Granary House
Rutland Street
Cork

Tel. [021]4321521
Fax. [021]4321522

environmental management for business

# ANNUAL ENVIRONMENTAL REPORT

# FOR

# KILCULLEN LANDFILL LIMITED

# LICENCE NO. W0081-04

# JANUARY – DECEMBER 2013

**Prepared For: -**

Kilcullen Landfill Ltd,
Brownstown,
Kilcullen,
Co Kildare.
.

**Prepared By: -**

O' Callaghan Moran & Associates,
Granary House,
Rutland Street,
Cork.

**13th June 2014**

| Project | Annual Environmental Report 2013 | | | |
|---|---|---|---|---|
| Client | Kilcullen Landfill Limited<br>W0081-04 | | | |
| Report No | Date | Status | Prepared By | Reviewed By |
| 2110301 | 09/05/2014 | Draft | Barry Sexton MSc | Jim O'Callaghan MSc |
| 2110301 | 13/06/2014 | Draft | Barry Sexton MSc | Jim O'Callaghan MSc |
| 2110301 | 13/06/2014 | Final | Barry Sexton MSc | Jim O'Callaghan MSc |
| | | | | |

# TABLE OF CONTENTS

**PAGE**

# LIST OF APPENDICES

# 1. INTRODUCTION

This is the 2013 Annual Environmental Report (AER) for the Kilcullen Landfill Limited non-hazardous residual landfill at Brownstown, Kilcullen, County Kildare. It covers the period from the 1st January 2013 to the 31st December 2013.

In March 2014 the Waste Licence was transferred from KTK Landfill Ltd to Kilcullen Landfill Ltd (KLL).

The content is based on Schedule F of the Waste Licence (Reg. No. W0081-04) and the report format follows guidelines set in the "Guidance Note for Annual Environmental Report" issued by the Environmental Protection Agency (Agency)[1]. Account is also taken of the AER Draft Guidance Document and AER Information Templates issued by the Agency in January 2013[2].

[1] EPA (Environmental Protection Agency) 1999 Waste Licensing – Draft Guidance on Environmental Management Systems and Reporting to the Agency

[2] EPA (Environmental Protection Agency) 2012 Draft AER Guidance Document

# 2. SITE DESCRIPTION

## 2.1 Site Location & Layout

The site is located in the Townland of Brownstown approximately 2km to the north east of Kilcullen Town.

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

- Administration Block (offices, stores, canteen, toilets and showers);
- Weighbridges (2 No.);
- Wheel Wash;(De commissioned)
- Capped Landfill Cells
- Security Fencing.
- Landscaped Areas
- Landfill gas utilisation compounds

## 2.2 Site History

KLL operates the Kilcullen Landfill under Waste Licence Register Number W0081-04. KTK Landfill was granted a Waste Licence (W0081-01) by the Environmental Protection Agency (EPA) in April 1999. In July 2001, KTK Landfill submitted an application for a Review of Waste Licence W0081-01. An amended Licence, No. W0081-02 was granted by the Agency on 8 April 2002. In November 2004 an application for revision of Waste Licence W0081-02 was submitted. An amended Licence, No. W0081-03 was granted on 16 February 2006. This licence was replaced on the 25th of July 2011 by waste Licence W0081-04 In March 2014 the Waste Licence was transferred from KTK Landfill Ltd to Kilcullen Landfill Ltd.

Acceptance of waste material ceased in December 2011. The site entered its closure, restoration and aftercare phase in 2011. During 2012, the final capping works were brought to practical completion and the facility is now managed in an aftercare capacity, while some top soiling and grass seeding remain along with other decommissioning works to be progressed over a phased bases. A detailed site map showing all monitoring locations at the site is presented in Drawing KTK/602, Rev E1, Site Layout plan showing monitoring locations (Appendix 1).

## 2.3 Waste Activities Carried Out at the Facility

The facility is a full containment landfill, which is designed to accept treated waste for final disposal. The licensed waste activities are summarised in Tables 2.1 and 2.2. The landfill is now closed and fully capped. No waste was accepted on site in 2013.

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

| | |
|---|---|
| Class 1 | Deposit on, in or under land (including landfill). |
| Class 5 | Specially engineered landfill, including placement into lined discrete cells, which are capped and isolated from one another and the environment. |
| Class 11 | Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule. |
| Class 13 | Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced. |

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

| | |
|---|---|
| Class 3 | Recycling or reclamation of metals and metal compounds. |
| Class 4 | Recycling or reclamation of other inorganic materials. |
| Class 9 | 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. |

## 2.4 Waste Received & Consigned

As the site ceased waste acceptance in December 2011 there was no waste received at the facility in 2013.

## 2.5 Report on Development and Restoration at the Site

There were no development or restoration works undertaken on site in 2013.

## 2.6 Progress and Implementation of Landscaping Programme

There was no additional tree planting at the facility during the reporting period. There was maintenance carried out on all existing tress planted, in terms of weeding and hedge cutting. Grass was also maintained both on the capped area, entrance and office surrounds.

## 2.7 Programme for Public Information

Kilcullen Landfill pursues an active programme of disseminating information on its operations to interested parties. Kilcullen Landfill's community development fund made significant donations to a number of local groups during the operation of the active landfill and in 2012 the fund ceased dispensing monies as the facility ceased waste acceptance in 2011.

A comprehensive public information programme developed in April 2000 continues to be used however in a scaled down version as the site is now non-operational. The communications programme contains 8 specific objectives:

- To promote public awareness of the Company's activities and environmental policies;
- To maintain an ongoing dialogue with authorities that have direct involvement with waste disposal activities;
- To make available Environmental Performance Data relating to Kilcullen Landfill;
- To disseminate information relating to the operation and management of the site as appropriate;
- To encourage liaison between Kilcullen Landfill, and local residents and those who may be affected by the sites operations;
- To provide general information on Waste Management Issues;
- To ensure all users and customers of the site are conversant with the requirements of the Site Licence; and
- To ensure that all objectives are, where possible, measurable and quantifiable.

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

- Personal Contact;
- Residents Meetings/Liaison Groups;
- Information Displays;
- Site Visits;
- Published Information.

# 3. ENVIRONMENTAL MONITORING

Kilcullen Landfill implements a comprehensive environmental monitoring programme to assess the significance of emissions from site activities. The programme includes groundwater, surface water, leachate, landfill gas, noise, dust. The monitoring locations are shown in Appendix 1.

The monitoring results, including the full laboratory reports, were submitted to the Agency at quarterly intervals in the reporting period. This section presents a summary of the monitoring. A summary of all monitoring data for 2013 is included in Appendix 2.

## 3.1 Groundwater Monitoring

### *3.1.1 Groundwater Levels*

Groundwater levels were monitored on a monthly basis in accordance with Schedule C of Waste Licence Register No. W0081-04. Due to a slight disruption to the routine monitoring groundwater levels were not recorded in January, February, April or May. The results of groundwater level monitoring were submitted to the Agency in the quarterly groundwater reports. The groundwater movement is from north to south across the site.

### *3.1.2 Groundwater Quality*

During 2013, two (2 No.) private groundwater well samples were collected and analysed. This sampling event took place in December 2013. The results of the analysis were reported in the Q-4 quarterly report. All residents received copies of the results from their respective wells. With the exception of Total and Faecal coliforms at Pri 1 EC and very low Total Coliforms at Pri 2 CK the other parameters were all lower that the IGV or GTV. Groundwater quality in the private wells was good and consistent with previous rounds.

Groundwater quality was monitored in the on-site monitoring wells and reported to the Agency at quarterly intervals. The sampling was carried out in accordance with internationally accepted techniques and control procedures and the analyses were completed by a laboratory using standard and internationally accepted procedures.

The groundwater analysis is compared to the licence specific trigger levels as well as the Interim Guideline Values (IGVs) for groundwater published by the Agency and the

Groundwater Regulations Threshold Value (GTV) which were introduced in 2010 (S.I. 9 of 2010).

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

The results from the onsite monitoring wells are consistent with previous results. The groundwater quality at the facility is influenced by an ongoing groundwater contamination plume emanating from the adjacent partially lined Silliot Hill landfill.

The quality of the water in both private wells is generally good and shows no impacts associated with the landfill facility. The slightly elevated total and faecal coliforms at Pri 1 EC are not unexpected, given the likelihood of surface water infiltration to the well. Pri EC 1 is not in use.

## 3.2 Surface Water Monitoring

Surface water monitoring was conducted at the facility in accordance with Schedule C.3 of Waste Licence Register No. W0081-04. Monitoring of surface water at the facility comprised of weekly visual inspections and quarterly sampling and analyses, which are discussed in more detail below.

### *3.2.1 Visual Assessment*

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

### *3.2.2 Chemical Assessment*

The surface water monitoring was conducted quarterly at the four monitoring locations specified in the Licence and reported to the Agency on a quarterly basis. The sampling was carried out in accordance with internationally accepted techniques and control procedures, the analyses were completed by a laboratory using standard and internationally accepted procedures. The 2013 results are generally consistent with previous years of monitoring.

## 3.3 Leachate

### *3.3.1 Leachate level results during 2013*

Leachate levels have been reported to the Agency in each of the monitoring reports from Quarter 1 to Quarter 4 of 2013. Records from leachate level monitoring conducted at the facility during the reporting period have been reported to the Agency in the quarterly reports; all exceedances of the 1 meter level limit were reported to the Agency at the time of occurrence. A full summary of the leached levels is presented in Appendix 2.

### *3.3.2 Chemical Analysis*

The monitoring programme involves the collection and testing of leachate samples from the collection sumps and the storage tank . The results for 2013 are generally consistent with the previous year's results.

Kilcullen Landfill operates two reverse osmosis treatment plants on site which treats landfill leachate before discharging it to the sewer system. Treated leachate from the reverse osmosis plants is referred to as permeate and the discharge of treated effluent (permeate) limit for Kilcullen Landfill is 150m3/day. Concentrate from the reverse osmosis units is re-circulated within the waste mass, as per the agreement with the Agency. This is a common practice in Europe when reverse osmosis units operate on landfills.

Kilcullen Landfill have also supplied chemical results from the reverse osmosis plants at the site detailing analysis of reverse osmosis leachate input, permeate output and concentrate output. These results are included in Appendix D of the Quarterly Reports 2013 (Q1 to Q4) along with graphical representations of levels of NH4, BOD and COD. A Summary of permeate results for RO 1 and OR 2 are presented in Appendix 2.

## 3.4 Landfill Gas (LFG)

Landfill Gas Monitoring was conducted at 14 monitoring well locations on a monthly basis during the 2013 reporting period. Kilcullen Landfill staff conducted the landfill gas monitoring. Collated landfill gas emission summary reports were included in the subsequent quarterly monitoring reports for 2013. Category 3 non-urgent incident reports were also forwarded to the Agency not later than 24 hours after a landfill gas emission level value was breeched.

Potential Landfill Gas is monitored at the facility offices and buildings by an on site continuous monitoring system . No measured landfill gas level in any of the facility buildings exceeded the above limits during 2013.

## 3.5 Noise Surveys

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

The results at the noise sensitive locations indicate that noise from the site complied with the licence limits.

## 3.6 Dust Monitoring

Dust monitoring was conducted at six locations on three occasions during the 2013 reporting period as specified in Schedule C.3 of the waste licence. The dust deposition limit of 350 mg/$m^2$/day was exceeded in June 2013 at Jar 5 and in August 2013 at Jar 1. The levels detected were 454.88mg/$m^2$/day in June 2013 and 776mg/$m^2$/day in August 2013. Incident reports were submitted to the Agency following the exceedances. All of the remaining 2013 monitoring results were less than the deposition limit set in the Licence (350 mg/$m^2$/day) and dust is not an issue at the facility.

## 3.7 Fugitive Gas Emissions Report 2013

### *3.7.1 Locations and Methods*

The licence stipulates that monitoring of any emissions to air is carried out at the enclosed gas Flare No. 1 (HAASE 2500) and No. 2 (HAASE 1500) and at the gas Utilisation Plant Engines GE01, GE02 and GE03 at Kilcullen Landfill. Odour Monitoring Ireland Ltd undertook this monitoring on two occasions, on the 5th June 2013 and 12 December 2012. These reports were submitted to the Agency throughout 2013.

**Table 3.1** Emission value results from landfill gas flare No. 1 June 2013 (2,500 HAASE)

| Parameter | Normalised Concentration (mgN/$m^3$) | Emission Limit Value (mgN/$m^3$) |
|---|---|---|

| | | |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 99.35 | 150 |
| Sulphur dioxide ($SO_x$) | 189.42 | - |

**Table 3.2** Emission value results from gas utilisation engine GE01 June 2013

| **Parameter** | **Normalised Concentration ($mgN/m^3$)** | **Emission Limit Value ($mgN/m^3$)** |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 373.88 | 500 |
| Carbon Monoxide (CO) | 813.09 | 1,400 |
| TNMVOCs | 13.14 | 75 |
| Sulphur dioxide ($SO_x$) | 548.18 | - |

**Table 3.3** Emission value results from gas utilisation engine GE02 June 2013

| **Parameter** | **Normalised Concentration ($mgN/m^3$)** | **Emission Limit Value ($mgN/m^3$)** |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 391.88 | 500 |
| Carbon Monoxide (CO) | 793.16 | 1,400 |
| TNMVOCs | 5.55 | 75 |
| Sulphur dioxide ($SO_x$) | 602.95 | - |

**Table 3.4** Emission value results from gas utilisation engine GE03 June 2013

| **Parameter** | **Normalised Concentration ($mgN/m^3$)** | **Emission Limit Value ($mgN/m^3$)** |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 450 | 500 |
| Carbon Monoxide (CO) | 727.20 | 1,400 |
| TNMVOCs | 15.20 | 75 |
| Sulphur dioxide ($SO_x$) | 682.23 | - |

**Table 3.5** Emission value results from landfill gas flare No. 1 Oct 2013 (2,500 HAASE)

| **Parameter** | **Normalised Concentration** | **Emission Limit Value ($mgN/m^3$)** |
|---|---|---|

| | (mgN/m$^3$) | |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 44.12 | 150 |
| Sulphur dioxide ($SO_x$) | 191.90 | - |

**Table 3.6** Emission value results from gas utilisation engine GE01 Oct 2013

| Parameter | Normalised Concentration (mgN/m$^3$) | Emission Limit Value (mgN/m$^3$) |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 393.15 | 500 |
| Carbon Monoxide (CO) | 967.24 | 1,400 |
| TNMVOCs | 6.07 | 75 |
| Sulphur dioxide ($SO_x$) | 625.78 | - |

**Table 3.7** Emission value results from gas utilisation engine GE03 Oct 2013

| Parameter | Normalised Concentration (mgN/m$^3$) | Emission Limit Value (mgN/m$^3$) |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 397.97 | 500 |
| Carbon Monoxide (CO) | 953.02 | 1,400 |
| TNMVOCs | 8.89 | 75 |
| Sulphur dioxide ($SO_x$) | 651.96 | - |

## 3.8 Meteorological Monitoring

Rainfall data for 2013 was collected from the synoptic stations at Casement Aerodrome Table 3.1 below details summary monthly data for 2013.

**Table 3.1** Rainfall Data: Casement Aerodrome – 2013

| Year | 2013 |
|---|---|
| January | 69.5 |

| | |
|---|---|
| February | 45.2 |
| March | 63.3 |
| April | 47.5 |
| May | 52.8 |
| June | 43.2 |
| July | 42.7 |
| August | 62.9 |
| September | 35.1 |
| October | 100.4 |
| November | 21.2 |
| December | 104.7 |
| **Annual** | **688.5** |

# 4. SITE DEVELOPMENT WORKS

## 4.1 Summary of Resource & Energy Consumption

The principal energy resources consumed at the site are electricity, water for potable supply, site cleaning and dust suppression, diesel fuel and hydraulic oils. All site vehicles are fuelled by diesel. Table 4.1 presents an estimate of the resources used on-site in 2013 and 2012 for comparison.

**Table 4.1** Resources Used On-Site

| Resource | Units | Total Consumption in 2012 | Total Consumption in 2013 |
|---|---|---|---|
| Electricity | kWh | 355,228 | 272392 |
| Water, potable supply | Litres | 140 | 135 |
| Water mains | Litres | 6,850 | 899 |
| Diesel | Litres | 3,317 | 1,500 |
| Hydraulic Oils | Litres | 100 | 100 |
| Grease | Litres | 1 | 1 |

Kilcullen Landfill gas utilisation plant exported 15,350,000 kWhr of electricity to the national grid during 2013. This is down approximately 30% on 2012 exported energy of 21,713,800kWhr. The main materials recovered at the facility during the reporting period were soil and topsoil. The details are listed in Table 4.2 below.

**Table 4.2** Material Recovery and Electricity Production 2013

| Resource | Units | Total in 2012 | Total in 2013 |
|---|---|---|---|
| Electricity | kWh | 21,713,800 | |
| Waste lubricating oil recovered from landfill gas utilisation engines | Litres | 34,000 | 19,300 |
| Soil and topsoil recovered for final capping | Tonnes | 39,578.18 | |

## 4.2 Proposed Site Development Works 2014

The facility is closed and not accepting waste. There are no site development works planned for 2014, with the exception of completing the final capping works with the placement of topsoil and grass seeding.

# 5. EMISSIONS

## 5.1 Leachate

Kilcullen Landfill operates two reverse osmosis treatment plants on site to treat leachate from the landfill. Kilcullen Landfill discharged treated leachate (permeate) from the reverse osmosis treatment plants directly to sewer. The volume details for 2013 are listed in Table 5.1 below.

**Table 5.1** Volume of Permeate discharged from site 2013

| Type | Units | Volume |
|---|---|---|
| Permeate to Sewer | $m^3$ | 10,978 |

The entire landfill area is fully capped and lined with a HDPE geomembrane. This means that there is no infiltration of rainfall through the wastes body. The only leachate which is generated within the waste body is residual leachate which is resultant from the breakdown of the waste material within the sealed landfill.

## 5.2 Landfill Gas

Two enclosed landfill gas flares were installed on site in October 2005. Flare 1 has a capacity of 2,500 $m^3$/hour, flare 2 a capacity of 1,500 $m^3$/hour. Flare 2 a back up flare did not run in 2013. Flare 1 flared a total of 694,341$m^3$ in 2013.

There are three landfill Gas Engines on site. Engine 1 extracted 1,852,420$m^3$, engine 2 extracted 153,358$m^3$ and engine 3 extracted 1,540,914$m^3$ in 2013.

## 5.3 Estimated Annual and Cumulative Quantity of Indirect Emissions to Groundwater

The potential sources of indirect emissions into groundwater are:

- **Landfill Base**

The landfill site has a composite base lining system comprising a HDPE geomembrane and one metre thick layer of compacted clay. A leak location survey of the HDPE geomembrane

after placement of the drainage stone layer was completed and defects to the HDPE liner were repaired in accordance with industry standards.

- **Surface Water Collection and Treatment System**

Surface water from the paved access road and service platform is collected and discharged into a water infiltration area. However, prior to final discharge into the ground, surface water is conveyed to a concrete silt settlement tank and a Class 1 Klargester surface water bypass separator. The quality of the surface water discharge downstream of the separator is measured quarterly at the monitoring manhole identified as SW7.

- **Treated Sewage Effluent**

There is one BioCycle waste water treatment unit on the site which treats the canteen and office waste water prior to discharge into a percolation area.

In summary as the landfill is fully contained there will be minimal to nil indirect emissions to ground water.

## 5.4 Surface Water

Rainfall run-off from the capped areas is collected by a series of swale drains and discharges to peculation areas or surface water discharge points .Rainfall on the roads and paned areas is directed to the silt settlement tank before discharge. Rainfall on the leachate treatment area is contained in the bunded area and pumped into the landfill before treatment by revenge osmosis.

# 6. NUISANCE CONTROL

KLL is committed to operating Kilcullen Landfill in the best possible manner using best available techniques to minimise impacts to the environment and local residential neighbours. KLL welcomes communications from local residents and any interested parties and all reasonable and practical measures will be implemented to eliminate or minimise any issues or nuisances. All nuisance control measures continue to be implemented so as to ensure licence compliance.

## 6.1 Vermin Control

Site personnel regularly checked for evidence of vermin on-site during regular routine inspections. A qualified contractor was employed throughout the duration of the reporting period in order to control potential nuisance caused by rodents. Continuous baiting was carried out by this contractor and adjusted as necessary to prevent any infestation of vermin. Since the closure of the site the requirement for bird control has ceased.

# 7. ENVIRONMENTAL INCIDENTS AND COMPLAINTS

## 7.1 Incidents

In total there were twenty three (23 No.) reportable incidents on site in the reporting period. These were reported to the agency as soon as the licensee was notified and did not cause any environmental impacts. Twelve (12 No.) incident were in relation to breaches of landfill gas carbon dioxide trigger levels, nine (9 No.) in relation to breaches of leachate levels in sumps and two (2 No.) were related to breaches of the dust deposition limit.

## 7.2 Register of Complaints

One odour complaint was received in the reporting period. Site management met with the complainant, identified and resolved the issue to the satisfaction of the complaint.

# 8. ENVIRONMENTAL MANAGEMENT SYSTEM

## 8.1 Management Structure

The Management Structure as required by Condition 2.1.1 of the waste licence the licensee employs a suitably qualified and experienced facility. A summary of the management structure is presented below.

### *8.1.1 Site Management Structure*

The day to day management of the facility and supervision of waste activities are the responsibility of Kilcullen landfill LTD the facility Manager, nominated Deputy Manager(s) and the site operatives. The positions and names of the persons who provide management and supervision are set out below: -

- Managing Director, Geoff Bailey
- Landfill Manager, Tomas Fingleton
- Assistant Landfill Manager, Thomas Finnegan
- Site Caretaker, Dominic Talbot

### *8.1.2 Responsibilities*

Tomas Fingleton is the facility manager and he attends the Kilcullen site on a regular and as needs basis. Thomas Finnegan is also Assistant Facility Manager Knockharley landfill and continues to attend the site to conduct site monitoring and other environmental and licence compliance related functions. Dominic Talbot is the site caretaker and attends the site daily.

## 8.2 EMP

Kilcullen Landfill implemented an Integrated Management System (IMS) in accordance with the requirements of Occupational Health and Safety Assessment Series (OHSAS) 18001:2007 and International Standard Organisation (ISO) 14001:2004 in order to manage the Health, Safety and Environmental performance of their business and to control health and safety risk and to minimise their environmental aspects and impacts.

The IMS has been developed for the achievement of continual improvement taking into the requirements of the Waste Licence Conditions. Kilcullen Landfill has prepared and effectively implemented documented procedures and instructions in accordance with the requirements of both the OHSAS 18001:2007 and ISO 14001:2004.As the site is closed and in its aftercare phase Kill has not pursued re-certification at this time, but continues to maintain the system in place.

The schedule of Objectives and Targets, including their status for 2012 (Table 8.1), as well as the proposed Objectives and Targets for 2014 (Table 8.2) are presented below.

### *8.2.1 Schedule of Objectives 2013*

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

**Table 8.1** Schedule of Targets and Objectives 2013

| Ref. No. | Objective | Ref. No. | Target | ENV Aspect | Resources Required | Person Responsible | Time Frame for Completion | Progress as of End of 2012. |
|---|---|---|---|---|---|---|---|---|
| O - 1 | Lower the environmental impacts associated with fugitive landfill gas emissions by continually developing the Facility's Gas Utilisation Infrastructure and landfill gas management techniques. | T - 1.1 | Undertake quarterly VOC surveys of the waste surface over the next 5 years, to establish the areas were fugitive emissions are most prevalent. | 1,9 | External Consultant (circa €1,800 per survey) | Site Manager | Completed | Completed |
| | | T - 1.2 | Installation of gas extraction boreholes were fugitive emissions have been identified from the VOC surveys. | 1,9 | Circa €1,700 per borehole. | Site Manager | Completed | Completed |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T - 1.3 | Achieve 70% utilisation of landfill gas extracted by 2012 by undertaking landfill gas modelling of the waste body to establish the most the environmentally beneficial method for managing landfill gas. i.e. By maximising landfill gas utilisation and minimising flaring. | 1,9 | External Consultant (circa €2,500 per model) | Site Manager | 2012 | Average annual utilisation 81% |
| | | T - 1.4 | Support University College Dublin Research Project commissioned to investigate the most effective cover material for achieving maximum odour neutralisation. | 1,9 | UCD<br>€10,000 | GM Landfill Group | Project Completed Dec 2009 | Completed |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T - 1.5 | Monitor and review the effectiveness of the perimeter odour neutralising infrastructure installed in 2005 and maintain record of performance. | 1,9 | Assistant Site Manager<br>(80 man hours) | Site Manager | Project Completed Removed in 2011 | Completed |
| | | T – 1.6 | Reduce fugitive emissions by completion of final permanent capping. 40% completed in 2009. 65% to be completed by end 2011. | 1, 9 | Site management, consultants, contractor<br>(est €4M) | Site Manager | Project Completed July 2012 | Final capping project reached practical completion July 2012. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| O - 2 | Lower the potential environmental impacts (i.e. risk of spillage, $CO_2$ emissions) associated with the off-site transport of leachate. | T - 2.1 | Divert leachate disposal from tankering offsite to direct discharge to sewer, by on-site treatment with agreement of EPA and KCC<br>Achieve 50% diversion rate by 2010 and a 75% diversion rate by 2012 | 2 | External Consultant (€2,500) | Site Manager | Tankering to WWTP ceased in September 2011 | Completed |
| | | T - 2.2 | Design and commission on-site leachate treatment plant to reduce leachate to domestic strength and dissolved methane levels in leachate to below the regulatory requirement of 0.14 mg/l.<br>Increase plant capacity to 150$m^3$/day | 2 | Circa €600,000 | Site Manager | Project completed in two parts December 2009 and July 2010 | Completed |
| O - 3 | Lower the potential environmental nuisance | T - 3.1 | Source road washing/sweeping plant for permanent operation on site | 7 | Circa €8,000 pa | Site Manager | Complete | Completed |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | associated with dust by improving dust management techniques | T - 3.2 | Investigate available technology options for dust suppression activities that minimises water usage. | 7 | Assistant Site Manager<br>(20 man hours) | Site Manager | Complete | |
| O - 4 | Implement CRAMP | T – 4.1 | Complete design, contractor selection, and engineering works associated with stage 1 area of final permanent capping of approx. 70,000m$^2$<br>Complete design, contractor selection, and engineering works associated with stage 2 area of final permanent capping of approx. 90,000m$^2$ | 1, 9 | External consultants and contractors | Site Manager | Stage 1 completed June 2010<br>Stage 2 completed Jul-12 | Completed |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| O - 5 | Minimise the amount of natural resources (water, power etc.) consumed at the Facility. | T - 5.1 | Update the existing utilities report on an annual basis so as to identify operational resource consumption | 4 | External Consultant (circa €1,000 pa) | Assistant Site Manager | Ongoing | To be adapted and incorporated into new time frame |
| | | T - 5.2 | Review Energy Audit of Facility and identify opportunities for improved energy efficiency. | 4 | Site Manager<br>(20 man hours) | Site Manager | Jan-11 | To be adapted and incorporated into new time frame |
| | | T – 5.3 | Carry out assessment of the use of raw material at the Facility and identify opportunities for the improved efficiency in the use of raw materials. | 4 | Assistant Site Manager<br>(40 man hours) | Site Manager | Dec-10 | To be adapted and incorporated into new time frame |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T - 5.4 | Carry out assessment of water usage at the facility and identify opportunities for improved efficiency of water usage. | 4 | Assistant Site Manager<br>(40 man hours) | Site Manager | Ongoing | To be adapted and incorporated into new time frame |
| | | T – 5.5 | Use storm water for dust suppression activities when available. | 4 | Tanker Trailer and bowser | Site Supervisor | Ceased | N/A |
| O - 6 | Improve Health, Safety and Welfare | T - 6.1 | Review and amend site safety statement so that it is consistent with other sites within the Greenstar Landfill Group | 8 | Assistant Site Manager<br>(40 man hours) | Site Manager<br>GM Landfill Group | Completed<br>Jun-10 | Completed |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T - 6.2 | Reduce lost time injuries by 5% over the next five years | 8 | | All site Personnel | Ongoing | To be adapted and incorporated into new time frame |
| | | T - 6.3 | Develop Accident Prevention Plan | 8 | Assistant Site Manager | Site Manager | Project Completed | Completed |
| | | | | | (80 man hours) | GM Landfill Group | Jun-07 | |
| O-7 | Training | T - 7.1 | Continue to train staff on a regular basis in EMS system, waste licence and Emergency Response. | | Assistant Site Manager | Site Manager | Ongoing Annual Basis | To be adapted and incorporated into new time frame |
| O-8 | Operations | T - 8.1 | Encourage all site hauliers to comply fully with the Waste Collection Permit Regulations | | Site Manager | Site Manager | Completed | Completed |

### *8.2.2 Schedule of Objectives 2014*

Greenstar has set a schedule of targets and objectives for 2014. These are presented in Table 8.2.

**Table 8.2** Schedule of Targets and Objectives 2014

| Ref. No. | Objective | Ref. No. | Target | ENV Aspect | Resources Required | Person Responsible | Time Frame for Completion | Progress as of end of 2013 |
|---|---|---|---|---|---|---|---|---|
| O - 9 | Complete CRAMP | T-9.1 | Complete installation of final capping layer - Topsoil, seeding and hedgerows | 1,9 | Works programme - source topsoil- plant and labour hire, and supplies | Facility Manager | Dec-14 | 65% completion |
| | | T-9.2 | Complete installation of Surface Water Management System | 1,9 | Works programme - plant & labour and materials | Facility Manager | Dec-14 | Ongoing |
| | | T-9.3 | Removal of surplus equipment and materials etc. on site | 1,9 | Management time 40 hours | Facility Manager | Dec-14 | Ongoing- Removed excess materials and supplies for reuse at BNG landfill |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| O - 10 | Lower the environmental impacts associated with the Landfill in the aftercare phase, Landfill Gas and Leachate Management | T - 10.1 | Re-configure gas management plan, extraction, utilisation and recording for the site in aftercare. | 1,9 | Management time 20 hours | Assistant Manager | Jul-14 | Developed new protocols with Gas utilisation company BPS -Ongoing |
| | | T - 10.2 | Implement reduced but focused aftercare monitoring regime | 1.9 | Management time 116 hours | Assistant Manager | | |
| | | T - 10.3 | Review of best available technology and possible options for the management of landfill gas at decreasing quality and quantity into the future (utilisation and control) | 1,9 | Management hours 100, consultants 10-15k. | Assistant Manager | Jan-16 | None |
| | | T - 10.4 | Review of leachate treatment on site and remaining leachate quality | 1,9 | Management hours 30. | Assistant Manager | Jul-15 | Ongoing |
| | | T - 10.5 | Review of possible remote access and operation of leachate management system | 1,9 | Management hours 40, Consultant 5k | Assistant Manager | Dec-15 | Ongoing |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| O - 11 | Improve Health, Safety and Welfare of site employees, contractors and visitors | T-11.1 | Develop system and procedures for working alone and ensure lone worker equipment and responses are working | 8 | Management time 20 hours, equipment 2k | Assistant Manager | Dec-14 | Procedures in place and lone worker alarm in place |
| | | T-11.2 | Continue to train staff on a regular basis in EMS system, waste licence and Emergency Response. | 8 | Works programme - plant & labour and materials | Assistant Manager | Dec-14 | Ongoing |

# 9. OTHER REPORTS

## 9.1 Financial Provision

Under condition 12.3.3 of the site licence Kilcullen Landfill is required to maintain a financial provision that is sufficient to cover all liabilities incurred whilst carrying on the activities to which this licence relates. As part of the licence transfer from KTK Landfill Ltd to Kilcullen landfill Ltd, the CRAMP liability was recalculated and agreed with the Office for Environmental Enforcement as being €3.42M as at 1 January 2013. Financial provision, to the satisfaction of the Board of the EPA, was then put in place sufficient to cover the cost of this CRAMP liability.

As part of Condition 12.3.2, the Licensee has completed a fully costed Environmental Liabilities Risk Assessment for the site. This document outlines the potential unknown environmental liabilities associated with the landfill and estimates the possible cost of these liabilities. An environmental liability insurance policy has been taken out for €10M which is more than sufficient to cover any unforeseen event contemplated within the ELRA.

The licensee will submit the requested Section 53A Statement to the Agency in Quarter 2 of 2014. Please note that the return will be for the 11 month period ending 28th February 2014 to coincide with the effective date of transfer of the licence. The financial year end for Kilcullen Landfill Ltd is 31 December which will mean the S53 returns for 2014 will be for the ten month period ending 31 December and thereafter will be 12 month periods that will coincide with the licence year.

## 9.2 Landscape Programme

## 9.3 European Pollutant Release and Transfer Register

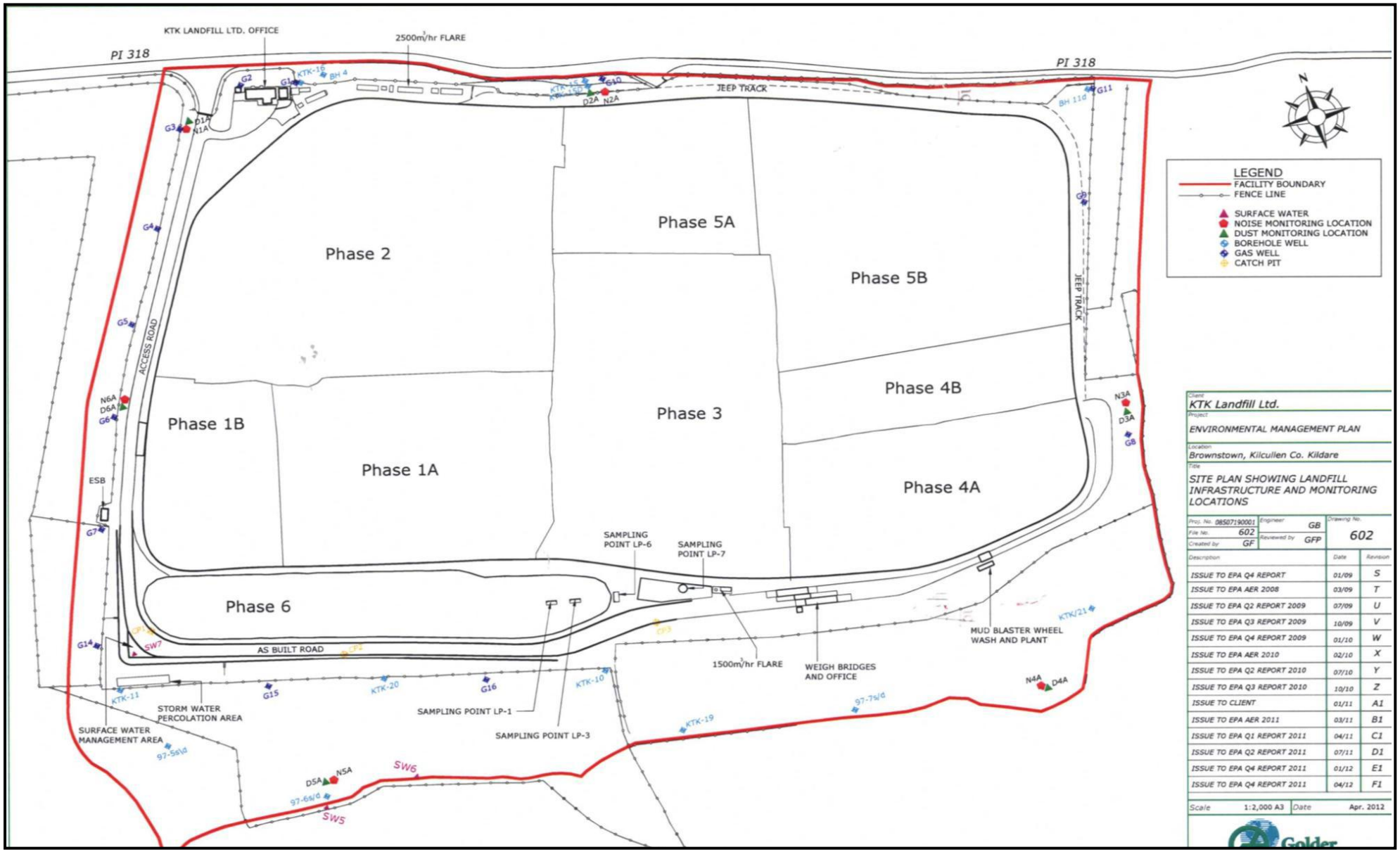
Under the European Pollutant Release and Transfer Register Regulation (EC) No. 166/2006 Kilcullen Landfill is required to submit information annually to the Agency. A copy of the information submitted to the Agency via the web-based data reporting system is included in Appendix 3.

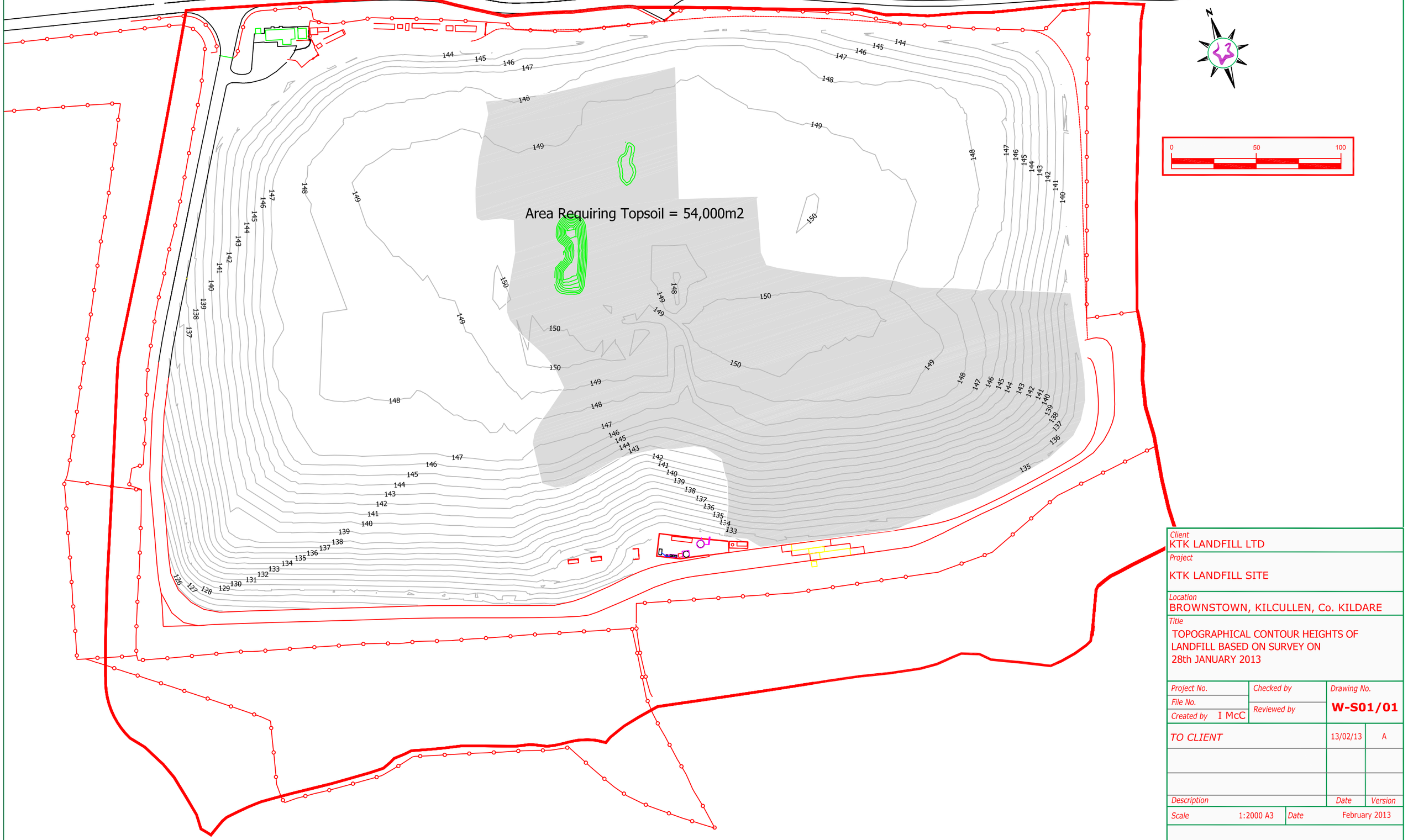
## 9.4 Tank, drum, pipeline and bund testing and inspection report

All integrity testing is carried out on site every three years. Testing was not required in 2013.

# APPENDIX 1

Topographic Survey with Monitoring Locations


KTK LANDFILL LTD. OFFICE
2500m³/hr FLARE
PI 318
PI 318
JEEP TRACK
Phase 2
Phase 5A
Phase 5B
Phase 1B
Phase 1A
Phase 3
Phase 4B
Phase 4A
Phase 6
ACCESS ROAD
JEEP TRACK
AS BUILT ROAD
ESB
SAMPLING POINT LP-6
SAMPLING POINT LP-7
SAMPLING POINT LP-1
SAMPLING POINT LP-3
1500m³/hr FLARE
WEIGH BRIDGES AND OFFICE
MUD BLASTER WHEEL WASH AND PLANT
STORM WATER PERCOLATION AREA
SURFACE WATER MANAGEMENT AREA
LEGEND
FACILITY BOUNDARY
FENCE LINE
SURFACE WATER
NOISE MONITORING LOCATION
DUST MONITORING LOCATION
BOREHOLE WELL
GAS WELL
CATCH PIT
Client
KTK Landfill Ltd.
Project
ENVIRONMENTAL MANAGEMENT PLAN
Location
Brownstown, Kilcullen Co. Kildare
Title
SITE PLAN SHOWING LANDFILL INFRASTRUCTURE AND MONITORING LOCATIONS
Proj. No. 0850719001
File No. 602
Created by GF
Engineer GB
Reviewed by GFP
Drawing No. 602
Description | Date | Revision
ISSUE TO EPA Q4 REPORT | 01/09 | S
ISSUE TO EPA AER 2008 | 03/09 | T
ISSUE TO EPA Q2 REPORT 2009 | 07/09 | U
ISSUE TO EPA Q3 REPORT 2009 | 10/09 | V
ISSUE TO EPA Q4 REPORT 2009 | 01/10 | W
ISSUE TO EPA AER 2010 | 02/10 | X
ISSUE TO EPA Q2 REPORT 2010 | 07/10 | Y
ISSUE TO EPA Q3 REPORT 2010 | 10/10 | Z
ISSUE TO CLIENT | 01/11 | A1
ISSUE TO EPA AER 2011 | 03/11 | B1
ISSUE TO EPA Q1 REPORT 2011 | 04/11 | C1
ISSUE TO EPA Q2 REPORT 2011 | 07/11 | D1
ISSUE TO EPA Q4 REPORT 2011 | 01/12 | E1
ISSUE TO EPA Q4 REPORT 2011 | 04/12 | F1
Scale 1:2,000 A3
Date Apr. 2012
Golder




| | | |
|---|---|---|
| Client | KTK LANDFILL LTD | |
| Project | KTK LANDFILL SITE | |
| Location | BROWNSTOWN, KILCULLEN, Co. KILDARE | |
| Title | TOPOGRAPHICAL CONTOUR HEIGHTS OF LANDFILL BASED ON SURVEY ON 28th JANUARY 2013 | |
| Project No. | Checked by | Drawing No. |
| File No. | Reviewed by | **W-S01/01** |
| Created by I McC | | |
| *TO CLIENT* | 13/02/13 | A |
| | | |
| | | |
| Description | Date | Version |
| Scale 1:2000 A3 | Date February 2013 | |

# APPENDIX 2

Monitoring Results 2013

# Groundwater Data 2013

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **BH11D** | **BH11D** | **BH11D** | **BH11D** | **BH11D** | **BH11D** | **BH11D** | **BH11D** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 6.7 | | | 9.3 |
| Dissolved Barium | µg/l | 50 | 52 | | | 52 | | | 50 |
| Dissolved Boron | µg/l | <12 | <12 | | | <12 | | | <12 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 120.5 | 128.6 | | | 116.8 | | | 114.4 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 8 | 5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 16.6 | 16 | | | 16.2 | | | 16.5 |
| Dissolved Manganese | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 0.001 |
| Dissolved Nickel | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | 0.8 | 0.8 | | | 0.9 | | | 0.7 |
| Dissolved Sodium | mg/l | 7.9 | 8.3 | | | 7.1 | | | 5.9 |
| Dissolved Zinc | µg/l | <3 | <3 | | | 4 | | | <3 |
| T Phosphorus | mg/l | 51 | 43 | | | 25 | | | 45 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 11.8 | 11.8 | | | 10.29 | | | 10.49 |
| Chloride | mg/l | 11.8 | 11.8 | | | 12 | | | 10.5 |
| Nitrate as NO3 | mg/l | 19.8 | 19.8 | | | 17.8 | | | 19.6 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | <0.03 | | | 0.3 | | | 0.03 |
| Total Alkalinity as CaCO3 | mg/l | 406 | 358 | | | 340 | | | 380 |
| DO | mg/l | 10 | 9 | | | 9 | | | 8 |
| Electrical Conductivity | Us/cm | 764 | 745 | | | 704 | | | 735 |
| TOC | mg/l | <2 | <2 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 3.1 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK15d** | **KTK15d** | **KTK15d** | **KTK15d** | **KTK15d** | **KTK15d** | **KTK15d** | **KTK15d** |
| Dissolved Arsenic | µg/l | <2.5 | 5.2 | | | 12.4 | | | 17.3 |
| Dissolved Barium | µg/l | - | 166 | | | 158 | | | 247 |
| Dissolved Boron | µg/l | - | 52 | | | 34 | | | 54 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 254.5 | 264.2 | | | 206.2 | | | 300.2 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | - | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 6 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 28.6 | 28.6 | | | 26.9 | | | 31.2 |
| Dissolved Manganese | µg/l | - | 3 | | | <2 | | | 1412 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 0.004 |
| Dissolved Nickel | µg/l | 8 | <2 | | | <2 | | | 18 |
| Dissolved Potassium | mg/l | 14 | 12.6 | | | 11.6 | | | 25 |
| Dissolved Sodium | mg/l | 18.4 | 20.4 | | | 16.9 | | | 15.1 |
| Dissolved Zinc | µg/l | 17 | 39 | | | 9 | | | 32 |
| T Phosphorus | mg/l | 28 | 45 | | | 22 | | | 26 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 56.58 | 10.06 | | | 53.7 | | | 81.71 |
| Chloride | mg/l | 29.2 | 11.7 | | | 32.1 | | | 35.1 |
| Nitrate as NO3 | mg/l | 34.1 | 18.8 | | | 33.1 | | | 27.6 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | 0.09 | | | 0.07 | | | 0.05 |
| Total Alkalinity as CaCO3 | mg/l | 738 | 662 | | | 602 | | | 716 |
| DO | mg/l | 6 | 8 | | | 8 | | | 6 |
| Electrical Conductivity | Us/cm | 1456 | 1414 | | | 1242 | | | 1,496 |
| TOC | mg/l | <2 | 8 | | | <2 | | | 6 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 26.9 |
| Faecal Coliform | µg/l | | | | | | | | 1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK16** | **KTK16** | **KTK16** | **KTK16** | **KTK16** | **KTK16** | **KTK16** | **KTK16** |
| Dissolved Arsenic | µg/l | 25.7 | | 27 | <0.9 | 28.3 | 11.4 | 40.5 | 16.2 |
| Dissolved Barium | µg/l | 515 | | 478.6 | 461.1 | 445 | 459 | 432 | 429 |
| Dissolved Boron | µg/l | 1,072 | | 1015 | 1098 | 1032 | 1035 | 1029 | 940 |
| Dissolved Cadmium | µg/l | <0.5 | | <0.03 | <0.03 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dissolved C | µg/l | 54.9 | | 55.7 | 45.3 | 37.7 | 48.9 | 48.4 | 44.2 |
| Total Dissolved Chromium | µg/l | 4.3 | | 4.3 | 4 | 3.2 | 2 | 4 | <1.5 |
| Dissolved Copper | µg/l | 39 | | 9 | 9 | <7 | 8 | 17 | <7 |
| Total Dissolved Iron | µg/l | 60 | | 499.9 | 50.7 | 49 | 49 | 151 | <20 |
| Dissolved Lead | µg/l | 8 | | <0.4 | 1.3 | <5 | <5 | <5 | <5 |
| Dissolved Magnesium | mg/l | 20.5 | | 19.5 | 22.4 | 18.8 | 23.3 | 25.6 | 23.3 |
| Dissolved Manganese | µg/l | 104 | | 122.8 | 119.7 | 93 | 111 | 111 | 103 |
| Dissolved Mercury | µg/l | <1 | | <0.5 | <0.5 | <1 | <1 | <1 | <1 |
| Dissolved Nickel | µg/l | 87 | | 78.4 | 85.9 | 74 | 78 | 80 | 73 |
| Dissolved Potassium | mg/l | 95.9 | | 102.6 | 94.3 | 82.4 | 110.2 | 129.2 | 125.9 |
| Dissolved Sodium | mg/l | 302.1 | | 265.5 | 340.1 | 299 | 300.2 | 337 | 344.7 |
| Dissolved Zinc | µg/l | 15 | | 20.9 | 12.3 | 6 | 5 | 22 | 15 |
| T Phosphorus | mg/l | 386 | | - | - | 97 | | | 88 |
| Total Phenols | µg/l | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fluoride | mg/l | <0.3 | | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| Sulphate | mg/l | <0.05 | | 0.64 | <0.05 | <0.05 | <0.05 | 0.18 | <0.05 |
| Chloride | mg/l | 271 | | 264.7 | 269 | 257 | 257.8 | 259.5 | 240.2 |
| Nitrate as NO3 | mg/l | 1.9 | | 0.2 | 20.3 | 20 | 68.6 | 4.7 | 6.2 |
| Nitrite as NO2 | µg/l | <0.02 | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.62 |
| Ortho Phosphate | mg/l | <0.06 | | <0.06 | <0.06 | 0.07 | <0.06 | <0.06 | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 203.89 | | 213.56 | 200.25 | 188.53 | 185.72 | 212.19 | 202.14 |
| Total Alkalinity as CaCO3 | mg/l | 1526 | | 1314 | 1310 | 1286 | 1240 | 1332 | 1,290 |
| DO | mg/l | 7 | | 7 | 6 | 9 | 5 | 11 | 8 |
| Electrical Conductivity | Us/cm | 3470 | | 3,317 | 3,306 | 3179 | 3,141 | 3,216 | 3,329 |
| TOC | mg/l | 29 | | 44 | 37 | 26 | | | 63 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | >2419.6 |
| Faecal Coliform | µg/l | | | | | | | | 87 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **97-4** | **97-4** | **97-4** | **97-4** | **97-4** | **97-4** | **97-4** | **97-4** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 5.9 | | | 11.2 |
| Dissolved Barium | µg/l | 44 | 45 | | | 54 | | | 39 |
| Dissolved Boron | µg/l | 24 | 21 | | | <12 | | | 12 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 136.6 | 143.1 | | | 126.6 | | | 138.5 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 8 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 7.9 | 7.9 | | | 8.4 | | | 7.2 |
| Dissolved Manganese | µg/l | <2 | <2 | | | 482 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 2 |
| Dissolved Nickel | µg/l | <2 | <2 | | | 3 | | | <2 |
| Dissolved Potassium | mg/l | <0.1 | 0.2 | | | 0.6 | | | <0.1 |
| Dissolved Sodium | mg/l | 2.6 | 3.4 | | | 3.5 | | | 3 |
| Dissolved Zinc | µg/l | 3 | <3 | | | 5 | | | <3 |
| T Phosphorus | mg/l | <5 | 20 | | | 19 | | | 0.02 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 2.18 | 3.26 | | | 0.76 | | | 2.32 |
| Chloride | mg/l | 1.7 | 2.6 | | | 3.3 | | | 1.8 |
| Nitrate as NO3 | mg/l | 0.8 | 0.5 | | | 33.1 | | | 0.5 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | 0.03 | | | 0.32 | | | <0.03 |
| Total Alkalinity as CaCO3 | mg/l | 424 | 392 | | | 374 | | | 364 |
| DO | mg/l | 8 | 6 | | | 5 | | | 5 |
| Electrical Conductivity | Us/cm | 737 | 725 | | | 665 | | | 651 |
| TOC | mg/l | 4 | <2 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 35.9 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **97-5D** | **97-5D** | **97-5D** | **97-5D** | **97-5D** | **97-5D** | **97-5D** | **97-5D** |
| Dissolved Arsenic | µg/l | 4.9 | <2.5 | 6.1 | <0.9 | 6.9 | <2.5 | 6.4 | 4.5 |
| Dissolved Barium | µg/l | 127 | 87 | 92.3 | 91.4 | 91 | 144 | 158 | 163 |
| Dissolved Boron | µg/l | 144 | 62 | 69 | 72 | 51 | 91 | 97 | 90 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | <0.03 | <0.03 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dissolved C | µg/l | 148.5 | 143.8 | 136.9 | 139.2 | 149.2 | 159.2 | 149.3 | 168.5 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | <0.2 | <0.2 | <1.5 | <1.5 | <1.5 | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | <3 | <3 | <7 | <7 | <7 | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | <4.7 | <4.7 | <20 | <20 | <20 | <20 |
| Dissolved Lead | µg/l | <5 | <5 | <0.4 | <0.4 | <5 | <5 | <5 | <5 |
| Dissolved Magnesium | mg/l | 18.5 | 16.9 | 15.6 | 16.1 | 17.1 | 16 | 16 | 15.1 |
| Dissolved Manganese | µg/l | <2 | <2 | 104.6 | <1.5 | <2 | 498 | 603 | 586 |
| Dissolved Mercury | µg/l | <1 | <1 | <0.5 | <0.5 | <1 | <1 | <1 | <1 |
| Dissolved Nickel | µg/l | 4 | <2 | 2.4 | 2 | <2 | 6 | 7 | 6 |
| Dissolved Potassium | mg/l | 5.9 | 2.1 | 2.8 | 1.7 | 2 | 2.3 | 2.2 | 2.6 |
| Dissolved Sodium | mg/l | 53.1 | 28.8 | 27.7 | 26.1 | 29.1 | 35.4 | 32.6 | 31.6 |
| Dissolved Zinc | µg/l | 3 | <3 | 8.7 | 3.2 | 4 | 4 | 7 | 7 |
| T Phosphorus | mg/l | 12 | 26 | - | - | 20 | | | 0.125 |
| Total Phenols | µg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| Sulphate | mg/l | 49.2 | 14.95 | 17.18 | 12.19 | 17.81 | 99.66 | 97.09 | 110.62 |
| Chloride | mg/l | 52.8 | 35 | 36.7 | 38.3 | 37.5 | 42 | 40.9 | 38.4 |
| Nitrate as NO3 | mg/l | 6.8 | 10.8 | 8.9 | 10 | 10.9 | 3.8 | 1.6 | 0.8 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 2.17 | 0.1 | 0.11 | 0.05 | 0.05 | 0.23 | 0.16 | 0.23 |
| Total Alkalinity as CaCO3 | mg/l | 472 | 394 | 444 | 424 | 420 | 420 | 392 | 386 |
| DO | mg/l | 8 | 6 | 7 | 7 | 7 | 7 | 5 | 7 |
| Electrical Conductivity | Us/cm | 1094 | 894 | 949 | 913 | 912 | 972 | 972 | 997 |
| TOC | mg/l | <2 | <2 | <2 | <2 | <2 | - | | <2 |
| VOCs (TICs) | µg/l | | | | | | | ND | |
| Semi - VOCs | µg/l | | | | | | | ND | |
| Pesticides MS | µg/l | | | | | | | ND | |
| Total Coliform | µg/l | | | | | | | 298.7 | |
| Faecal Coliform | µg/l | | | | | | | 1 | |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | 97-6D | 97-6D | 97-6D | 97-6D | 97-6D | 97-6D | 97-6D | 97-6D | 97-6D |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 7.9 | | | 5.4 |
| Dissolved Barium | µg/l | 108 | 104 | | | 101 | | | 98 |
| Dissolved Boron | µg/l | 65 | 59 | | | 40 | | | 47 |
| Dissolved Cadmium | µg/l | <0.5 | 0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 144.6 | 153.4 | | | 143.8 | | | 147.8 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.4 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | 30 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | <5 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 18.8 | 18.6 | | | 17.8 | | | 18.4 |
| Dissolved Manganese | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | <1 |
| Dissolved Nickel | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | 1.9 | 1.6 | | | 1.6 | | | 1.5 |
| Dissolved Sodium | mg/l | 25.8 | 23.8 | | | 18.6 | | | 19.2 |
| Dissolved Zinc | µg/l | <3 | <3 | | | <3 | | | 3 |
| T Phosphorus | mg/l | 8 | 24 | | | 10 | | | 0.015 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 16.11 | 16.49 | | | 17.96 | | | 18.95 |
| Chloride | mg/l | 32.5 | 27.1 | | | 26.8 | | | 25.9 |
| Nitrate as NO3 | mg/l | 10.5 | 9.9 | | | 10.7 | | | 9.6 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 0.13 | 0.3 | | | 0.23 | | | 0.26 |
| Total Alkalinity as CaCO3 | mg/l | 464 | 422 | | | 440 | | | 422 |
| DO | mg/l | 7 | 8 | | | 7 | | | 7 |
| Electrical Conductivity | Us/cm | 964 | 916 | | | 888 | | | 863 |
| TOC | mg/l | 4 | <2 | | | >2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 488.4 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **97-7** | **97-7** | **97-7** | **97-7** | **97-7** | **97-7** | **97-7** | **97-7** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 7.2 | | | 5.8 |
| Dissolved Barium | µg/l | 70 | 76 | | | 73 | | | 79 |
| Dissolved Boron | µg/l | 14 | 16 | | | <12 | | | 13 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 100.5 | 141.7 | | | 127.7 | | | 109.5 |
| Total Dissolved Chromium | µg/l | 2.7 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 7 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 15.3 | 17.3 | | | 16 | | | 16.8 |
| Dissolved Manganese | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 2 |
| Dissolved Nickel | µg/l | 3 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | <0.1 | 0.6 | | | 0.6 | | | 0.5 |
| Dissolved Sodium | mg/l | 8.3 | 10.7 | | | 8.3 | | | 7.9 |
| Dissolved Zinc | µg/l | <3 | 4 | | | <3 | | | <3 |
| T Phosphorus | mg/l | 32 | 27 | | | 9 | | | 0.021 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 13.39 | 16.34 | | | 17.69 | | | 18.76 |
| Chloride | mg/l | 14.9 | 17.5 | | | 17.4 | | | 14.3 |
| Nitrate as NO3 | mg/l | 17.8 | 17.5 | | | 19.9 | | | 13.3 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | <0.03 | | | 0.09 | | | <0.03 |
| Total Alkalinity as CaCO3 | mg/l | 396 | 380 | | | 398 | | | 370 |
| DO | mg/l | 10 | 8 | | | 8 | | | 7 |
| Electrical Conductivity | Us/cm | 751 | 818 | | | 830 | | | 744 |
| TOC | mg/l | <2 | <2 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | <1 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK-10** | **KTK-10** | **KTK-10** | **KTK-10** | **KTK-10** | **KTK-10** | **KTK-10** | **KTK-10** |
| Dissolved Arsenic | µg/l | 2.7 | <2.5 | | | 3.1 | | | 6.2 |
| Dissolved Barium | µg/l | 67 | 63 | | | 40 | | | 44 |
| Dissolved Boron | µg/l | 16 | 15 | | | <12 | | | 12 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 131.8 | 131.8 | | | 87.9 | | | 72.9 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | <5 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 14.3 | 12.1 | | | 7.9 | | | 8.2 |
| Dissolved Manganese | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | <1 |
| Dissolved Nickel | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | 0.9 | 0.2 | | | 0.4 | | | 0.2 |
| Dissolved Sodium | mg/l | 16.4 | 12.8 | | | 12.8 | | | 26.4 |
| Dissolved Zinc | µg/l | <3 | 4 | | | 12 | | | <3 |
| T Phosphorus | mg/l | 6 | 55 | | | 18 | | | 0.018 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 34.89 | 15.96 | | | 36.1 | | | 59.88 |
| Chloride | mg/l | 23 | 16.1 | | | 14.3 | | | 30 |
| Nitrate as NO3 | mg/l | 5.9 | 4.1 | | | 4.3 | | | 4.7 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | 0.04 | | | 0.03 | | | <0.03 |
| Total Alkalinity as CaCO3 | mg/l | 402 | 348 | | | 242 | | | 220 |
| DO | mg/l | 12 | 9 | | | 8 | | | 9 |
| Electrical Conductivity | Us/cm | 820 | 731 | | | 540 | | | 603 |
| TOC | mg/l | 3 | 3 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | >2419 |
| Faecal Coliform | µg/l | | | | | | | | 4 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK-11** | **KTK-11** | **KTK-11** | **KTK-11** | **KTK-11** | **KTK-11** | **KTK-11** | **KTK-11** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | 6.7 | <0.9 | 8.4 | <2.5 | 11.8 | 7.3 |
| Dissolved Barium | µg/l | 145 | 137 | 121.7 | 122.4 | 115 | 95 | 101 | 112 |
| Dissolved Boron | µg/l | 302 | 246 | 223 | 220 | 188 | 138 | 11 | 152 |
| Dissolved Cadmium | µg/l | <0.5 | 0.6 | 0.25 | 0.5 | <0.5 | 0.5 | 0.7 | 0.6 |
| Dissolved C | µg/l | 145 | 153.1 | 126.8 | 134.5 | 136.3 | 155.7 | 163.4 | 186.8 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | <0.2 | 1 | <1.5 | <1.5 | 2.3 | 1.6 |
| Dissolved Copper | µg/l | <7 | <7 | <3 | 4 | <7 | <7 | <7 | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | 8.7 | <4.7 | <20 | <20 | <20 | <20 |
| Dissolved Lead | µg/l | 6 | 7 | 1.4 | 2.7 | <5 | <5 | <5 | <5 |
| Dissolved Magnesium | mg/l | 14.8 | 16 | 13.4 | 13.2 | 12.2 | 23.3 | 14.4 | 15.4 |
| Dissolved Manganese | µg/l | 2514 | 1521 | 1595 | 1825 | 2243 | 2130 | 2210 | 1995 |
| Dissolved Mercury | µg/l | <1 | <1 | <0.5 | <0.5 | <1 | <1 | <1 | <1 |
| Dissolved Nickel | µg/l | 25 | 15 | 16 | 16.3 | 16 | 10 | 11 | 12 |
| Dissolved Potassium | mg/l | 19 | 13.3 | 16.9 | 14.1 | 15.4 | 12.8 | 10 | 9.8 |
| Dissolved Sodium | mg/l | 57.4 | 68.4 | 58.7 | 50.1 | 34.5 | 31.8 | 36.4 | 42.2 |
| Dissolved Zinc | µg/l | 6 | 5 | 8 | 7.3 | 8 | 4 | 7 | 6 |
| T Phosphorus | mg/l | 15 | 22 | - | - | 21 | | | 0.021 |
| Total Phenols | µg/l | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| Sulphate | mg/l | 112.16 | 112.16 | 60.89 | 85.25 | 96.02 | 80.4 | 87.62 | 82.92 |
| Chloride | mg/l | 65.8 | 65.8 | 81.5 | 66 | 49 | 43.2 | 48 | 50.8 |
| Nitrate as NO3 | mg/l | <0.2 | <0.2 | 1.7 | 1.2 | 3.8 | 8.6 | 12 | 4 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | 0.24 | <0.06 | <0.06 | <0.06 | <0.06 | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 26.95 | 15.77 | 26.49 | 17.57 | 19.91 | 8.25 | 5.72 | 6.28 |
| Total Alkalinity as CaCO3 | mg/l | 514 | 514 | 472 | 430 | 406 | 394 | 420 | 442 |
| DO | mg/l | 8 | 9 | 6 | 7 | 7 | | 5 | 6 |
| Electrical Conductivity | Us/cm | 1331 | 1286 | 1,300 | 1,182 | 1127 | 980 | 1,069 | 1156 |
| TOC | mg/l | 8 | 8 | <2 | 7 | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | <1 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK-19** | **KTK-19** | **KTK-19** | **KTK-19** | **KTK-19** | **KTK-19** | **KTK-19** | **KTK-19** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 5.9 | | | 2.9 |
| Dissolved Barium | µg/l | 140 | 152 | | | 137 | | | 141 |
| Dissolved Boron | µg/l | 37 | 34 | | | 23 | | | 34 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 81.9 | 86.8 | | | 82.3 | | | 83.9 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 11 | 6 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 23.3 | 23.8 | | | 22.4 | | | 24 |
| Dissolved Manganese | µg/l | <2 | 342 | | | <2 | | | 574 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | <1 |
| Dissolved Nickel | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | 1 | 1.5 | | | 1.5 | | | 1.5 |
| Dissolved Sodium | mg/l | 14.4 | 16.7 | | | 14.2 | | | 17.5 |
| Dissolved Zinc | µg/l | <3 | 3 | | | <3 | | | 4 |
| T Phosphorus | mg/l | 128 | 152 | | | 66 | | | 0.054 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | 0.4 | 0.5 | | | 0.5 | | | 0.4 |
| Sulphate | mg/l | 23.13 | 22.5 | | | 25.55 | | | 27.78 |
| Chloride | mg/l | 10.2 | 10.4 | | | 10.9 | | | 10 |
| Nitrate as NO3 | mg/l | <0.2 | 0.4 | | | <0.2 | | | <0.2 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 0.18 | 0.18 | | | 0.19 | | | 0.17 |
| Total Alkalinity as CaCO3 | mg/l | 368 | 468 | | | 322 | | | 320 |
| DO | mg/l | 8 | 8 | | | 7 | | | 7 |
| Electrical Conductivity | Us/cm | 640 | 626 | | | 605 | | | 634 |
| TOC | mg/l | 6 | 2 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 5.1 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK-20** | **KTK-20** | **KTK-20** | **KTK-20** | **KTK-20** | **KTK-20** | **KTK-20** | **KTK-20** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 8.3 | | | 7.7 |
| Dissolved Barium | µg/l | 244 | 245 | | | 237 | | | 223 |
| Dissolved Boron | µg/l | 16 | 19 | | | <12 | | | 15 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 130.1 | 147.7 | | | 130 | | | 121.4 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 11 | 6 | | | <5 | | | 5 |
| Dissolved Magnesium | mg/l | 27 | 28.2 | | | 25.4 | | | 28.5 |
| Dissolved Manganese | µg/l | <2 | 643 | | | 77 | | | 705 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 2 |
| Dissolved Nickel | µg/l | 3 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | 0.8 | 1.2 | | | 1.3 | | | 1.2 |
| Dissolved Sodium | mg/l | 12.4 | 12.9 | | | 11.4 | | | 13.1 |
| Dissolved Zinc | µg/l | <3 | <3 | | | <3 | | | 3 |
| T Phosphorus | mg/l | 38 | 76 | | | 72 | | | 0.472 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | 0.4 | 0.4 | | | 0.4 | | | 0.4 |
| Sulphate | mg/l | 48.14 | 52.51 | | | 50.87 | | | 53.78 |
| Chloride | mg/l | 13.7 | 14.7 | | | 15.6 | | | 14.2 |
| Nitrate as NO3 | mg/l | <0.2 | 0.3 | | | 0.6 | | | <0.2 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | 0.65 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 0.12 | 0.16 | | | 0.12 | | | 0.16 |
| Total Alkalinity as CaCO3 | mg/l | 450 | 420 | | | 432 | | | 708 |
| DO | mg/l | 11 | 6 | | | 7 | | | 4 |
| Electrical Conductivity | Us/cm | 888 | 884 | | | 884 | | | 856 |
| TOC | mg/l | <2 | 3 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | <1 |
| Faecal Coliform | µg/l | | | | | | | | <1 |

| | | Mar-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **KTK 21** | **KTK 21** | **KTK 21** | **KTK 21** | **KTK 21** | **KTK 21** | **KTK 21** | **KTK 21** |
| Dissolved Arsenic | µg/l | <2.5 | <2.5 | | | 7.1 | | | 9.9 |
| Dissolved Barium | µg/l | 63 | 92 | | | 73 | | | 68 |
| Dissolved Boron | µg/l | 17 | 14 | | | <12 | | | <12 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 | | | <0.5 | | | <0.5 |
| Dissolved C | µg/l | 112 | 141.8 | | | 125.7 | | | 127.9 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 | | | <1.5 | | | <1.5 |
| Dissolved Copper | µg/l | <7 | <7 | | | <7 | | | <7 |
| Total Dissolved Iron | µg/l | <20 | <20 | | | <20 | | | <20 |
| Dissolved Lead | µg/l | 5 | <5 | | | <5 | | | <5 |
| Dissolved Magnesium | mg/l | 12 | 12.4 | | | 16.5 | | | 11.9 |
| Dissolved Manganese | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Mercury | µg/l | <1 | <1 | | | <1 | | | 1 |
| Dissolved Nickel | µg/l | <2 | <2 | | | <2 | | | <2 |
| Dissolved Potassium | mg/l | <0.1 | 0.3 | | | 0.6 | | | 0.2 |
| Dissolved Sodium | mg/l | 3.2 | 3.6 | | | 8.6 | | | 2.5 |
| Dissolved Zinc | µg/l | <3 | <3 | | | <3 | | | <3 |
| T Phosphorus | mg/l | 1526 | 635 | | | 10 | | | 0.3 |
| Total Phenols | µg/l | <0.1 | <0.1 | | | <0.1 | | | <0.1 |
| Fluoride | mg/l | <0.3 | <0.3 | | | <0.3 | | | <0.3 |
| Sulphate | mg/l | 2.64 | 3.37 | | | 12.7 | | | 10.49 |
| Chloride | mg/l | 2.6 | 3.1 | | | 17.9 | | | 10.5 |
| Nitrate as NO3 | mg/l | 0.5 | 1.1 | | | 21.1 | | | 19.6 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 | | | <0.02 | | | <0.02 |
| Ortho Phosphate | mg/l | <0.06 | <0.06 | | | <0.06 | | | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | <0.03 | 0.05 | | | <0.03 | | | 0.03 |
| Total Alkalinity as CaCO3 | mg/l | 466 | 358 | | | 366 | | | 380 |
| DO | mg/l | 7 | 7 | | | 9 | | | 8 |
| Electrical Conductivity | Us/cm | 745 | 740 | | | 769 | | | 735 |
| TOC | mg/l | 5 | 3 | | | <2 | | | <2 |
| VOCs (TICs) | µg/l | | | | | | | | ND |
| Semi - VOCs | µg/l | | | | | | | | ND |
| Pesticides MS | µg/l | | | | | | | | ND |
| Total Coliform | µg/l | | | | | | | | 74.8 |
| Faecal Coliform | µg/l | | | | | | | | 22 |

| | | Pri 1 EC | Pri 2 CK |
|---|---|---|---|
| | **Units** | **Dec-13** | **Dec-13** |
| Dissolved Arsenic | µg/l | 6.8 | 3.2 |
| Dissolved Barium | µg/l | 24 | 22 |
| Dissolved Boron | µg/l | 19 | <12 |
| Dissolved Cadmium | µg/l | <0.5 | <0.5 |
| Dissolved Calcium | µg/l | 106 | 46.4 |
| Total Dissolved Chromium | µg/l | <1.5 | <1.5 |
| Dissolved Copper | µg/l | 29 | 11 |
| Total Dissolved Iron | µg/l | <20 | <20 |
| Dissolved Lead | µg/l | <5 | <5 |
| Dissolved Magnesium | mg/l | 4.7 | 4.6 |
| Dissolved Manganese | µg/l | 8 | 6 |
| Dissolved Mercury | µg/l | 1 | 2 |
| Dissolved Nickel | µg/l | <2 | <2 |
| Dissolved Potassium | mg/l | 1.9 | 0.5 |
| Dissolved Sodium | mg/l | 2 | 5.7 |
| Dissolved Zinc | µg/l | <3 | 41 |
| Total Phosphorus | mg/l | 0.161 | 0.047 |
| Total Phenols HPLC | µg/l | <0.1 | <0.1 |
| Fluoride | mg/l | <0.3 | 0.6 |
| Sulphate | mg/l | 12.29 | 20.86 |
| Chloride | mg/l | 1.7 | 9.9 |
| Nitrate as NO3 | mg/l | <0.2 | 1.7 |
| Nitrite as NO2 | µg/l | <0.02 | <0.02 |
| Ortho Phosphate as PO4 | mg/l | <0.06 | <0.06 |
| Ammoniacal Nitrogen as N | mg/l | 0.03 | <0.03 |
| Total Alkalinity as CaCO3 | mg/l | 306 | 128 |
| Dissolved Oxygen | mg/l | 5 | 10 |
| Electrical Conductivity @25C | Us/cm | 564 | 323 |
| Total Organic Carbon | mg/l | <2 | <2 |

# Surface Water Data 2013

| SW4 | Units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | <2 | 2 | 2 | 7 |
| Zinc | ug/l | 18 | <0.2 | 10 | 3 |
| Mercury | ug/l | 0.092 | <0.0001 | <0.013 | <0.013 |
| Nickel | ug/l | 6 | <0.2 | 3 | 5 |
| Manganese | ug/l | 108 | 0.4 | 5480 | 43 |
| Magnesium | ug/l | 13.3 | 11.2 | 12.7 | 7.1 |
| Lead | ug/l | 1.5 | <0.2 | 1.7 | |
| Iron | ug/l | 849 | <0.2 | 3327 | 207 |
| Copper | ug/l | 18 | <0.2 | 17 | 36 |
| Chromium | ug/l | 2 | <0.2 | 1 | 2 |
| Cadmium | ug/l | 0.5 | <0.2 | 0.7 | 0.2 |
| Boron | ug/l | 140 | 94 | 105 | <50 |
| Ortho-Phosphate | mg/l | <0.025 | <0.025 | 0.073 | 0.03 |
| Sulphate | mg/l | 21.2 | 28 | | <20 |
| Sodium | mg/l | 38.3 | 35.8 | 26.8 | 15.3 |
| Potassium | mg/l | 2.8 | 3.8 | | 3 |
| Phosphorous | mg/l | <0.05 | <2 | | <0.05 |
| Chloride | mg/l | <10 | <50 | 27.76 | 22.5 |
| Calcium | mg/l | 146 | 133 | 241 | 150 |
| Ammonia | mg/l | 0.02 | <1 | | 0.05 |
| TOC | mg/l | 4 | 7.04 | 8.48 | 14.29 |
| Nitrate | mg/l | 2.48 | <4.8 | <2 | <2 |
| Nitrite | mg/l | 0.06 | 0.04 | 0.01 | 0.01 |
| Akalinity | mg/l | <30 | 45 | | 276 |
| TSS | mg/l | 13 | 10 | 26 | 15 |
| Dissolved Oxygen | mg/l | 10.4 | 10.4 | 2 | 9.8 |
| Conductivity | us/cm | 971 | 987 | 1050 | 638 |
| COD | mg/l | 21 | 32 | 43 | 46 |
| pH | pH units | 7.5 | 7.31 | | 7.5 |

| SW5 | Units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | <2 | 20 | | 4 |
| Zinc | ug/l | 11 | <0.2 | | 32 |
| Mercury | ug/l | <0.0130 | <0.0001 | | <0.013 |
| Nickel | ug/l | 2 | <0.2 | | 4 |
| Manganese | ug/l | 237 | 0.4 | | 0.9 |
| Magnesium | ug/l | 6.6 | 7.1 | | 6.7 |
| Lead | ug/l | 1 | <0.2 | | 2.1 |
| Iron | ug/l | 9360 | 4.9 | | 21.1 |
| Copper | ug/l | 24 | <0.2 | | 34 |
| Chromium | ug/l | 1 | <0.2 | | 1 |
| Cadmium | ug/l | 0.9 | <0.2 | | 1 |
| Boron | ug/l | <50 | <50 | | <50 |
| Ortho-Phosphate | mg/l | 0.032 | 0.3 | | 0.052 |
| Sulphate | mg/l | <20 | <20 | | <20 |
| Sodium | mg/l | 8 | 7.9 | | 9 |
| Potassium | mg/l | <0.4 | <0.4 | | 4.6 |
| Phosphorous | mg/l | 0.68 | <2 | | 0.59 |
| Chloride | mg/l | <10 | <50 | | 16.1 |
| Calcium | mg/l | 107 | 118 | | 111 |
| Ammonia | mg/l | <0.01 | <1 | | 0.09 |
| TOC | mg/l | 8.1 | 11.37 | | 32.95 |
| Nitrate | mg/l | 2.52 | <4.8 | | <2 |
| Nitrite | mg/l | <0.005 | <0.01 | | 0.01 |
| Akalinity | mg/l | 229 | 298 | | 192 |
| TSS | mg/l | 11 | 36 | | 60 |
| Dissolved Oxygen | mg/l | 9.6 | 9 | | 9.5 |
| Conductivity | us/cm | 612 | 629 | | 453 |
| COD | mg/l | 36 | 54 | | |
| pH | pH units | 7.33 | 7.42 | | 7.35 |

| SW6 | Units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | 2 | 22 | | 5 |
| Zinc | ug/l | 4 | <0.2 | | 11 |
| Mercury | ug/l | <0.0130 | <0.0001 | | <0.013 |
| Nickel | ug/l | 1 | <0.2 | | 3 |
| Manganese | ug/l | 432 | 0.3 | | 384 |
| Magnesium | ug/l | 4.9 | 5.9 | | 6.1 |
| Lead | ug/l | 1.2 | <0.2 | | 1 |
| Iron | ug/l | 5578 | 1.3 | | 1.9 |
| Copper | ug/l | 27 | <0.2 | | 31 |
| Chromium | ug/l | 1 | <0.2 | | 1 |
| Cadmium | ug/l | 0.6 | <0.2 | | 0.5 |
| Boron | ug/l | <50 | <50 | | <50 |
| Ortho-Phosphate | mg/l | <0.025 | <0.025 | | 0.062 |
| Sulphate | mg/l | <20 | <20 | | <20 |
| Sodium | mg/l | 7.1 | 8 | | 9.1 |
| Potassium | mg/l | <0.4 | <0.4 | | 3.6 |
| Phosphorous | mg/l | 0.36 | <2 | | 0.15 |
| Chloride | mg/l | 12.32 | <50 | | 16.18 |
| Calcium | mg/l | 95.4 | 109 | | 100 |
| Ammonia | mg/l | <0.01 | <1 | | 0.07 |
| TOC | mg/l | 12 | 11.73 | | 24.54 |
| Nitrate | mg/l | <2 | <4.8 | | <2 |
| Nitrite | mg/l | <0.005 | <0.01 | | 0.1 |
| Akalinity | mg/l | 187 | 266 | | 162 |
| TSS | mg/l | 20 | 36 | | 16 |
| Dissolved Oxygen | mg/l | 9.5 | 9.1 | | 8.8 |
| Conductivity | us/cm | 503 | 597 | | 381 |
| COD | mg/l | 69 | 53 | | 55 |
| pH | pH units | 7.04 | 7.05 | | 7.03 |

| SW7 | Units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | <2 | 2 | | 2 |
| Zinc | ug/l | 2 | <0.2 | | 2 |
| Mercury | ug/l | 0.015 | 0.0004 | | <0.013 |
| Nickel | ug/l | 4 | <0.2 | | 3 |
| Manganese | ug/l | 111 | 1.1 | | 22 |
| Magnesium | ug/l | 12.4 | 9.8 | | 9.4 |
| Lead | ug/l | 1.7 | <0.2 | | 2 |
| Iron | ug/l | 74 | <0.2 | | 76 |
| Copper | ug/l | 17 | <0.2 | | 27 |
| Chromium | ug/l | 1 | <0.2 | | 1 |
| Cadmium | ug/l | 0.4 | <0.2 | | 0.5 |
| Boron | ug/l | <50 | <50 | | <50 |
| Ortho-Phosphate | mg/l | <0.025 | <0.025 | | <0.025 |
| Sulphate | mg/l | 137.8 | 98.3 | | 145 |
| Sodium | mg/l | 31.7 | 23.3 | | 23.3 |
| Potassium | mg/l | 3.3 | 3.2 | | 2.6 |
| Phosphorous | mg/l | <0.05 | <2 | | <0.05 |
| Chloride | mg/l | 68.36 | 50 | | 39.09 |
| Calcium | mg/l | 179 | 163 | | 207 |
| Ammonia | mg/l | 0.04 | 1.31 | | 0.65 |
| TOC | mg/l | 7.1 | 6.39 | | 7.13 |
| Nitrate | mg/l | <2 | <4.8 | | <2 |
| Nitrite | mg/l | 0.04 | 0.03 | | 0.01 |
| Akalinity | mg/l | 247 | 274 | | 247 |
| TSS | mg/l | 5 | 18 | | <2 |
| Dissolved Oxygen | mg/l | 10.5 | 10.4 | | 11.6 |
| Conductivity | us/cm | 1124 | 957 | | 797 |
| COD | mg/l | 23 | 25 | | 15 |
| pH | pH units | 7.86 | 7.73 | | 787 |

# Leachate Data 2013

| LP1 | units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | 237 | 544 | 220 | 186 |
| Zinc | ug/l | 0.41 | <0.2 | <0.2 | <0.2 |
| Mercury | ug/l | <0.0001 | 0.00031 | <0.00006 | 0.00035 |
| Nickel | ug/l | 0.2 | 0.2 | 0.2 | 0.2 |
| Manganese | ug/l | 0.2 | 0.3 | 0.2 | 0.2 |
| Magnesium | ug/l | 42.8 | 46.4 | 44.4 | 74.2 |
| Lead | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Iron | ug/l | 10.8 | 2.6 | 10 | 1.8 |
| Copper | ug/l | 0.8 | 0.7 | 0.5 | <0.2 |
| Chromium | ug/l | 0.3 | 0.4 | 0.3 | 0.3 |
| Cadmium | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Boron | ug/l | 9930 | 13600 | 11100 | 14500 |
| Ortho-Phosphate | mg/l | 13.528 | 17.272 | 0.21 | 11.016 |
| Sulphate | mg/l | 160.9 | 54.8 | 83.9 | 1120 |
| Sodium | mg/l | 1700 | 1560 | 1620 | 2100 |
| Potassium | mg/l | 709 | 440 | 649 | 746 |
| Phosphorous | mg/l | 15.35 | 12.45 | 16.1 | 20.2 |
| Chloride | mg/l | 6066 | 2455 | 1702 | 189 |
| Calcium | mg/l | 33 | 37.1 | 34.1 | 46.5 |
| Ammonia | mg/l | 2113.74 | 1717.98 | 1732.45 | 1782.56 |
| TOC | mg/l | | | | |
| Nitrate | mg/l | | | | |
| Nitrite | mg/l | | | | |
| Akalinity | mg/l | | | | |
| TSS | mg/l | 128 | 20 | 52 | 8 |
| Dissolved Oxygen | mg/l | | | | |
| Conductivity | us/cm | 19340 | 30200 | 25100 | 22800 |
| COD | mg/l | 4780 | 5160 | 4810 | 4870 |
| pH | pH units | 7.7 | 7.78 | 7.83 | 7.55 |
| cyanide | mg/l | 0.025 | 0.051 | <0.050 | <0.2 |

| LP3 | units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | 219 | 565 | 219 | 179 |
| Zinc | ug/l | <0.2 | <0.2 | <.2 | <0.2 |
| Mercury | ug/l | <0.0001 | 0.0002 | <0.00006 | 0.00023 |
| Nickel | ug/l | 0.2 | 0.2 | <0.2 | 0.23 |
| Manganese | ug/l | 0.2 | 0.3 | 0.2 | 0.2 |
| Magnesium | ug/l | 41.4 | 49.6 | 30.1 | 61.5 |
| Lead | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Iron | ug/l | 3.6 | 1.7 | 1 | 0.8 |
| Copper | ug/l | <0.2 | 0.2 | <0.2 | <0.2 |
| Chromium | ug/l | 0.3 | 0.3 | 0.3 | 0.3 |
| Cadmium | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Boron | ug/l | 8430 | 13300 | 9660 | 13600 |
| Ortho-Phosphate | mg/l | 12.867 | 16.398 | 0.239 | 8.908 |
| Sulphate | mg/l | 139.1 | <20 | 72 | 88.9 |
| Sodium | mg/l | 1540 | 1770 | 1090 | 1550 |
| Potassium | mg/l | 554 | 569 | 416 | 568 |
| Phosphorous | mg/l | 13.25 | 9.9 | 14.1 | 16.5 |
| Chloride | mg/l | 5138 | 2249 | 1600 | 1586 |
| Calcium | mg/l | 31.3 | 40.9 | 20 | 40.7 |
| Ammonia | mg/l | 2050.41 | 1740.61 | 189.17 | 1614.09 |
| TOC | mg/l | 1500 | | 1005.84 | |
| Nitrate | mg/l | <4.8 | <4.8 | <4.8 | |
| Nitrite | mg/l | | | | |
| Akalinity | mg/l | | | | |
| TSS | mg/l | 100 | 4 | 32 | 4 |
| Dissolved Oxygen | mg/l | | | | |
| Conductivity | us/cm | 21300 | 27200 | 26300 | 20180 |
| COD | mg/l | 4080 | 4660 | 5110 | 4720 |
| pH | pH units | 7.61 | 7.72 | 7.86 | 7.61 |
| cyanide | mg/l | 0.056 | 0.07 | 0.05 | <0.2 |

| LP6 | units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | 146 | 139 | 135 | 139 |
| Zinc | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Mercury | ug/l | <0.0001 | 0.00007 | <0.00006 | 0.00031 |
| Nickel | ug/l | <0.2 | 0.2 | 0.2 | <0.2 |
| Manganese | ug/l | 0.4 | 0.5 | 0.5 | 0.5 |
| Magnesium | ug/l | 44.8 | 54.2 | 41.4 | 71.3 |
| Lead | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Iron | ug/l | 0.8 | 0.5 | 0.3 | 0.3 |
| Copper | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Chromium | ug/l | 0.3 | 0.3 | 0.3 | 0.3 |
| Cadmium | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Boron | ug/l | 7720 | 12100 | 10600 | 13100 |
| Ortho-Phosphate | mg/l | 11.421 | 14.782 | 0.276 | 8.764 |
| Sulphate | mg/l | 189.3 | <20 | 78.7 | 87.7 |
| Sodium | mg/l | 1220 | 1620 | 1160 | 1550 |
| Potassium | mg/l | 512 | 515 | 483 | 623 |
| Phosphorous | mg/l | 11.5 | 10.85 | 15.2 | 13.9 |
| Chloride | mg/l | 1549 | 2191 | 1836 | 1586 |
| Calcium | mg/l | 66.1 | 62 | 54.7 | 101 |
| Ammonia | mg/l | 1598.42 | 1584.51 | 1844.15 | 1438.78 |
| TOC | mg/l | | | | |
| Nitrate | mg/l | | | | |
| Nitrite | mg/l | | | | |
| Akalinity | mg/l | | | | |
| TSS | mg/l | 276 | 60 | 64 | 42 |
| Dissolved Oxygen | mg/l | | | | |
| Conductivity | us/cm | 2560 | 27900 | 24500 | 16000 |
| COD | mg/l | 3610 | 4530 | 4400 | 3480 |
| pH | pH units | 7.81 | 7.8 | 7.76 | 7.47 |
| cyanide | mg/l | 0.031 | 0.069 | <0.050 | <0.20 |
| Flouride | mg/l | 0.7 | 0.9 | 1 | 0.9 |
| TON | mg/l | <5 | <5 | <5 | 6.64 |

| LP7 | units | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|---|
| CBODS | mg/l | 172 | 149 | 224 | 218 |
| Zinc | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Mercury | ug/l | <0.0001 | 0.00015 | <0.00006 | 0.00019 |
| Nickel | ug/l | 0.2 | 0.2 | 0.2 | 0.2 |
| Manganese | ug/l | 0.3 | 0.3 | 0.2 | 0.2 |
| Magnesium | ug/l | 43.9 | 48.9 | 40.5 | 68.1 |
| Lead | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Iron | ug/l | 1 | 0.8 | 1 | 1.4 |
| Copper | ug/l | <0.2 | <0.2 | 0.5 | <0.2 |
| Chromium | ug/l | 0.3 | 0.3 | 0.3 | 0.3 |
| Cadmium | ug/l | <0.2 | <0.2 | <0.2 | <0.2 |
| Boron | ug/l | 8910 | 12900 | 12300 | 14900 |
| Ortho-Phosphate | mg/l | 13.011 | 16.928 | 0.296 | 8.42 |
| Sulphate | mg/l | 143.1 | <20 | 85.1 | 84.5 |
| Sodium | mg/l | 1370 | 1590 | 1450 | 1910 |
| Potassium | mg/l | 626 | 531 | 570 | 680 |
| Phosphorous | mg/l | 7.9 | 11.45 | 15.1 | 18.6 |
| Chloride | mg/l | 5959 | 2284 | 1860 | 1394 |
| Calcium | mg/l | 48.6 | 38 | 27.9 | 49.9 |
| Ammonia | mg/l | 1913.83 | 1843.56 | 1970.15 | 1445.46 |
| TOC | mg/l | 1500 | | 1137.01 | |
| Nitrate | mg/l | <4.8 | | <4.8 | 6.24 |
| Nitrite | mg/l | | | | |
| Akalinity | mg/l | | | | |
| TSS | mg/l | 140 | 3 | 20 | <2 |
| Dissolved Oxygen | mg/l | | | | |
| Conductivity | us/cm | 21700 | 23700 | 25600 | 19240 |
| COD | mg/l | 3950 | 4720 | 5120 | 4420 |
| pH | pH units | 7.78 | 7.89 | 7.98 | 7.76 |
| cyanide | mg/l | 0.016 | 0.044 | <0.050 | <0.2 |
| Flouride | mg/l | 0.9 | 1.2 | 1.3 | 1.4 |
| TON | mg/l | <5 | <5 | <5 | 6.68 |

| Week No | Average | B.LP1 Level m(Ave) | B.LP3 Level m(Ave) | B.LP6 Level m(Ave) |
|---|---|---|---|---|
| 1 | Average | 0.82 | 0.72 | 0.53 |
| 2 | Average | 0.77 | 0.66 | 0.43 |
| 3 | Average | 0.88 | 0.78 | 0.44 |
| 4 | Average | 0.7 | 0.61 | 0.6 |
| 5 | Average | 0.7 | 0.62 | 0.23 |
| 6 | Average | 0.8 | 0.73 | 0.53 |
| 7 | Average | 0.93 | 0.84 | 0.88 |
| 8 | Average | 0.92 | 0.84 | 0.73 |
| 9 | Average | 0.96 | 0.9 | 0.94 |
| 10 | Average | 1.01 | 0.93 | 0.98 |
| 11 | Average | 0.83 | 0.78 | 0.6 |
| 12 | Average | 0.68 | 0.65 | 0.48 |
| 13 | Average | 0.72 | 0.68 | 0.51 |
| 14 | Average | 0.65 | 0.61 | 0.49 |
| 15 | Average | 0.76 | 0.71 | 0.71 |
| 16 | Average | 0.74 | 0.67 | 0.64 |
| 17 | Average | 0.76 | 0.73 | 0.7 |
| 18 | Average | 0.69 | 0.67 | 0.76 |
| 19 | Average | 0.75 | 0.73 | 0.67 |
| 20 | Average | 0.76 | 0.74 | 0.65 |
| 21 | Average | 0.77 | 0.75 | 0.78 |
| 22 | Average | 0.89 | 0.82 | 0.81 |
| 23 | Average | 0.99 | 0.92 | 0.71 |
| 24 | Average | 1.04 | 0.63 | 0.87 |
| 25 | Average | 1.04 | 0.25 | 0.74 |

| Week No | Average | B.LP1 Level m(Ave) | B.LP3 Level m(Ave) | B.LP6 Level m(Ave) |
|---|---|---|---|---|
| 26 | Average | 1.03 | 0.25 | 0.76 |
| 27 | Average | 1.08 | 0.9 | 0.92 |
| 28 | Average | 1.09 | 0.93 | 0.9 |
| 29 | Average | 0.98 | 0.9 | 0.87 |
| 30 | Average | 0.96 | 0.89 | 0.89 |
| 31 | Average | 0.996 | 0.91 | 0.91 |
| 32 | Average | 0.97 | 0.88 | 0.8 |
| 33 | Average | 1.06 | 0.98 | 0.99 |
| 34 | Average | 1.11 | 1.04 | 0.83 |
| 35 | Average | 1.15 | 1.08 | 1 |
| 36 | Average | 1.18 | 1.1 | 0.71 |
| 37 | Average | 1.14 | 1.05 | 1.08 |
| 38 | Average | 1.07 | 1 | 0.89 |
| 39 | Average | 1.05 | 0.999 | 0.91 |
| 40 | Average | 0.97 | 0.95 | 0.76 |
| 41 | Average | 0.9 | 0.87 | 0.65 |
| 42 | Average | 0.96 | 0.93 | 0.71 |
| 43 | Average | 0.91 | 0.89 | 0.93 |
| 44 | Average | 0.9 | 0.88 | 0.71 |
| 45 | Average | 0.88 | 0.86 | 0.57 |
| 46 | Average | 0.59 | 0.6 | 0.58 |
| 47 | Average | 0.49 | 0.51 | 0.36 |
| 48 | Average | 0.6 | 0.61 | 0.54 |
| 49 | Average | 0.59 | 0.6 | 0.44 |
| 50 | Average | 0.51 | 0.53 | 0.43 |
| 51 | Average | 0.64 | 0.67 | 0.6 |
| 52 | Average | 0.88 | 0.9 | 0.85 |

# Landfill Gas Data 2013

| | Jan-13 | Feb-13 | Mar-13 | Apr-13 | May-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CH4** | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) |
| **G1** | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G2** | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G3** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G4** | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G8** | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 |
| **G9** | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 |
| **G10** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G11** | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 |
| **G14** | 0 | 0 | 0 | 0 | Inaccessible | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G15** | 0 | 0 | 0 | 0 | Inaccessible | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **G16** | 0 | 0 | 0 | 0 | Inaccessible | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | Jan-13 | Feb-13 | Mar-13 | Apr-13 | May-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO2** | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) |
| **G1** | 0 | 0.1 | 0.01 | 0.1 | 0 | 0.1 | 2.8 | 3.8 | 0 | 0.2 | 0.1 | 10.5 |
| **G2** | 0.3 | 0.2 | 0.9 | 0.5 | 0.1 | 0.1 | 0 | 2.1 | 0.1 | 0 | 0.4 | 0 |
| **G3** | 7.7 | 5.1 | 5.5 | 5.3 | 3.8 | 4.4 | 3.2 | 2.9 | 4 | 3.7 | 2.3 | 4.8 |
| **G4** | 8.1 | 5 | 6.4 | 0.3 | 3.5 | 3.47 | 3.7 | 2.8 | 4.2 | 3.6 | 3.3 | 4.7 |
| **G5** | 1.5 | 1.8 | 2.4 | 1.2 | 0.1 | 0.1 | 2.4 | 1.6 | 2.5 | 2.1 | 1.1 | 2.5 |
| **G6** | 6.2 | 3.5 | 6 | 1.8 | 1.5 | 1.7 | 3.7 | 2 | 2 | 2.4 | 2 | 3.7 |
| **G7** | 3.3 | 3 | 4.1 | 2.5 | 1.6 | 1.5 | 3.4 | 4.1 | 0.9 | 1.5 | 0.4 | 5.9 |
| **G8** | 5.4 | 4.6 | 3.8 | 3.2 | 0 | 0 | 4.6 | 4.3 | 1.4 | 0.6 | 1.6 | 4.7 |
| **G9** | 12.7 | 1.4 | 1 | 1.2 | 0.1 | 0.3 | 3.3 | 1.7 | 0.4 | 3.1 | 1.2 | 6.1 |
| **G10** | 13 | 2.9 | 5 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 0 | 0 | 0.2 | 0.6 |
| **G11** | 2.7 | 0.1 | 2.3 | 0 | 0 | 0 | 2.5 | 2.5 | 0 | 2 | 0.1 | 2.7 |
| **G14** | 4.8 | 4.4 | 4.5 | 2.7 | Inaccessible | 1.8 | 3.5 | 2.7 | 2.3 | 3.7 | 2.7 | 4.4 |
| **G15** | 1.3 | 2.6 | 2.3 | 1.8 | Inaccessible | 2 | 1.6 | 1.7 | 1.5 | 1 | 2.1 | 1.9 |
| **G16** | 1.1 | 0.7 | 0.7 | 0.5 | Inaccessible | 0.5 | 2.2 | 0.5 | 0.3 | 0.9 | 0.4 | 0.5 |

| | Jan-13 | Feb-13 | Mar-13 | Apr-13 | May-13 | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **O2** | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) | (% v/v) |
| **G1** | 19 | 21 | 20.7 | 20.7 | 20.9 | 20.7 | 17.1 | 16.3 | 20.9 | 20.5 | 21 | 6.9 |
| **G2** | 8.1 | 20.9 | 18 | 18 | 20.2 | 20.8 | 18.1 | 18.4 | 20.8 | 20.7 | 19.7 | 20.6 |
| **G3** | 13.2 | 18 | 16.7 | 16.7 | 15.3 | 17.4 | 15.6 | 18.5 | 16.1 | 15.6 | 18.4 | 14.8 |
| **G4** | 14 | 18 | 15.2 | 15.2 | 18 | 18.2 | 15.7 | 18.2 | 16.5 | 16.7 | 18.6 | 17.3 |
| **G5** | 19 | 19.2 | 18.4 | 18.4 | 20.8 | 20.6 | 16.8 | 18.9 | 18 | 18.3 | 19.2 | 18 |
| **G6** | 15 | 18.1 | 15.7 | 15.7 | 19.5 | 19.4 | 15.7 | 18.8 | 18.9 | 18.3 | 19.4 | 17.1 |
| **G7** | 18.8 | 19.5 | 18.2 | 18.2 | 20.1 | 19.8 | 15.8 | 14.2 | 19.8 | 19.2 | 20.7 | 17.6 |
| **G8** | 16.1 | 17.1 | 17.5 | 17.5 | 20.8 | 20.8 | 15.6 | 16.5 | 11.5 | 19.7 | 19.7 | 18.6 |
| **G9** | 17 | 19.8 | 20.4 | 20.4 | 21 | 20.7 | 16.4 | 18.6 | 20.5 | 13.7 | 20.3 | 15.5 |
| **G10** | 9.1 | 18.6 | 16.1 | 16.1 | 20.7 | 20.7 | 15.1 | 20.2 | 20.8 | 20.6 | 21 | 19.5 |
| **G11** | 17.7 | 20.9 | 18 | 18 | 20.8 | 20.8 | 16.6 | 17.5 | 20.8 | 18.2 | 21 | 18.3 |
| **G14** | 19.6 | 16.5 | 17 | 17 | Inaccessible | 19.5 | 16.4 | 18.1 | 19.1 | 19 | 18 | 16.4 |
| **G15** | 20.2 | 19.6 | 19.5 | 19.5 | Inaccessible | 19.5 | 18.7 | 18.4 | 19.7 | 20.1 | 19.5 | 19.5 |
| **G16** | 20.2 | 20.6 | 20.6 | 20.6 | Inaccessible | 20.5 | 17.1 | 20.2 | 20.2 | 20.2 | 20.8 | 20.7 |

# Noise Data 2013

| Station | Time | $L_{Aeq\ 30\ min}$ dB | $L_{AF10\ 30\ min}$ dB | $L_{AF90\ 30\ min}$ dB | Specific level* dB | Noise audible |
|---|---|---|---|---|---|---|
| N1A | 1120-1150 | 54 | 51 | 45 | 44 | Gas engines continuously audible at low level, with audible hum, codominant with distant road traffic to SW. Sporadic road traffic outside entrance. Occasional bangs audible to NW at 1-200 m. Bird song/calls, lightly rustling trees and aircraft. Local car movement through landfill entrance 1136-1137. |
| N2A | 1008-1038 | 51 | 47 | 44 | 44 | Gas engines continuously audible at low level, with audible hum, not intrusive. No other site emission audible. Distant traffic noise generally masked by gas engines. Sporadic local road traffic outside boundary dominant when present. Bird song/calls, aircraft and lightly rustling vegetation. |
| N3A | 0932-1002 | 43 | 46 | 38 | <38 | No site emissions audible. Rustling trees significant. Bird song/calls, aircraft, distant dog barking and distant traffic all variously significant. Agri-machinery or quarry plant audible from time to time in distance to SW. |
| N4A | 0857-0927 | 45 | 48 | 39 | <39 | No facility emissions audible. Distant road traffic noise to SW continuously audible, codominant with local rustling vegetation. Intermittent traffic to S and SE also audible. Bird song/calls, aircraft and distant dog barking. |
| N5A | 0818-0848 | 44 | 46 | 42 | <42 | No facility emissions audible. Distant traffic noise to SW continuously audible and dominating noise environment. Dog barking audible at several locations to SE. Bird song/calls, aircraft and rustling vegetation. |
| N6A | 1047-1117 | 50 | 54 | 41 | <41 | Gas engines faintly discernible, almost entirely masked by continuously dominant road traffic noise to SW. Bird song/calls, aircraft, rustling vegetation and occasional agri-machinery or quarry emissions or similar in distance. Tractor in field outside site boundary dominant 1053-1110. |
| N8A | 1155-1225 | 61 | 53 | 43 | <43 | No facility emissions audible. Road traffic continuously audible to SW, W and NW, and dominant. Bird song/calls, aircraft and rustling vegetation. Sporadic local road traffic dominant when present. Emissions slightly audible occasionally from quarry to W and/or or NW. |
| N12A | 1341-1411 | 61 | 57 | 41 | <41 | No facility emissions audible. Rustling trees occasionally dominant as local area is heavily wooded. Distant road traffic noise to W continuously audible at low level. Sporadic local traffic dominant when present. Bird song/calls. Occasional banging noise emissions audible to NW, most likely quarry related or similar. |
| N14A | 1305-1335 | 49 | 49 | 39 | <39 | No site emissions audible. Sporadic local road traffic dominant when present. Traffic on distant roads audible at low level. Rustling vegetation significant at times. Bird song/calls and aircraft. Distant quarry noise or similar slightly audible. Strimmer audible at several hundred metres from time to time. |
| N16A | 1230-1300 | 54 | 50 | 43 | <43 | No site emissions audible. Noise audible from distant traffic, rustling trees, bird song/calls, distant dog barking and distant agri-machinery or similar. Sporadic local traffic dominant when present. |

# Dust Data 2013

| Sample Location | Units | June | August | November |
|---|---|---|---|---|
| **Jar 1** | Mg/m2/day | 116.7 | 776 | 5.36 |
| **Jar 2** | Mg/m2/day | 39.94 | 69 | 21.97 |
| **Jar 3** | Mg/m2/day | 49.79 | 122 | 303.32 |
| **Jar 4** | Mg/m2/day | 76.24 | * | 167.74 |
| **Jar 5** | Mg/m2/day | 454.88 | 91 | 84.67 |
| **Jar 6** | Mg/m2/day | * | 154 | 90.03 |

* Jar Damaged

# APPENDIX 3

E-PRTR Returns

Guidance to completing the PRTR workbook

# AER Returns Workbook

Version 1.1.18

| | |
|---|---|
| **REFERENCE YEAR** | 2013 |

**1. FACILITY IDENTIFICATION**

| | |
|---|---|
| Parent Company Name | Kilcullen Landfill Limited |
| Facility Name | |
| PRTR Identification Number | W0081 |
| Licence Number | W0081-04 |

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. |
| 3.1 | Deposit on, in or under land (including landfill). |
| 3.11 | Blending or mixture 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. |
| 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. |
| 4.3 | Recycling or reclamation of metals and metal compounds. |
| 4.4 | Recycling or reclamation of other inorganic materials. |
| Address 1 | Brownstown and Carnalway |
| Address 2 | Kilcullen |
| Address 3 | Co. Kildare |
| Address 4 | |
| | |
| | Kildare |
| Country | Ireland |
| Coordinates of Location | -6.71785 53.1451 |
| River Basin District | IEEA |
| NACE Code | 3821 |
| Main Economic Activity | Treatment and disposal of non-hazardous waste |
| **AER Returns Contact Name** | Tomas Fingleton |
| **AER Returns Contact Email Address** | tomas.fingleton@landfills.ie |
| **AER Returns Contact Position** | Landfill Manager |
| **AER Returns Contact Telephone Number** | 0867741813 |
| **AER Returns Contact Mobile Phone Number** | 0867741813 |
| **AER Returns Contact Fax Number** | 045 482629 |
| **Production Volume** | 0.0 |
| **Production Volume Units** | |
| **Number of Installations** | 0 |
| **Number of Operating Hours in Year** | 0 |
| **Number of Employees** | 3 |
| **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 |
| 5(d) | Landfills |
| 50.1 | General |

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

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

**4. WASTE IMPORTED/ACCEPTED ONTO SITE**

Guidance on waste imported/accepted onto site

| | |
|---|---|
| Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ? | No |

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

## 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 | | | | | QUANTITY | | |
| | | | Method Used | | Flare 1 2,500 | Engines GE 01, 02 & 03 | | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | Emission Point 2 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| 03 | Carbon dioxide (CO2) | C | OTH | Gas sim model 2011 figures | 0.0 | 0.0 | 32000000.0 | 0.0 | 32000000.0 |
| **01** | **Methane (CH4)** | C | OTH | Gas sim model 2011 figures | 0.0 | 0.0 | 4300000.0 | 0.0 | 4300000.0 |
| 02 | Carbon monoxide (CO) | M | EN 15058:2004 | horiba 250 | 77.55 | 7635.94 | 7713.49 | 0.0 | 0.0 |
| 08 | Nitrogen oxides (NOx/NO2) | M | EN 14792:2005 | horiba 250 | 71.11 | 3142.93 | 3214.04 | 0.0 | 0.0 |
| 11 | Sulphur oxides (SOx/SO2) | M | EN 14792:2005 | horiba 250 | 1759.0 | 5070.71 | 6829.71 | 0.0 | 0.0 |
| 07 | Non-methane volatile organic compounds (NMVOC) | M | ALT | Signal FID 3030PM and TNMHC analyser | 0.0 | 58.67 | 58.67 | 0.0 | 0.0 |

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

### SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

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

### Additional Data Requested from Landfill operators

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

**Landfill:** 0

| **Please enter summary data on the quantities of methane flared and / or utilised** | **T (Total) kg/Year** | **M/C/E** | **Method Used** | | **Facility Total Capacity m3 per hour** | |
|---|---|---|---|---|---|---|
| | | | **Method Code** | **Designation or Description** | | |
| Total estimated methane generation (as per site model) | 4300000.0 | C | other | Gas Sim model 2011 figures | N/A | |
| Methane flared | 479407.0 | C | calculated | EPA-Bernard hyde model | 2500.0 | (Total Flaring Capacity) |
| Methane utilised in engine/s | 2448811.0 | C | calculated | EPA-Bernard hyde model | 1800.0 | (Total Utilising Capacity) |
| Net methane emission (as reported in Section A above) | 4300000.0 | C | other | Gas Sim model 2011 figures | N/A | |

## 4.2 RELEASES TO WATERS

Link to previous years emissions data



### SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

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

### SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

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

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

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

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

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

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

## 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 | | | 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 |
| | | | | | 0.0 | 0.0 | 0.0 |

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

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

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

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

**Please enter all quantities on this sheet in Tonnes**

| Transfer Destination | European Waste Code | Hazardous | Quantity (Tonnes per Year) | Description of Waste | Waste Treatment Operation | Method Used | | Location of Treatment | Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer | Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer | Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY) | Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | M/C/E | Method Used | | | | | |
| Within the Country | 19 07 03 | No | | landfill leachate other than those mentioned in 19 07 02 | D8 | C | Volume Calculation | Offsite in Ireland | Osberstown wwtp Kildare Coco ,D00** | Kildare County Council Headquarters , , , ,Aras Chill Dara Devoy Park Naas Co. Kildare | | |

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

Link to previous years waste data
Link to previous years waste summary data & percentage change
Link to Waste Guidance