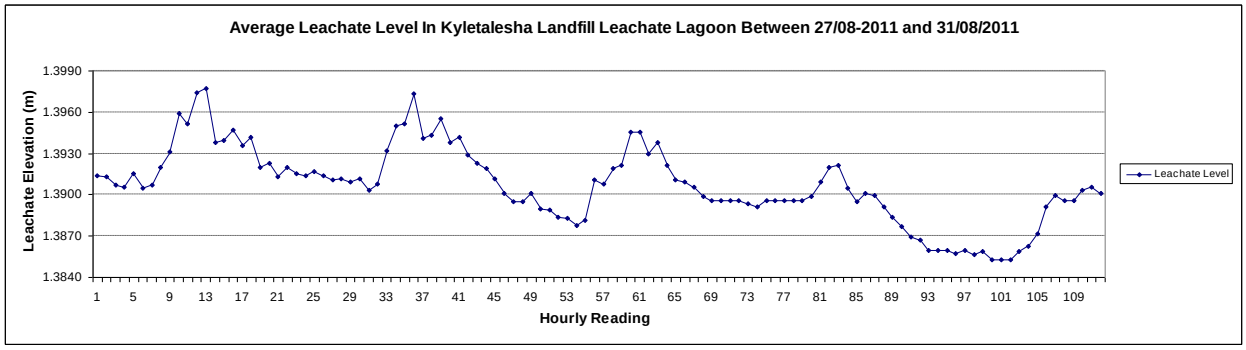
reached a level whereby it must be pumped and transported for off-site treatment and disposal. The transducer provided measurements to a precision of less than 1 mm.

An analysis of pressure transducer readings for the lined lagoon was completed over a five day period from August 27 to 31, 2011. Averaged liquid elevations were recorded within the lagoon over the assessment period. A review of weather data for the assessment period was also completed as part of the assessment to estimate potential liquid loss through evaporation. The Met Eireann weather data is provided in Attachment 1.

Leachate Level Monitoring Results

An analysis of pressure transducer readings for the lined lagoon was completed over a five day period from August 27 to 31, 2011, see Attachment 2. Elevation readings were collected at ten minute intervals throughout the 5 day assessment period and these readings were averaged to provide hourly elevations within the lagoon over the assessment period (see Figure 1).

Figure 1: Lagoon Leachate Elevations between August 27 and 31, 2011



The mean leachate elevation recorded throughout the trial period was 1.3907m with a standard deviation of 0.0028m. The pressure sensor within the lagoon recorded a starting leachate elevation of 1.3914 m on August 27th and a final elevation reading of 1.3861m recorded on August 31st, 2011. The sensor indicated an overall elevation decrease of 0.0055 m over the assessment period or <0.1% decrease in elevation. Diurnal fluctuations were noted throughout the assessment period ranging between a minimum elevation of 1.3853 m to a maximum elevation of 1.3977 m. A number of factors have been attributed to the fluctuation of liquid elevation in the lagoon (e.g., barometric pressure changes and the effects of wind on the lagoon cover). The peak to peak and trough to trough measurements indicate a decline of 0.0055 and 0.0075mm, respectively over a period of 120 hours. The leachate elevation sensors are calibrated on an annual basis to record leachate levels within the lagoon. Calibration records are provided in Attachment 3.

Based on the dimensions of the lagoon (i.e., base area of 860m^2) and a liquid elevation drop of 0.0065m over the 120 hour period represents a loss of 5.6m^3 of liquid.

Evaporative losses

The lagoon has a floating cover in place that significantly reduces the loss of liquid from the lagoon due to evaporation. However, the floating cover is not a sealed system and up to 1% of the lagoon area may have been susceptible to loss through evaporation. The potential volume loss due to evaporation based on Penman (*1948)* was determined using inputs from weather records for the study period.

Weather records for the assessment period were reviewed and indicated the following:
Average windspeed over the five day assessment period was 2.8 m/s

Barometric pressure ranged between 1010 - 1020 hPa (i.e., 10,299 – 10,401 mm H_2O)

Mean temperature was 17^oC

Mean Relative Humidity was 77%

Precipitation level was 0mm for the five day period

Weather data is provided in Attachment 3.
The Penman estimation of evaporation is calculated as:

$$Eo = \frac{MRn + P_a C_p (\sigma e)\, Ба}{\lambda v\,(M + \gamma)}$$

Where:
Eo = Open water evaporation rate (kg/s/m^2)

M = Slope of Saturation (based on air temperature of 17^oC) – 0.0075

Rn = Net Radiation (MJ/m^2) = 1.33 MJ/m2 – Based on data from Met Eireann

P_a = density of air (kg/m^3) – 1.2251

Cp = Latent Capacity of Air (J/kg/K) – 1,000

Ба – average windspeed over surface of lagoon (m/s) – 2.8 m/s

σe – Vapour pressure deficit (RH of 77.5%) – 0.165

λv – latent heat of vapourization (J kg^{-1}) – 245,000

γ = psychrometric constant (kPa/^oC) – 0.066 kPa ^oC

$$Eo = \frac{0.0075(1.33 + 1.2251) \times 1{,}000(0.2725) \times 2.8}{245{,}000\,(0.0075 + 0.0647)}$$

$$Eo = \frac{0.0075(2.55)\,(763)}{17{,}689} = \frac{14.34}{17{,}689}$$

Eo = 0.0008 kg/m^2/s

Over an area of 8.6m^2 for a 120h assessment period an estimated 2,972 kg of leachate potentially lost from the lagoon through evaporation. The specific gravity of the leachate is assumed to be similar to water (i.e., 1 kg = 1 litre = 0.001 m^3). Therefore, 2.97 m^3 of the 5.6 m^3 of leachate losses could be attributed to evaporation over the assessment period.

Liner Efficiency

The balance of the leachate losses is attributed to leakage through the liner. This leakage rate for the lagoon is 2.63m^3 of leachate over a 120hour period (or 0.022m^3/hour). In order to determine the liner performance, the 'equivalent hydraulic conductivity' was determined to see how this performance compares to regulatory and design expectations.

According to *Giroud and Bonaparte (1989)*, the leakage through liners can be determined using the following formula:

$$q_g = Q_g/A = k_g i = k_g \Delta h/T_g$$

where:

q_g = unitized leachate rate
Q_g = leakage rate due to geomembrane permeation
A = surface area
k_g = equivalent hydraulic conductivity
i = hydraulic gradient
Δh = hydraulic head difference
T_g = geomembrane thickness

$$q_g = 0.022\ m^3/h / 860 m^2/ 3600\ s/h = 7.1 \times 10^{-9}\ m/s$$

For a HDPE geomembrane, this unitized leachate rate is slightly larger than can be attributed strictly to permeation through the membrane. According to *Giroud and Bonaparte (1989)*, the anticipated unitized leachate rate for depths of water of 0.3 and 3m is 9×10^{13} and 9×10^{-11} m/s, respectively.

The equivalent hydraulic conductivity of the geomembrane assuming the lagoon is constructed as a single geomembrane lined pond with a permeable sub-base is shown below

$$k_g = Q_g/A/(\Delta h/T_g).$$

$$K_g = (0.022\ m^3/h / 860\ m^2)/(1.39\ m / 0.001\ m)/(3600\ s/h)$$

$$= 6.0 \times 10^{-12} m/s$$

Comparing the leakage rate observed ($0.022 m^3/h$ or ~6100Lphd) to calculated flows through defects by *Giroud and Bonaparte (1989)*, the flow rate suggests any defects to be substantially less than a 'large hole (11mm diameter), but equivalent to 2-3 'small holes' (3mm diameter). This defect rate is considered to be within tolerances for high level construction.

Conclusion

The liner assessment indicates the liner at the landfill is performing at design criteria that could be expected based on best management practices for geomembranes and those outlined by Environmental Protection Agency. Over the trial period, a decline in the leachate lagoon depth of 0.0065mm was observed over a 120 hour period. After accounting for an evaporation rate of $0.025 m^3$/hour, a seepage rate from lagoon was determined to be approximately $0.022 m^3$/hour. Based on the hydraulic head across the geomembrane, the equivalent hydraulic conductivity of the lagoon liner is determined to 1.09×10^{-9}m/s, which is similar to the typical design target for impermeable liners. Based on this determination, SLE considers the leachate lagoon liner to be performing up to current design expectations.

General Limitations

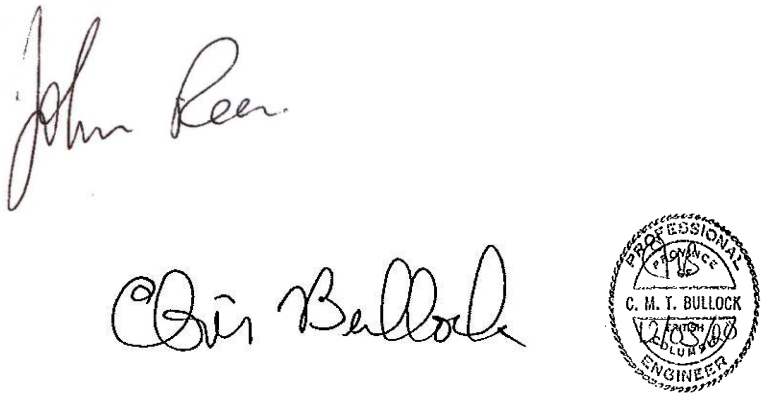
person. Laois and SLE make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, and decision made or any action taken based on this report or the work referred to in this report.

The assessment undertaken by SLE with respect to this report and any conclusions or recommendations made in this report reflect SLE's judgment based on the information provided to SLE by Laois at the time of the Site assessment on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to this Site and it is based, in part, upon visual observation of the Site and analysis of data provided to SLE for the assessment period. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions.

If Site conditions or applicable standards change or if any additional information becomes available at a future date, SLE requests notification so that we may decide if modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by SLE and Laois, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SLE or Laois. Nothing in this report is intended to constitute or provide a legal opinion.

We trust this provides you with the information you currently require. If you have any questions, please contact the undersigned at your earliest convenience.



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SNC-LAVALIN INC., ENVIRONMENT DIVISION

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enc.

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Appendix XI

BMW Testing report

EVALUATION OF BIODEGRADEABLE MUNICIPAL WASTE DEPOSITED AT PUBLIC DISPOSAL AREA OF KYLETALESHA LANDFILL IN 2011 (WASTE LICENCE N0. 26-03)

Prepared for:

LAOIS COUNTY COUNCIL

ÁRAS AN CHONTAE
PORTLAOISE
CO. LAOI

Prepared By:

John Rea, B.Sc., MIEnvSc.
Project Manager

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II BMW Composition Forms

INTRODUCTION

Under EU Directives 1996/61/EC, 1999/31/EC and 2006/12/EC, Ireland has an obligation to clarify the pre-treatment requirements for municipal waste prior to disposal at landfill. In 2009, the Environmental Protection Agency (EPA) published a guidance document entitled, *Technical Guidance Document on Municipal Solid Waste Pre-Treatment & Residuals Management* that outlined the pre-treatment requirements for municipal solid waste (MSW) and the limitation of biodegradeable municipal waste (BMW) being disposed of at EPA licensed landfills.

To reflect the pre-treatment requirements, the EPA has implemented limitations (by waste licence conditions) on the percentage BMW permitted to be disposed to licensed landfills in Ireland. Under section 5.15 of waste licence W0026-03 (waste licence), Laois County Council (Laois) is required to provide details to the EPA on the BMW content of MSW accepted to the body of the Kyletalesha landfill.

Section 5.14.1 of the waste licence outlines the BMW requirements for Kyletalesha landfill, the following limits shall apply:

(i) *From 1 July 2010 to 30 June 2013 inclusive, a maximum of 47% by weight of municipal solid waste (MSW) accepted for disposal to the body of the landfill shall comprise biodegradable municipal waste (BMW), measured on a calendar year basis or, in 2010 and 2013, part thereof.*

Commercial waste management companies must pre-treat any MSW prior to deposit at landfill. Based on a waste characterisation assessments completed by the EPA in 2008/2009, EPA approved factors for the calculation of BMW content of MSW from pre-treatment facilities were developed, see Appendix I. Commercial customers use these factors to calculate the BMW content of the waste they dispose to landfill.

In addition to commercial customers, Laois also accepts municipal waste from members of the public at Kyletalesha landfill. This waste has undergone some source separation by householders (i.e., domestic separation of food waste and recyclables). Because no BMW factors exist for these wastes, a BMW sampling and characterization assessment was completed in May and October 2011 to determine if the BMW content of wastes deposited to landfill by members of the public complies with the 47% limit set in section 15.14.1 of the landfill waste licence.

Methodology

In 2009, the EPA published a draft guidance document for assessing the BMW content of municipal waste entitled, '*Protocol for the Evaluation of Biodegradeable Municipal Waste sent to Landfill by Pre-treatment Facilities'* (protocol document). The protocol document outlines the required waste characterisation process for determining the percentage BMW content of MSW.

Waste Characterisation

SLE completed the waste characterisation and BMW sampling assessment with close reference to section 3 of the EPA draft document for the evaluation of BMW. A composite sampling approach was used to determine the BMW content of waste accepted at the public deposit at Kyletalesha landfill site. Waste samples were prepared and characterised with reference to sections 3.4 and 5.2 of the protocol document.

Fifteen (15) waste sample increments were collected over a one week period for both characterisation assessment events (i.e., between May 16th and 23rd, 2011 and October 17th and 24th, 2011). Waste sample increments were collected based on the number of waste deliveries to the landfill cell from the public waste deposit area. Over the sample periods, approximately six (6) trailer loads of waste per day were delivered to the landfill cell from the public deposit area. Based on thirty (30) deliveries of waste during each sample week (i.e., 6 deliveries per day, 5 days per week) a sub-sample of approximately 200 kg was collected from every second delivery to the landfill cell from the public deposit area. Sub-samples were weighed and the results are provided in Appendix II. It was ensured that each sample was collected after the deposited load had been appropriately mixed to create a composite sample, using a front end loader;

The sample weight collected during the May 2011 sample period was 3,210 kg (3.21 tonnes) and the sample weight collected during the October 2011 sample period was 2,620 kg (2.62 tonnes). The sample material was stored in a covered skip container prior to assessment and characterisation. Following each one week sampling programme, the collected waste material was deposited in the waste quarantine area and reduced to a manageable size (i.e., between 100-200 kg) by cone and quartering. A rope was used to divide the waste pile into quarters and then opposite quarters were removed. The remaining material was then mixed and the process repeated until a reduced sample weight was achieved (i.e., 165.5 kg in May 2011 and 167.5 kg in October, 2011).

The waste characterisation assessments for both sampling periods were completed between May 24th and 25th, 2011 and October 24th and 25th, 2011. For each characterisation assessment, thirteen separate containers were labelled to provide receptacles for the various waste materials outlined in Appendix B of the EPA guidance document (i.e., full, part and non-BMW). The main waste categories are outlined in Table A.

Table A – Waste Categories and Associated BMW Content

Waste Category	BMW Content
Organic Waste	Full BMW
Paper	Full BMW
Cardboard	Full BMW
Composites	Non-BMW
Textiles	Part BMW
Plastics	Non-BMW
Glass	Non-BMW
Metals	Non-BMW
Wood	Part BMW
Hazardous Municipal Waste	Non BMW
Unclassified Combustibles	Part BMW
Unclassified Incombustibles	Non BMW
MSW Fines (< 20 mm)	Part BMW

A waste characterisation assessment was completed on the reduced composite sample whereby the full, part and non-BMW waste materials were separated and weighed. Samples were weighed using a GFK 150 floor scales with a weight capacity of 150 kg and a precision of 10 g.

Bulk Density

The bulk density of waste material sampled was also calculated as part of the sampling programme. A representative sample of the waste material was collected and transferred to a container of known volume (i.e., a 10 litre bucket). The container was filled to 1/3 capacity and dropped squarely from approximately 1 foot high to the ground five times. This process was repeated when the container was 2/3 full and again when full. The weight of the material (excluding the weight of the container) was recorded in kilograms and the result multiplied by 100 to provide a weight per m^3.

Results

The results of the waste characterisation assessments completed in May and October 2011 are provided in Table B.

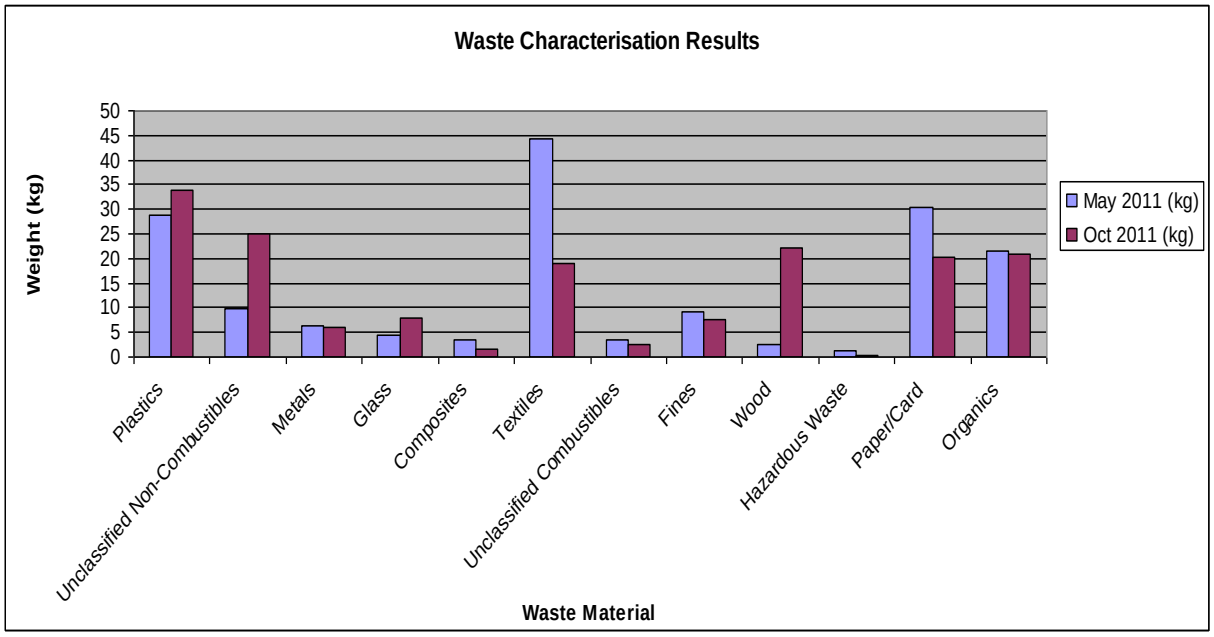
Table B – Results of Waste Characterisation Programme

Waste Category	Date	Sample Weight (kg)	Full BMW (kg)	Part BMW (kg)	Non-BMW (kg)
Plastics	May 2011	28.81	-	-	28.81
	October 2011	33.83	-	-	33.83
Unclassified Non-Combustibles	May 2011	9.69	-	-	9.69
	October 2011	25.12	-	-	25.12
Metals	May 2011	6.38	-	-	6.38
	October 2011	6.11	-	-	6.11
Glass	May 2011	4.44	-	-	4.44
	October 2011	7.89	-	-	7.89
Composites	May 2011	3.60	-	-	3.60
	October 2011	1.71	-	-	1.71
Textiles	May 2011	44.46	-	44.46	-
	October 2011	18.92	-	18.92	-
Unclassified Combustibles	May 2011	3.35	-	3.35	-
	October 2011	2.42	-	2.42	-
Fines	May 2011	9.14	-	9.14	-
	October 2011	7.62	-	7.62	-
Wood	May 2011	2.45	-	2.45	-
	October 2011	22.26	-	22.26	-
Hazardous Waste	May 2011	1.41	-	-	1.41
	October 2011	0.28	-	-	0.28
Paper/Card	May 2011	30.35	30.35	-	-
	October 2011	20.14	20.14		
Organics	May 2011	21.47	21.47	-	-
	October 2011	20.88	20.88		
May 2011 Total (kg)			**51.82**	**59.40**	**54.33**
October 2011 Total (kg)			**41.02**	**51.22**	**74.94**

Note – Waste Categories are based on Appendix B of the EPA Guidance document.

The characterisation results indicated that the weight of full BMW wastes had reduced between the May and October sampling events. It also provided an indication of the success of Laois' efforts to reduce the BMW content of waste disposed to landfill from the public deposit area. A comparison of waste material weights between the two assessment events is provided in Figure 1 below.

Figure 1 – Weights of Waste Categories Characterised in May and October 2011



May 2011 Waste Characterisation Results

The total sample weight characterised in October 2011 was 165.55 kg. The BMW content of waste deposited to the public area was calculated based on the weights of individual waste categories separated and weighed during the characterisation assessment, see Table B. The percentage BMW content calculations are outlined below:

- Full BMW – (51.82kg / 165.55 kg)*100 = 31.3%
- Part BMW – (59.40 kg / 165.55 kg)*100 = 35.89%
- Non-BMW – (54.33 kg / 165.55 kg)*100 = 32.81%

Based on an assumption that part BMW wastes (including fines) contain a 50% BMW content (as outlined in section 3.2 of the EPA guidance document) the BMW content of the waste sample for May 2011 is calculated to be:

31.3% (full BMW) + 35.89% / 2 (50% of Part BMW) = 31.3% + 17.94% = **49.24%**

May 2011 Bulk Density Results

The bulk density of the waste material characterised in May 2011 was measured and calculated as outlined in section 2.2. The results of the bulk density assessment are outlined below:

- Container Volume – 10 litres
- Sample weight (excluding container weight) - 3.04 kg
- Bulk density per litre - 3.04 kg / 10 litres = 0.304 kg
- Weight per m^3 – 0.304 kg x 1000 = 304.4 kg/m^3

October 2011 Waste Characterisation Results

The total sample weight characterised in October 2011 was 167.18 kg. The BMW content of waste deposited to the public area was calculated based on the weights of individual waste categories separated and weighed during the characterisation assessment, see Table B. The percentage BMW content calculations are outlined below:

- Full BMW – (41.02kg / 167.18 kg)*100 = 24.54%
- Part BMW – (51.22 kg / 167.18 kg)*100 = 30.64%
- Non-BMW – (74.94 kg / 167.18 kg)*100 = 44.83%

Based on an assumption that 50% of part BMW materials have a full BMW content (as outlined in section 3.2 of EPA guidance document) the BMW content of the waste sample is calculated to be:

24.54% (full BMW) + 30.64% / 2 (50% of Part BMW) = 24.54% + 15.32% = **39.86%**

October 2011 Bulk Density Results

The bulk density of the waste material characterised in October 2011 was measured and calculated as outlined in section 2.2. The results of the bulk density assessment are outlined below:

- Container Volume – 10 litres
- Sample weight (excluding container weight) - 3.26 kg
- Bulk density per litre - 3.26 kg / 10 litres = 0.326 kg
- Weight per m^3 – 0.326 kg x 1000 = 326.0 kg/m^3

discussion

In June 2011, Laois stationed a member of staff at the public deposit area to monitor the wastes being deposited at the public disposal area and to advise members of the public on the proper disposal / recycling options for specific waste materials (e.g., ensuring that grass clippings were deposited in the green waste container instead of the generals waste receptacle). The characterisation assessment provided an indication of the success of Laois' efforts to reduce the BMW content of waste deposited to landfill from the public deposit area.

The waste characterisation programme indicated that the percentage BMW in May 2011 (i.e., before site monitoring) was marginally above the 47% licence limit and the percentage BMW in October 2011 (i.e., following site monitoring) was significantly less than the 47% limit set in section 5.14.1 of the landfill waste licence. The assessment indicated that the presence of a member of staff at the public area to provide assistance to members of the public on the appropriate wastes to be deposited at the public area resulted in a 9% decrease (i.e., reduction from 49% BMW in May to 40% BMW in October) in the calculated BMW content of MSW being deposited to landfill. When both results are averaged for 2011 the percentage BMW content of MSW being deposited to landfill from the public deposit area is 44.5% (i.e., 49.24% + 39.86% / 2).

The characterisation assessments indicated that recyclable materials that could be disposed of to the Civic Amenity site for recycling (e.g., paper, cardboard, wood, plastics and textiles) were still being disposed of at the public disposal area for landfill. Waste inspections by site staff, and on-going advice to members of the public by Laois should be continued to ensure that reduced volumes of BMW material are deposited to landfill from the public deposit area.

conclusions

The following are the conclusions of the waste characterisation programme completed at Kyletalesha landfill in May and October 2011.

- The bulk density of MSW characterised in May and October 2011 was 304 kg/m^3 and 326 kg/m^3 respectively.
- The composite sample collected from the public deposit area over two separate five working day periods (i.e., 15 incremental sub-samples) weighed 3.21 tonnes in May 2011 and 2.62 tonnes in October 2011.
- The characterised sample (reduced by cone and quarter) in May 2011 weighed 165.5 kg and the characterised sample in October 2011 weighed 167.18 kg;
- The weight of full BMW material in the May 2011 sample was 51.82 kg (31.3% of sample) and the weight of full BMW material in the October 2011 sample was 41.02 kg (24.54% of sample);
- The weight of part BMW material in the May 2011 sample was 59.40 kg (35.89% of sample) and the weight of part BMW material in the October 2011 sample was 51.22 kg (30.64% of sample)
- The weight of non BMW material in the May 2011 sample was 54.33 kg (32.81% of sample) and the weight of non BMW material in the October 2011 sample was 74.94 kg (44.83% of sample).
- The BMW content of the waste sample characterised in May 2011was 49.24% and the BMW content of the waste sample characterised in October 2011 was 39.86%.
- The average BMW content of the waste samples characterised in May and October 2011 from the public disposal area at Kyletalesha Landfill was 44.5% and below the waste licence limit of 47%.

APPENDIX XI

EPA Approved BMW Factors

APPENDIX II

BMW Composition Forms

BIODEGRADEABLE MUNICIPAL WASTE COMPOSITION FORM – MAY 2011 (Data Sheet)				
Waste Categories	**Full BMW**	**Part BMW**	**Non-BMW**	**Fines** **(smaller than 20mm)**
Unit	**Kg**	**Kg**	**Kg**	**Kg**

1	Plastics			22.16	
2	Plastics			18.88	
3	Unclassified Non-Combustibles			14.52	
4	Metals			9.0	
5	Metals			3.82	
6	Glass			7.66	
7	Composites		8.43		
8	Textiles		42.98		
9	Textiles		24.9		
10	Unclassified Combustibles		7.17		
11	Fines				10.75
12	Wood		5.67		
13	Hazardous Waste			3.02	
14	Paper / Card	17.5			
15	Paper / Card	31.32			
16	Organics	14.89			
17	Organics	14.65			
18					
19					
20					
TOTAL (including Container Weight)		78.36 kg	89.15 kg	79.06 kg	10.75 kg
TOTAL TARE WEIGHT (Container)		22.54 kg	30.59 kg	37.03 kg	1.61 kg

NET WEIGHT (kg)	**55.82**	**58.56**	**42.03**	**9.14**
% COMPOSITION	**33.72%**	**35.37%**	**25.39%**	**5.52%**

BIODEGRADEABLE MUNICIPAL WASTE COMPOSITION FORM – OCTOBER 2011

(Data Sheet)

	Waste Categories	Full BMW	Part BMW	Non-BMW	Fines (smaller than 20mm)
	Unit	Kg	Kg	Kg	Kg
1	Plastics			41.9	
2	Plastics			12.86	
3	Unclassified Non-Combustibles			12.98	
4	Unclassified Non-Combustibles			20.57	
5	Metals			5.35	
6	Metals			8.81	
7	Glass			7.99	
8	Glass			6.34	
9	Composites			2.97	
10	Composites			3.57	
11	Textiles		24.54		
12	Textiles		4.04		
13	Unclassified Combustibles		4.03		
14	Fines				9.23
15	Wood		15.17		
16	Wood		15.14		
17	Hazardous Waste			1.89	
18	Paper / Card	23.88			
19	Paper / Card	10.75			
20	Organics	16.68			
21	Organics	13.86			

TOTAL (including Container Weight)	**65.17 kg**	**62.92 kg**	**125.23 kg**	**9.23 kg**
TOTAL TARE WEIGHT (Container)	**24.15 kg**	**19.32 kg**	**49.91 kg**	**1.61 kg**
NET WEIGHT (kg)	**41.02**	**43.60**	**75.32**	**7.62**
% COMPOSITION	**24.5%**	**26.0%**	**45.0%**	**4.5%**

Appendix XI

PRTR

AER Returns Workbook

REFERENCE YEAR	2011

1. FACILITY IDENTIFICATION

Parent Company Name	Laois County Council
Facility Name	Kyletalesha Landfill
PRTR Identification Number	W0026
Licence Number	W0026-03

Waste or IPPC Classes of Activity

No.	class_name
3.5	Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.
3.11	Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule.
3.12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
3.2	Land treatment, including biodegradation of liquid or sludge discards in soils.
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
3.6	Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule.
3.7	##
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.3	Recycling or reclamation of metals and metal compounds.

4.4	Recycling or reclamation of other inorganic materials.
4.9	Use of any waste principally as a fuel or other means to generate energy.
Address 1	Clonsoughy
Address 2	Kyleclonhobert
Address 3	Co. Laois
Address 4	test
	Laois
Country	Ireland
Coordinates of Location	-6.36721 53.325
River Basin District	IESE
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Brenda Cuddy
AER Returns Contact Email Address	bcuddy@laoiscoco.ie
AER Returns Contact Position	Landfill Manager
AER Returns Contact Telephone Number	087 6295556
AER Returns Contact Mobile Phone Number	
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	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

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

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

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

4.1 RELEASES TO AIR

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs				
POLLUTANT		METHOD			ADD EMISSION POINT		QUANTITY		
		Method Used			Flare 1 - AFS750	Flare 2 -			
No. Annex II	Name	M/C/E	Method Code	Designation or Descripti	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Site Data & Gas Sim Stats	24397.0	70.5	92095.563	0.0	67628.063
03	Carbon dioxide (CO2)	C	OTH	Site Data & Gas Sim Pl Report	51424.8	16482.8	4355527.7	0.0	4287620.1

ADD NEW ROW | DELETE ROW *

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

R POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs					
POLLUTANT		METHOD			ADD EMISSION POINT			QUANTITY		
		Method Used			Flare 1 - AFS750	Flare 2 -				
No. Annex II	Name	M/C/E	Method Code	Designation or Descripti	Emission Point 1	Emission Point 2	Emission Point 3	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
15	Chlorofluorocarbons (CFCs)	C	OTH	Gas Sim 2 - Pl Report	0.0	0.0	0.0	6.88	0.0	6.88
14	Hydrochlorofluorocarbons (HCFCs)	C	OTH	Gas Sim 2 - Pl Report	0.0	0.0	0.0	7.68	0.0	7.68

ADD NEW ROW | DELETE ROW *

* 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			ADD EMISSION POINT	QUANTITY		
		Method Used						
Pollutant No.	Name	M/C/E	Method Code	Designation or Descripti	Emission Point 1	T (Total) KG/Year	A (Accidental)	F (Fugitive)
					0.0	0.0	0.0	0.0

ADD NEW ROW | DELETE ROW *

* 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: Kyletalesha Landfill

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**	
Total estimated methane generation (as per site model)	1654620.336	C	ssc	Estimated using Gas Sim2 - Statistics	N/A	
Methane flared	1562524.773	M	ssc	Site Data	1500.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	92095.563	E	ssc	Difference between estim	N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

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

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs						
POLLUTANT					ADD EMISSION POINT				QUANTITY		
			Method Used		Surface Water Discharges to River Triogue	Surface Water Discharges to River					
No. Annex II	Name	M/C/E	Method Code	Designation or Descriptio	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
79	Chlorides (as Cl)	C	OTH	Scaled up using monitoring results	4589.8	1283.8	0.0	0.0	5873.6	0.0	0.0
					0.0	0.0	0.0	0.0	0.0	0.0	0.0

ADD NEW ROW | DELETE ROW * | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete buttor

SECTION B : REMAINING PRTR POLLUTANTS

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

ADD NEW ROW | DELETE ROW * | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete buttor

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

RELEASES TO WATERS					Please enter all quantities in this section in KGs				
POLLUTANT					ADD EMISSION POINT		QUANTITY		
			Method Used		Surface Water	Surface Water			
Pollutant No.	Name	M/C/E	Method Code	Designation or Descriptio	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive)
238	Ammonia (as N)	C	OTH	Scaled up using monitoring results	25.15	74.6	99.75	0.0	0.0
303	BOD	C	OTH	Scaled up using monitoring results	62.9	69.4	132.3	0.0	0.0
240	**Suspended Solids**	C	OTH	Scaled up using monitoring results	0.0	913.6	913.6	0.0	0.0

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	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

ADD NEW ROW | DELETE ROW *

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

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

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	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

ADD NEW ROW | DELETE ROW *

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

4.4 RELEASES TO LAND

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

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

ADD NEW ROW | DELETE ROW *

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

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

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

ADD NEW ROW | DELETE ROW *

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	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/Disparer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disparer	Name and Licence / Permit No. and Address of Final Recoverer / Disparer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disparal Site (HAZARDOUS WASTE ONLY)
					M/C/E	Method Used					
Within the Country	20 01 08	29.88	biodegradable kitchen and canteen waste	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 02 01	124.22	biodegradable waste	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	15 01 01	129.54	paper and cardboard packaging	R3	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	15 01 01	53.02	paper and cardboard packaging	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 01	176.56	Newspaper and Magazines	R3	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	20 01 01	74.63	Newspaper and Magazines	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	15 01 07	122.16	glass packaging	R5	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	15 01 07	51.11	glass packaging	R5	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 02	10.18	glass	R5	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 02	10.96	glass	R5	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	15 01 04	16.98	Aluminium Cans	R4	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	15 01 04	10.14	Aluminium Cans	R4	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 40	97.28	metals	R4	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	20 01 40	68.16	metals	R4	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	15 01 02	87.6	plastic packaging	R3	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	15 01 02	26.26	plastic packaging	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 39	68.8	plastics	R3	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	20 01 39	29.22	plastics	R3	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 11	25.74	textiles	R5	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	20 01 11	9.3	textiles	R5	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		

Within the Country	13 02 04	11.18	mineral-based chlorinated engine, gear and lubricating oils	R9	M	Weighed	Offsite in Ireland	Enva Ireland,W0184-01	Clonminam Industrial Estate,Portlaoise,Laois,,Ireland	ENVA Ireland Ltd,W0184-1,Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland	Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland
Within the Country	15 02 02	0.56	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	R9	M	Weighed	Offsite in Ireland	Enva Ireland,W0184-01	Clonminam Industrial Estate,Portlaoise,Laois,,Ireland	ENVA Ireland Ltd,W0184-1,Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland	Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland
Within the Country	16 01 03	16.64	end-of-life tyres	R4	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	16 01 03	5.06	end-of-life tyres	R4	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Count 01 27		46.54	paint, inks, adhesives and resins containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland	Greenstar,W0053-03,Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland
Within the Country	19 07 03	11659.0	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Portlaoise Wastewater Treatment Plant,D0001-01	Ridge Road,,Portlaoise,Co Laois,Ireland		
Within the Country	16 06 04	0.52	alkaline batteries (except 16 06 03)	R4	M	Weighed	Offsite in Ireland	Greenstar,W0053-03	Bray Depot,La Valee House,Fassaroe,Co Wicklow,Ireland		
Within the Country	16 06 04	0.35	alkaline batteries (except 16 06 03)	R4	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland		
Within the Country	20 01 27	4.64	paint, inks, adhesives and resins containing dangerous substances	D9	M	Weighed	Offsite in Ireland	AES Ireland,W0104-02	Cappincur,,Tullamore,Co Offaly,Ireland	ENVA Ireland Ltd,W0184-1,Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland	Clonminam Industrial Estate,,Portlaoise,Co Laois,Ireland