ANNUAL ENVIRONMENTAL REPORT

By

Louth County Council

To

Environmental Protection Agency

For

Waste Licence Reference: W0060-03

Reporting Period January – December 2016

WHITERIVER LANDFILL SITE, COUNTY LOUTH

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1 Introduction

Louth County Council holds a Waste Licence from the Environmental Protection Agency to operate Whiteriver landfill Site. This report provides a review of all data collected and the environmental aspects of operations at the site for the year 2016.

The site is located 1 km north of the main R169 Collon Rd at its junction with Whiteriver Cross, Co Louth. The facility is located in a rural setting at grid references O301450E 285625N in the townlands of Whiteriver. The northern and western boundaries adjoin two minor roads which serve scattered dwellings, whilst agricultural grazing lands adjoin the southern and eastern boundaries. The main access to the site is situated on the north western site boundary, immediately off the principle approach road. Louth County Council is the sole landowners of the site on which the landfilling activity is based.

The current waste licence (W0060-03) was issued on the 24th March 2010. The site ceased to accept municipal solid waste on the 30th August 2013 and Incinerator Bottom ash on the 20th December 2013. The site is now closed.

Facility information summary is provided in Table 1.1

Table 1.1 Facility Information Summary

AER Reporting Year	2016
Licence Register Number	(W0060-03)
Name of site	Whiteriver Landfill Site
Site Location	Whiteriver & Gunstown Townland
NACE Code	3821
Class/Classes of Activity	Landfill

1.1 Report Period

The report period for this Annual Environmental Report (AER) is from January to December 2016 and relates to the waste licence (W0060-03).

2 Waste Activities Carried Out at the Facility

In accordance with Condition 5 of the waste licence only those waste types and quantities of waste listed in the Schedule shall be disposed of at the facility unless the prior agreement of the Agency has been obtained. The maximum annual tonnage of individual waste types for disposal is listed in the Schedule of the Waste Licence and total is as follows;

Table 2.1 Maximum Annual Tonnage

Total (Tonnes per annum)	(W0060-03)
Total	96,000

* As from September 2003

The licence waste disposal activities in accordance with the Third Schedule of the waste

Management Act, 1996 are restricted to those listed as follows:

- Class 1: Deposit on, in or under land (including landfill).
- Class 4: Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
- Class 5: Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.
- Class 6: Biological treatment not referred to elsewhere in this Schedule which results in Final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule.
- Class 7: Physio-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcination), which results in Final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule.
- Class 12: Repacking 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 is produced.

The licence waste disposal activities (W0060-03), in accordance with the Fourth Schedule of the Waste Management Act, 1996 are restricted to those listed as follows;

- Class 2 Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes): This activity is limited to the use of compost or similar material in the restoration of the landfill.

- Class 4 Recycling or reclamation of other inorganic materials: This activity is limited to the use of soil, subsoil and construction and demolition waste for daily cover, engineering works and the restoration of cells at the facility.

- Class 9 Use of any waste principally as a fuel or other means to generate energy: This activity is limited to the use of landfill gas as a fuel for the generation of electricity/ energy.

- Class 10 The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system: This activity is limited to the use of various suitable wastes as daily or intermediate cover and in the restoration of the landfill, subject to the agreement of the Agency.

- Class 13 Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced: This activity is limited to the storage of soil, subsoil and construction and demolitions wastes at the facility prior to recovery / reuse at the facility.

3 Quantity and Composition of Waste Received and Disposed of During the Reporting Period and Each Previous Year

The quantities of waste accepted for disposal at the facility on a yearly basis are shown in Table 3.1.

Table 3.1 Waste Quantities Accepted (tonnes)[1]

Waste	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total	25,110	20,940	20,000	15,066	31,500	37,146	25,776	36,006	60,833
Waste	**2005**	**2006**	**2007**	**2008**	**2010**	**2011**	**2012**	**2013**	**2014**
Total	80,634	82,547	70,396	84,402	53,744	75,243	89,290	84,992	Closed

[1] Figures for 1996 to 2000 are the estimated annual waste inputs (tonnes). Waste data figures where estimated by means of assessment based on the category of vehicle depositing waste at the site.

4 Calculated Remaining Capacity of the Facility and Year in which Final Capacity is Expected to be Reached

The site is now closed.

5 Methods of Deposition of Waste

The site is now closed.

6 Summary Report on Emissions

6.1 Emissions to Air

There is no continuous air emission monitoring at Whiteriver landfill site. Periodic/non-continuous monitoring is carried out on the engine/flare. This is further discussed in Section 7.7.

In accordance with The PRTR Regulations, releases of pollutants and off site transfers of waste by facilities operating in relevant industrial sectors are to be reported by the EPA to the European E-PRTR website where the facility exceeds specified thresholds. This has been completed for Whiteriver landfill site and included in Appendix B.

There were two landfill gas flares and two engines in operation various times at Whiteriver landfill site in 2016. Based on model predications and information from the landfill gas flares and engines the estimated net emission of methane from the flare combustion process and both surface and lateral emissions from the landfill body is 192,859 kg/year as shown on Table 6.1.

Table 6.1 Net Methane Emission

Quantities of Methane Flared and / or Utilised	T (Total) kg/Year
Total estimated methane generation (as per site model)	924,478
Methane flared	2,218
Methane utilised in engine/s	729,401
Net Methane Emission	192,859

6.2 Emissions to Groundwater and Surface Water

There are no direct discharges to groundwater from Whiteriver Landfill Site. There is one licensed emissions direct to surface water from the surface water retention pond. This is further discussed in Section 7.5.4.

6.3 Emissions to Waste Water Treatment Works

There are no licensed emissions direct to sewer from Whiteriver Landfill Site. Treated leachate is transported off site to Drogheda wastewater treatment plant. The volume tankered during the period January to December 2016 was 10,655 m^3.

7 Summary of Results and Interpretation of Environmental Monitoring

7.1 Monitoring Locations

Monitoring was carried out at locations and at frequencies as specified in Schedule D of the waste licence (W0060-03). Monitoring points are labelled and permanent access to all monitoring points is maintained. BH13A was re drilled and BH20 was installed as a groundwater water borehole to detect leakages of the lagoon in June 2006. Private wells BH15 (Taffes), BH16 (Byrnes), and BH18 (Taffes) have been decommissioned and are no longer monitored as part of the licence requirements.

Monitoring points are detailed in Drawings IBR0856/101, 102 and 103. The monitoring point grid references for those available are detailed in Table 7.1. The locations of groundwater monitoring boreholes are shown in Table 7.2.

Table 7.1 Grid References of Monitoring Points

Monitoring Points	Easting	Northing
Groundwater Boreholes		
BH1	301 385	285 310
BH2	301 259	285 380
BH3	301 384	285 501
BH4	301 405	285 648
BH5A	301737	285541
BH6	301 856	285 480
BH7	301 740	285 438
BH8	301 588	285 302
BH9	301 944	285 348
BH10	301 824	285 117
BH11	302 045	285 105
BH12	301 943	285 356
BH13(redrilled)	301 824	285 126
BH14	302 045	285 119
BH17	301 293	285 180

Monitoring Points	Easting	Northing
BH19	301490	285650
BH20	301 428	285 623
Surface Water Monitoring		
SW1	301 384	285 424
SW2A	301 965	285 427
SW3	301 935	285 410
Gas Piezometers		
PZ1	301 438	285 596
PZ2	301 454	285 614
PZ3	301 496	285 628
PZ4	301 542	285 624
PZ5	301 600	285 610
PZ6	301 603	285 552
PZ7	301 603	285 512
PZ8	301 601	285 463
PZ9	301 594	285 401
PZ11	301 383	285 333
PZ12	301 382	285 381
PZ13	301 382	285 441
PZ14	301 383	285 498
PZ15	301 385	285 563
PZ16	301 410	285 579
PZ21	301 385	285 289
PZ22	301 377	285 205
PZ23	301 459	285 200
PZ24	301 490	285 201
PZ25	301 586	285 219
PZ26 PZ54	Not available	
Noise		
N1	301 336	285348
N2	135 907	270 000

Monitoring Points	Easting	Northing
N3	301345	284 739
N4	302105	284 927
N5	302 723	285 258
N6	301409	285 598
Dust		
DG1	301 395	285 372
DG2	301 596	285 374
DG3	301 960	285 421
DG4	302 058	285 043
DG5	301 648	285584
DG6	301834	285486
Leachate		
L1	301 427	285 625
L2	301 405	285 495

Table 7.2 Location of Groundwater Monitoring Boreholes

Borehole[2]	Upstream/Downstream	Private Well	Overburden or Bedrock
BH1	Upstream		Overburden
BH2A	Upstream	Crawleys Private Well	Bedrock
BH3	Upstream		Bedrock
BH4	Upstream		Bedrock
BH5	Downstream		Overburden
BH6	Downstream		Bedrock
BH9	Downstream		Bedrock
BH10	Downstream		Overburden
BH11	Downstream		Overburden
BH12	Downstream		Overburden
BH13A	Downstream		Bedrock

[2] Private wells BH15 (Taffes), BH16 (Byrnes), and BH18 (Taffes) have been decommissioned and are no longer monitored as part of the licence requirements.

Borehole[2]	Upstream/Downstream	Private Well	Overburden or Bedrock
BH14	Downstream		Bedrock
BH17	Downstream	Holcrofts Private Well	Domestic
BH19	Upstream	McGranes Private Well	Agricultural water supply
BH20	Upstream landfill downgradient of leachate lagoon		Overburden

7.2 Treated Leachate Quality

Periodic monitoring (non-continuous) of treated leachate quality is undertaken at the facility. Leachate values recorded in the lagoon (treated leachate) were within the emission limit values as set out in the waste licence.

Table 7.3 Treated Leachate Concentrations in 2016

Parameter	Min. Conc	Max. Conc	Limit Value
Ammoniacal Nitrogen(mg/l N)	43.61	171	900
BOD	9.39	30.3	500
COD	52	1,000	1,500
pH (pH units)	7.7	8.7	>6.0 and <9.0
Temperature (°C)			<25
Sulphate (mg/l)	16.9	143	250

7.3 Groundwater

As required under the Waste Licence, groundwater monitoring was undertaken at the borehole locations as set out in the current waste licence. The Schedules of the waste licence requires the monitoring of certain parameters on either a monthly, quarterly or annual basis; the frequencies of the monitoring of groundwater parameters currently at the closed site as agreed with the EPA are shown in Table 7.4.

Boreholes BH1, BH3 BH4, BH5A are located within the site boundary, whilst BH6 is located approximately 240m from the eastern boundary of the site. BH2A (Crawleys) is a private

well located upstream of the facility. BH9, BH10, BH11, BH12, BH13A and BH14 were installed further downstream of the extension to the existing site. Monitoring is also undertaken at two private wells. These private wells are boreholes BH17 (Holcrofts) and BH19 (McGranes, Agricultural Water Supply).

Table 7.4 Groundwater Parameters Monitoring Frequencies

Quarterly		Annually	
Groundwater Level	Chloride	Metals /Non Metals	List I and II Substances
	Dissolved Oxygen	Cyanide	Residue on evaporation
	pH	Fluoride	
	Total Oxidised Carbon	Total Oxidised Nitrogen	
	Visual Inspection/ Odour	Total Alkalinity	
	Ammoniacal Nitrogen	Orthophosphate	
	Electrical Conductivity	Mercury	
	Temperature	Sulphate	

The results contained in this report are assessed as follows:

- Whiteriver Trigger Levels (WTL) agreed with the EPA (21 December 2004, 60-2/GEN09EM);
- EPA Interim guideline values (IGV);
- SI No 278 of 2007 EC (Drinking water) Regulations (DWR); and
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended (GTV).

The results are presented graphically and in table format in Appendix C. The majority of parameters were below the recommended limits.

Parameters that are indicative of possible leachate contamination include Ammonia, Conductivity, Iron, Chloride and heavy metals.

Table 7.5 provides a summary of results in 2016 from groundwater monitoring boreholes throughout these monitoring periods.

Table 7.5 Summary of 2016 Results from Groundwater Monitoring Boreholes

	Units	No. of Samples	Minimum	Maximum	Mean
Alkalinity	**mg/lCaCO3**	30	249.83	405.45	302
Aluminium	**µg/l**	30	<50	64870	
Ammonia	**mg/l N**	60	<0.11	0.27	
Antimony	**µg/l**	30	< 0.14	< 0.14	
Arsenic	**µg/l**	30	<2	73.76	
Barium	**µg/l**	30	<1.62	1031	
Boron	**µg/l**	30	<135	353.2	
Cadmium	**µg/l**	30	<0.09	1.356	
Calcium	**mg/l Ca**	30	45.22	234.3	113
Chloride	**mg/l Cl**	75	10.8	56.8	22
Chromium	**µg/l**	30	<2.14	161.9	
Cobalt	**µg/l**	15	<0.02	67.01	
Conductivity	**µS/cm @ 25**	60	489	878	658
Copper	**µg/l**	30	<4	148.9	
Cyanide	**0**	15	<5	<5	
D.O.	**% Saturation**	30	5.57	79	29
Fluoride	**mg/l**	15	0.17	0.31	
Iron	**µg/l**	30	<0.024	102300	
Lead	**µg/l**	30	<0.02	80.26	
Magnesium	**mg/l Mg**	30	9.446	58.9	25
Manganese	**µg/l**	30	1.65	7836	1610
Mercury	**µg/l**	30	<0.02	0.102	
Molybdenum (µg/l)	**0**	15	<5	5.749	
Nickel	**µg/l**	30	0.513	220.9	33
Ortho-Phosphate	**mg/l P**	15	<0.005	0.09	
pH	**0**	60	6.79	7.6	7
Potassium	**mg/l**	30	0.568	11.9	3

	Units	No. of Samples	Minimum	Maximum	Mean
Selenium	**µg/l**	15	<0.47	8.456	
Sodium	**mg/l**	45	7.152	31.02	18
Strontium	**µg/l**	30	139.1	647.2	268
Sulphate	**0**	30	3.12	66.95	20
Temp	**°C**	15	11.8	13.6	13
T.O.C.	**mg/l**	59	0.31	95.1	5
T.O.N	**mg/l N**	14	0.35	0.97	1
Total Suspended Solids	**mg/l**	15	2	1688	356
Uranium	**µg/l**	15	0.617	5.138	2
Zinc	**µg/l**	30	10.52	681.6	158

7.4 Quarterly Monitoring Parameters

All Ammonia concentrations during the reporting period were within the WTL agreed with the EPA of 0.2 mg/l N and the GTV of 0.175 mg/l N with the exception of BH19 (0.27 mg/l N) in May. pH values analysed during the reporting period were all within the WTL of 7.0 to 8.0 with the exception of BH12 (min 6.79) in 3 of the 4 sampling dates.

Electrical Conductivity values were all below the WTL of 800 µS/cm throughout the year except for BH12 (max 878 µS/cm) in 3 of the 4 sampling dates. BH12 does not exceed the IGV of 1000 µS/cm and GTV of 800-1875 µS/cm.

Chloride levels exceeded the WTL of 20 mg/l in upgradient BH1 throughout the year. Concentrations ranged from 33.6 to 56.8 mg/l. BH5, BH09, BH10, BH13A and BH17 downstream of the site also exceeded the WTL level at times throughout the monitoring period. The highest concentration was in BH5 (43.3 mg/l) in January. The results were all below the GTV of 187.5 mg/l.

Chloride WTL level has been exceeded in BH20 throughout the monitoring period ranging from 35.23 to 56.4 mg/l Cl.

All boreholes were below WTL for TOC of 10 mg/l except BH10 (95.1 mg/l) and BH20 (17.1 mg/l) in May.

7.5 Annual Monitoring Parameters

7.5.1 Upgradient Annual Results

Annual analysis for metals was undertaken in all upgradient boreholes on 20th July 2016. It should be noted that the analysis for metals was undertaken as total metals (includes the metals content both dissolved and present in the particulates in the water).

Aluminium, arsenic, boron, cadmium, calcium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, sulphate and zinc were below the WTL, IGV, DWR and GWR 2010 were applicable.

Concentrations detected above the triggers and standards limit/levels were as follows:

- Barium exceeded the IGV in BH1 (148 µg/l);
- Iron exceeded the IGV in BH5 (5.42 mg/l);
- Manganese exceeded the IGV in BH3 (166 µg/l) and in BH4 (79.6 µg/l).

Concentrations above the limit of detection were measured for the following parameters:

- Alkalinity concentrations ranged from 170 to 315 mg/l.

Annual analysis for Polycyclic Aromatic Hydrocarbons (PAH), pesticides, herbicides, semi volatile organic compounds (SVOCs) and volatiles organic compounds (VOCs) was undertaken at one location upgradient of the site (BH2A) on 20th July 2016.

The concentration for PAHs was <0.01 µg/l. Pesticide and herbicide, SVOCs and VOCs parameters were either below the IGV for those comparable or were below the lower detection limit for the analytical methodology used.

7.5.2 Downgradient Annual Results

Annual analysis for metals was undertaken in all downgradient boreholes on 20th July 2016. Arsenic, boron, cadmium, calcium, chromium, lead, magnesium, mercury, nickel, potassium, sodium, sulphate and zinc were below the WTL, IGV, DWR and GWR 2010 were applicable.

Concentrations detected above the triggers and standards limit/levels were as follows:

- Aluminium exceeded the IGV in a number of downgradient boreholes. Concentrations ranged from 233 to 4,820 µg/l.
- Barium exceeded the IGV in a number of downgradient boreholes. Concentrations ranged from 124 to 335 µg/l.
- Copper exceeded the IGV in BH9 (109 µg/l),
- Iron exceeded the IGV exceeded the IGV in a number of downgradient boreholes. Concentrations ranged from 0.283 to 10.6 µg/l,
- Lead exceeded IGV in BH9 (15.2 µg/l),
- Manganese exceeded the IGV in a number of downgradient boreholes. Concentrations ranged from 133 to 8,900 µg/l.

As per the HRA (2015), the continual elevated iron and manganese exceedances are not attributed to landfill leachate. Ammonia and chloride concentrations remain unchanged downgradient and therefore other exceedances are also not attributed to landfill leachate. It should be noted that the analysis for metals was undertaken as total metals (includes the metals content both dissolved and present in the particulates in the water).

Concentrations above the limit of detection were measured for the following parameters:

- Alkalinity concentrations ranged from 195 to 455 mg/l.

Annual analysis for Polycyclic Aromatic Hydrocarbons (PAH), pesticides, herbicides, semi volatile organic compounds (SVOCs) and volatiles organic compounds (VOCs) was undertaken at two locations downgradient of the site (BH9 and BH14) on 20th July 2016.

The concentration for PAHs was <0.01 µg/l. Pesticide and herbicide, SVOCs and VOCs parameters were either below the IGV for those comparable or were below the lower detection limit for the analytical methodology used.

7.6 Surface Water

Whiteriver Landfill Site is situated on a plateau and is located in a sub-catchment of one of the main tributaries of the White River. The White River is located approximately 4km south west of the site and it is this river, which is the main receptor for any potential surface water contamination from the site.

As required under the Waste Licence, surface water monitoring was undertaken at the station locations as set out in Table D.1.1 of the waste licence. Schedule D of the waste licence requires the monitoring of certain parameters on either a monthly, quarterly or annual basis; the frequencies of the monitoring of surface water parameters are shown in Table 7.6 below.

Table 7.6 Surface Water Parameters Monitoring Frequencies

Quarterly	Annually
Ammoniacal Nitrogen	Metals / non metals
Biological Oxygen Demand	Mercury
Chemical Oxygen Demand	Sulphate
Chloride	Total Alkalinity
Dissolved Oxygen	Orthophosphate
Electrical Conductivity	TON
pH	
Total Suspended Solids	
Temperature	

The results contained in this report were assessed against the EC (Drinking water) Regulations 2007, S.I. No. 106 of 2007 (DWR), the EC Environmental Objectives (Surface Water) Regulations 2009, S.I. No. 272 of 2009 Environmental quality standard (EQS) and the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989, S.I. No. 294 of 1989 (SWQS). These results are presented in table format in Appendix D.

Table 7.7 provides a summary of results in 2016 from surface water locations.

Table 7.7 Summary of 2016 Results from Surface Water Locations

Parameters	Units	No. of Samples	Minimum	Maximum
Alkalinity	**mg/lCaCO3**	4	179.18	302
Aluminium	**µg/l**	4	407.3	2224
Ammonia	**mg/l N**	8	0.054	2
Antimony	**µg/l**	4	<2.9	0.24
Arsenic	**µg/l**	4	<2	5

Parameters	Units	No. of Samples	Minimum	Maximum
Barium	**µg/l**	4	85.54	166
B.O.D.	**mg/l O2**	8	<2	20
Boron	**µg/l**	4	78.67	172
Cadmium	**µg/l**	2	0.055	0
Calcium	**mg/l Ca**	4	42.05	91
C.O.D.	**mg/l O2**	10	15	400
Chloride	**mg/l Cl**	8	7.34	39
Chromium	**µg/l**	4	<3	20
Cobalt	**µg/l**	2	1.54	2
Conductivity	**µS/cm @ 25**	8	325	635
Copper	**µg/l**	4	9.159	18
D.O.	**% Saturation**	4	9.18	98
Iron	**µg/l**	4	179.7	4015
Lead	**µg/l**	4	<0.5	4
Magnesium	**mg/l Mg**	4	8.589	13
Manganese	**µg/l**	4	51.11	473
Mercury	**µg/l**	4	<0.02	<0.03
Molybdenum (µg/l)	**0**	2	<5	<5
Nickel	**µg/l**	4	0.491	9
Ortho-Phosphate	**mg/l P**	4	0.587	1
pH	**0**	8	7.57	8
Potassium	**mg/l**	4	0.79	11
Selenium	**µg/l**	2	2.041	4
Sodium	**mg/l**	4	6.102	13
Strontium	**µg/l**	2	142.9	220
Sulphate	**mg/l SO4**	4	17.49	18
Suspended Solids	**mg/l**	8	5	600
Temp	**°C**	2	8.2	8
T.O.N	**mg/l N**	4	<0.1	2
Uranium	**µg/l**	2	<0.17	<0.17
Zinc	**µg/l**	4	62.05	97

Surface water monitoring is undertaken at one location upstream at SW1 and two locations downstream of the site at SW2A and SW3. Chemical analyses of surface water are summarised in Appendix D.

SW1 and SW2A pH readings were within the A1 SWQS (5.5-8.5) ranging from of 7.57 to 8.

Ammonia concentrations upstream at SW1 were above the EQS value of 0.14 mg N/l/ during 3 of the 4 monitoring periods with a range of 0.054 to 2.21 mg/l N. An excess of 0.1 mg/l N can indicates agricultural contamination. Downstream samples of Ammonia (SW2A) were elevated in February and May when values of 0.399 and 0.87 mg/l N were recorded.

Upstream (SW1) BOD concentrations were above the EQS of 2.6 mg/l in May (20.4 mg/l). Elevated concentrations of BOD were also recorded downstream (SW2A) in May (8.31 mg/l).

COD concentrations exceeded the SWQS value of 40 mg/l upstream (SW1) in 4 of the 5 sampling dates with concentrations ranging from 54 to 400 mg/l. Lower concentrations of COD were recorded downstream (SW2A) from the site. COD concentrations exceeded the SWQS value of 40 mg/l downstream in 2 of the 5 sampling dates.

Electrical Conductivity readings were below the SWQS of 1000 µS/cm upstream and downstream during the monitoring period. Chloride concentrations were within the SWQS of 250 mg/l upstream and downstream throughout the monitoring period.

Total Suspended Solids (TSS) concentrations exceeded the SWQS of 50 mg/l upstream in SW1 in May (600 mg/l).and July (231 mg/l). TSS concentrations above the threshold value were recorded downstream in SW2A in May (97 mg/l).

7.6.1 Lagoon/Surface Water Retention Pond

The surface water retention pond, SW3 is located on the eastern boundary of the site and discharges to the stream running along the northern boundary of the site.

SW3 pH readings are within the A1 SWQS (5.5-8.5) ranging from 7.5 to 8.05.

Ammonia concentrations were below the EQS value of 0.14 mg/l N during the monitoring period with concentrations ranging between <0.01 and 0.14 mg/l N.

The BOD concentrations in the SW3 were below the EQS of 2.6 mg/l and SWQS A1 classification of 5 mg/l.

COD concentrations were below the SWQS classification of 40 mg/l except in December (67.40 mg/l).

Electrical Conductivity in SW3 ranged from 325 to 473µS/cm, which is below the SWQS of 1000µS/cm. Chloride concentrations recorded throughout the monitoring period were below the SWQS of 250 mg/l.

TSS concentrations were below the SWQS of 50 mg/l during the monitoring period ranging from 5 to 11 mg/l.

7.6.2 Annual Results

Annual analysis was undertaken at surface water monitoring locations on 20th July 2016.

Aluminium, arsenic, barium, boron, cadmium, calcium, chromium, copper, lead, magnesium, mercury, nickel, sodium, sulphate and zinc were below the WTL, IGV, SWQS and EQS were applicable.

Concentrations detected above the triggers and standards limit/levels were as follows:

- Iron exceeded the IGV at SW1 (0.301 mg/l),
- Potassium exceeded the IGV at SW1(14.50 mg/l), and SW2A (9.70 mg/l),
- Zinc exceeded the EQS at SW1 (8.30 µg/l) , and SW2A (19.5 µg/l).

7.7 Hydrogeological Risk Assessment

A Hydrogeological Risk Assessment was undertaken in 2015 and a conceptual site model has been developed for the site. The report found that groundwater hydrochemistry data between 2006 and 2013 confirms that the landfill does not appear to be impacting on the underlying aquifer. In the main, concentrations of indicative parameters of contamination are broadly lower or similar to upgradient concentrations and confirm that the landfill is not impacting on the underlying aquifer body. There are no sustained upward trends in contaminant export from the site.

Surface water hydrochemistry indicates that the landfill is not impacting on the quality of the adjacent stream which flows into White river. Downgradient sampling locations recorded concentrations of selected parameters lower or similar to upgradient sampling locations

which are attributed to an upgradient agricultural source. Leachate appears to be contained within the landfill. No evidence of leachate penetrating the engineered liner or natural clay layer is evident.

7.8 Gas Monitoring

As required under the Waste Licence, landfill gas monitoring has been undertaken at the borehole locations as set out in current waste licence.

Schedule D of the waste licence requires the licensee to conduct monthly monitoring on the perimeter and in the waste of the landfill site. The trigger level for landfill gas emissions are Methane, greater than or equal to 1.0% v/v and Carbon dioxide, greater than or equal to 1.5% v/v. Landfill gas is monitored using a GA2000 infra-red analyser. These results are presented in Appendix E.

Results were below the trigger limit for Methane of 1% v/v for all perimeter locations (not in waste) during the year. From the results it can be seen that no methane was recorded in piezometers around the perimeter of the site.

Carbon dioxide levels around the perimeter of the site exceeded the licence requirements of 1.5% v/v at a number of locations during the year (PZ1, PZ5, PZ26, PZ28, PZ46 and PZ49). The maximum level was 3.2 % v/v at PZ46 in March and June.

Carbon dioxide was detected in a few boundary monitoring locations, similar to previous monitoring reports. These exceedances are not considered to be due to migration of landfill gas.

Two engines have been installed at the facility to generate power to the national grid. These were commissioned in June 2014. The two enclosed gas flares with a combined capacity of 2,600m³/hr remain on site.

7.9 Monitoring of Emissions from Landfill Gas Flare/Engines

Air emission monitoring was undertaken on the permanent landfill gas flares. All monitoring was carried out in accordance with Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2). NOx as NO2, CO, VOC, HCL, HF and SO2 emissions from both flares were within the emission limit values specified in Waste licence W060-03.

Air emission monitoring was also undertaken on the landfill gas engines. TPM, NOx as NO2, CO, VOC, HCL, HF and T A Luft Organics emissions from both engines were within the emission limit values specified in Waste licence W060-03.

7.10 Noise Monitoring

Noise monitoring was not undertaken during this monitoring period.

7.11 Dust Monitoring

Dust monitoring has been discontinued as the site is now closed and permanently capped.

7.12 Meteorological Monitoring

Meteorological data is monitored in accordance with Schedule of the licence. This information is available on site.

7.13 Slope Stability Assessment

A slope stability assessment was undertaken in April 2016. The analyses for the final waste slopes indicated that the factors of safety for the filling of waste and the slope geometry are satisfactory. An analysis of the topographic surveys for the site indicated that the site is currently in a primary settlement phase following filling. There are no negative features within the surveys from a slope stability viewpoint. In addition a site walkover survey and examination of the waste slope was undertaken and there was no evidence of slope instability or failure within the site throughout Phase 1 – Phase 5. This report is available on site.

7.14 Odour Monitoring

Total Volatile Organic compound monitoring has been undertaken at the site on a bi annual basis. Slight emissions were detected around the gas wells. Based on these reports a number of the recommendations have been carried out to reduce the landfill gas leakage from the site and therefore reducing odour. These reports have been submitted to EPA.

7.15 Ecology Monitoring

Biological sampling and a water quality assessment in accordance with EPA Q-rating methodology was undertaken at two locations on the White River adjacent to the landfill site on 20th September 2016. The biological assessment indicated unpolluted conditions (Q4) upstream at Site 1, and slightly polluted conditions (Q3-4) downstream at Site 2 indicating deterioration in water quality between the upstream and downstream sites. This shows degradation in water quality from 2015 results.

The report concluded that runoff from the landfill passes through a settlement pond and is therefore unlikely to be the source of siltation in the Whiteriver. In addition, quarterly monitoring of the surface water discharge from the landfill has not shown any signs of contamination from the landfill.

8 Resources and Energy Consumption Summary

Consumption of resources for the reporting period is shown in Table 8.1 below.

Table 8.1 Consumption of Resources

Parameters	Unit	Annual Total 2013	Annual Total 2014	Annual Total 2015	Annual Total 2016
Light fuel oil (Diesel)	litres	1,998,000	1,400	1,100	0
Electricity used	kWh	212,000	120,000	50,000	48,200
Water	m^3		110	55	62

9 Proposed Development of the Facility and Timescale of Such Development

The site is now closed. Restoration of the site was completed in 2014. Landfill gas engines have been operational since July 2014. The site is currently exporting 0.8 to 1MW to the grid. There is no further proposed development for the facility in 2017.

10 Volume of leachate produced and volume of leachate tankered off site

The volume of leachate transported off site to Drogheda wastewater treatment plant during the period January to December 2016 is provided in Table 10.1. A water balance calculation has been undertaken and is included in Appendix F using rainfall data from metrological station on site. This estimates the annual leachate production to be approximately 11,020 m^3. This is based on using worst case scenario for infiltration on temporarily capped /restored area of 30% and 10% for restored areas.

Table 10.1 Volume of Leachate Transported Off Site in 2016

Month	Weight Volume (m^3)
January	2136.28
February	2137.98
March	1270.04
April	982.62
May	866.26
June	392.70
July	829.68
August	232.14
September	149.15
October	608.30
November	245.64
December	804.38
Total	**10655.17**

11 Report on Development Works Undertaken During the Reporting Period, and a Timescale for Those Proposed During the Coming Year

11.1 Restoration of Completed Cells/Phases

The site has been fully restored. This was completed in 2014.

11.2 Timescale for Development Works Proposed During the Coming Year

There is no further proposed development for the facility in 2017.

12 Site Survey Showing Existing Levels of the Facility at the End of the Reporting Period

A topographical survey was carried out in June 2015. This is available for inspection on site.

13 Estimated Annual Quantity of Landfill Gas (LFG) Emitted from the Site

The gas yield figures provided in Appendix G were calculated using GasSim Model 2.0. As can be seen from the data landfill gas production is calculated to be approximately 575 m^3/hr in 2016.

There are two landfill gas flares and two engines installed at Whiteriver landfill site. The two engines are now running continuous with flare(s) providing backup when required.

The EPA landfill gas survey was also completed for 2016. The average flow rate and methane content for the engines in 2016 is provided in Table 13.1 below.

Table 13.1 Average flow rate and methane content for the engines

Engine	Average flow rate m^3/hr	Methane content %
Engine 1	245	51
Engine 2	163	51

14 Estimated Annual Quantity of Indirect Emissions to Groundwater

The site has been developed on a containment basis, hence controlling potential discharge to groundwater. The risk of leakage is mitigated by the following;

- The relative thickness of the low permeability boulder clays constitutes a natural effective barrier to downward groundwater migration.
- Groundwater resources within the granular horizons are confined under subartesian pressure with a net upward groundwater movement.
- Leachate levels are maintained below licence limits on site.
- Leachate is pumped from the cells, to treatment lagoon and tankered off site for treatment.

There were no direct discharges to groundwater or surface water. The volume of leachate transported off site to Drogheda wastewater treatment plant during the period January to December 2016 was 10,655.17 m^3. A water balance calculation has been undertaken. This estimates the annual leachate production to be approximately 11,020 m^3 as discussed in Section 10.

15 Assessment of the Feasibility of the Utilisation of Landfill Gas as an Energy Resource

Two engines (0.80 Mw and 0.60 Mw) have been installed at the facility to generate power to the national grid. These were commissioned in June 2014.

16 Monthly Water Balance Calculation and Interpretation

A water balance calculation has been undertaken and is included in Appendix F. This estimates the annual leachate production to be approximately 11,020 m^3. The actual quantity of leachate tankered from the site was 10,655.17 m^3.

17 Schedule of Environmental Objectives and Targets for the Forthcoming Year

1.1 Report on the Progress Towards Achievement of the Environmental Objectives and Targets Contained in the Previous Years Report

The objective for the site for 2017 is to ensure the site complies with the waste licence conditions.

18 Full Title and a Written Summary of Any Procedures Developed by the Licensee in the Year, which Relates to the Facility Operation

As part of the Environmental Management System (EMS) procedures have been developed for the site. Operational procedures ensure that the routine operational tasks related to the environmental management of the facility are undertaken in a satisfactory manner as required to maintain effective control of the environmental aspects of the facility. This is available for inspection on site. There were no changes to the procedures during 2016.

19 Reported Incidents and Complaint Summaries, Correspondence to/from EPA

Minor incidents (10 in total) were reported for 2016 in relation to a carbon dioxide levels in perimeter landfill gas piezometers. Quarterly incidents were due to the presence of chloride in groundwater which did not cause a significant environmental issue. No complaints were received in 2016.

A site visit was undertaken by the EPA on 22/04/2016. The following actions are to be undertaken:

- Create a Fire Prevention Plan or amend the Accident Prevention Procedure to address fire incidents. The Emergency Response Procedure document should be finalised with the document control department;
- Repair pipework at P2-4, bentonite and neoprene seals and ensure ports are installed on both sides of the gas valves;
- Ensure gas well head caps are in place at all times where appropriate and that scheduled preventative management and balancing of the gas field occurs;
- Ensure Agency receipt of the VOC survey report results as per Schedule E;
- Implement Hydrological Risk Assessment report recommendations following consideration and agreement from the EPA;
- Update site maps and put in place a document control system;
- Notify EPA of any Incidents as soon as is practicable and adhere to Conditions 9.2, 11.2 and Schedule E; and
- Undertake annual side slope stability assessments and report them as per Schedule E. Ground and top of casing elevations at all groundwater and leachate monitoring points should be surveyed to check levels are accurate.

20 Review of Nuisance Controls

The site ceased to accept municipal solid waste on the 30th of August 2013 and Incinerator Bottom ash on the 20th of December 2013. The site is now closed and has been restored.

Odour monitoring is currently still being undertaken at the facility. Total Volatile Organic compound monitoring was undertaken at the site on a bi annual basis in 2016.

21 Report on Financial Provisions Made Under this License, Management and Staffing Structure of the Facility and a Programme for Public Information

Louth County Council being a local authority is able to provide the necessary finances to ensure the proper management development and restoration of Whiteriver Landfill Site.

Overall responsibility for the ongoing operations of the landfill site is held by a Senior Engineer assigned to the Environmental Section of Louth County Council. The site ceased to accept municipal solid waste on the 30th of August 2013 and Incinerator Bottom ash on the 20th of December 2013.

Management Structure for the closed site is as follows. This is the present status although it may be changed at a future stage.

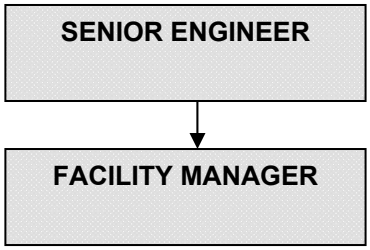


Figure 21.1 Management Structure at Whiteriver Landfill Site

22 Other Information

22.1 Report on Training of Staff Training

No staff training was undertaken in 2016. The site is now closed.

22.2 Tank, Pipeline and Bund Testing and Inspection Report

There are no tanks, pipeline or bund inspection undertaken on site.

22.3 Updates to Landfill Environmental Management Plan (LEMP)

This was last reviewed in October/November 2010 and is available for inspection on site.

22.4 Review of Environmental Liabilities

An Environmental Liabilities Risk Assessment (ELRA) has been completed for the site. This was submitted to EPA in June 2011. The level of financial cover has been agreed with the Agency; however the method of putting in place the financial provision has yet to be agreed. No reply from the EPA has been received to date.

22.5 Report on Waste Recovery

No wastes were recovered on site. The site in now closed.

22.6 Statement of Compliance of Facility with any Updates of the Relevant Waste Management Plan

The number of waste management planning regions has been reduced from 10 regions to 3 (Connacht-Ulster, Eastern-Midland, and Southern). Louth is now part of the Eastern-Midland Region of which Dublin City Council is the lead authority.

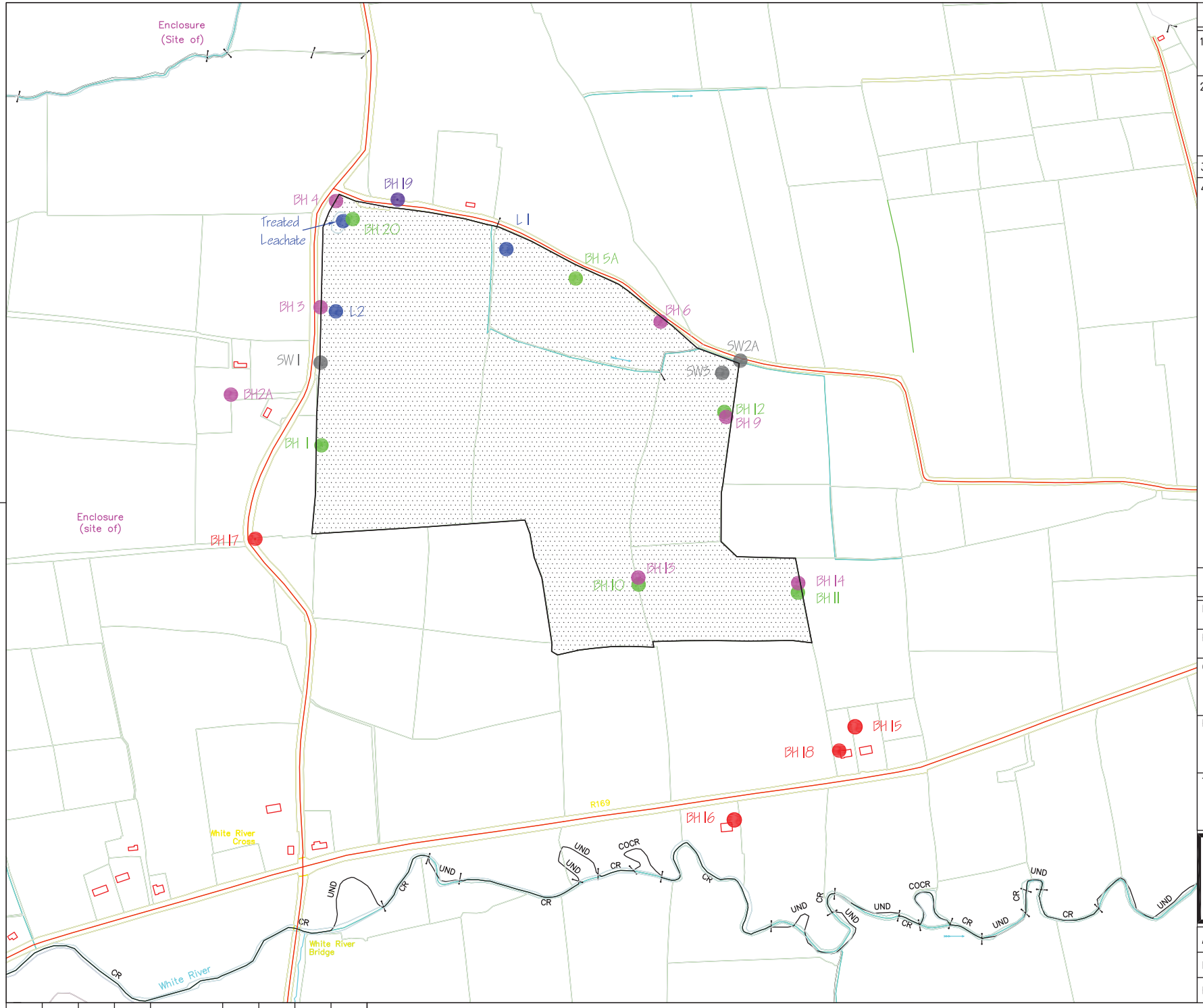
This Plan will set the key objectives and targets for the Region to be achieved over the next 6 years. The Plan was launched on May 14th 2015.

Whiteriver landfill site is listed under local authority landfill capacity closed in the region.

22.7 Statement on the Achievement of the Waste Acceptance and Treatment Obligations

The site in now closed.

Appendix A
Drawings



NOTES

1. VERIFYING DIMENSIONS. THE CONTRACTOR SHALL VERIFY DIMENSIONS AGAINST SUCH OTHER DRAWINGS OR SITE CONDITIONS AS PERTAIN TO THIS PART OF THE WORK.

2. SERVICES. APPROVED OPENINGS FOR SERVICES THROUGH THE STRUCTURE ARE INCORPORATED ON THE DRAWINGS. ANY ADDITIONAL OPENINGS OF A MINOR NATURE REQUIRED BY THE MAIN CONTRACTOR OR HIS SUBCONTRACTORS MUST BE SUBMITTED ON A DRAWING FOR APPROVAL BEFORE WORK COMMENCES.

3. DATUM

4. KEY

INCLUDES ORDNANCE SURVEY IRELAND DATA REPRODUCED UNDER OSI LICENCE NUMBER 2003/07CCMA/LOUTH LOCAL AUTHORITIES. UNAUTHORISED REPRODUCTION INFRINGES ORDNANCE SURVEY IRELAND AND GOVERNMENT OF IRELAND COPYRIGHT. © ORDNANCE SURVEY IRELAND, 2006.

- BH15 Groundwater well (Domestic)
- BH1 Groundwater monitoring boreholes (Overbunden)
- BH4 Groundwater monitoring boreholes (Bedrock)
- SW1 Surfacewater monitoring location points
- L1 Leachate monitoring points
- BH19 Agricultural water supply

REV	DESCRIPTION	BY DATE	CHECK DATE
D	Private well decommissioned removed.	AMB Jul '12	AMcG Jul '12

DRAWN BY RP DATE NOV '06	CHECK BY AMcG DATE NOV '06	APPROVED D.D DATE NOV '06
PLOT SCALE 1:5000	SCHEDULES	SHEET SIZE A3

CLIENT
LOUTH COUNTY COUNCIL

PROJECT
WHITERIVER LANDFILL SITE

TITLE
MONITORING BOREHOLES

RPS Consulting Engineers
TEL: 074 91 61927 www.rpsgroup.com/ireland FAX: 074 91 61928
THE ENTERPRISE FUND BUSINESS CENTRE, BALLYRAINE, LETTERKENNY, Co. DONEGAL

ARCHITECT

DRAWING No. IBL0069/101

REVISION A B C D

DWG. STATUS	
PRELIM.	
TENDER	
CONST.	
RECORD	●

NOTES

1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.

2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.

3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

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PZ27 Landfill Gas Piezometer

rev	amendments	drawn date	checked date

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Client: LOUTH COUNTY COUNCIL

Project: Whiteriver Landfill Site

Title: Landfill Gas Piezometer

Architect:

Drawing Status	Sheet Size	Drawing Scale
Preliminary	A3	1:2500

Drawing Number	Rev
IBR0138/100	0

Drawn By / Date		Checked By / Date		Approved By / Date	
AMB	Mar '10	AMcG	Mar '10	DD	Mar '10

Appendix B

PRTR Reporting

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2016

1. FACILITY IDENTIFICATION

Parent Company Name	Louth County Council
Facility Name	Whiteriver Landfill Site
PRTR Identification Number	W0060
Licence Number	W0060-03

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Whiteriver & Gunstown Townland
Address 2	Dunleer
Address 3	
Address 4	
	Louth
Country	Ireland
Coordinates of Location	-6.52774 53.6647
River Basin District	GBNIIENB
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Damien Homes
AER Returns Contact Email Address	damien.holmes@louthcoco.ie
AER Returns Contact Position	Executive Scientist
AER Returns Contact Telephone Number	042 9392920
AER Returns Contact Mobile Phone Number	086 6097315
AER Returns Contact Fax Number	042 9334549
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	8760
Number of Employees	1
User Feedback/Comments	Large drop off in quantity of methane generated and consequently the net emission
Web Address	

2. PRTR CLASS ACTIVITIES

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

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

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

4. WASTE IMPORTED/ACCEPTED ONTO SITE Guidance on waste imported/accepted onto site

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

4.1 RELEASES TO AIR Link to previous years emissions data | PRTR# : W0060 | Facility Name : Whiteriver Landfill Site | Filename : W0060_2016 PRTR.xls | Return Year : 2016 | 19/04/2017 09:12

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Gassim Model	0.0	192859.0	0.0	192859.0
55	1,1,1-trichloroethane	C	OTH	Gassim Model	0.0	13.2	0.0	13.2
04	Hydro-fluorocarbons (HFCs)	C	OTH	Gassim Model	0.0	14.5	0.0	14.5

* 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
15	**Chlorofluorocarbons (CFCs)**	C	OTH	Gassim Model	0.0	20.0	0.0	20.0

* 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) flare 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: Whiteriver Landfill Site

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)	924478.0	C	Gassim	Gassim Lite	N/A	
Methane flared	2218.0	C	Measured	Measured	0.0	(Total Flaring Capacity)
Methane utilised in engine/s	729401.0	C	Measured	Measured	0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	192859.0	C	Measured	Measured	N/A	

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE | PRTR# : W0060 | Facility Name : Whiteriver Landfill Site | Filename : W0060_2016 PRTR.xls | Return Year : 2016 | 19/04/2017 09:13

Please enter all quantities on this sheet in Tonnes 3

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility 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	10655.0	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	EPS ,.	Marsh Road,Drogheda,Co. Louth,.,Ireland		

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

Appendix C

Groundwater Monitoring Results

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS																																	
																	RESULTS																	
Monitoring Point:																	BH1																
																	UPSTREAM OVERBURDEN																
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			272				240				290				284				284				258					249.83		260	
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					52.66		58.2	
Ammonia	**mg/l N**	0.2	0.09	0.03	0.23	<0.03	0.03	0.03	<0.03	<0.03	0.04	<0.03	0.03	<0.03	0.05	<0.03	0.02	<0.03	0.03	0.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.033	<0.2	<0.11	0.014	< 0.11		
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	**µg/l**												<0.5				<0.5				<1.0				<1.0					0.276		<2	
Barium	**µg/l**												153.6				178.4				170				160					160.7		148	
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
B.O.D.	**mg/l O2**																												-				
Boron	**µg/l**	1000			11.9				13.9				12.3				12.48				16				15					10.42		<135	
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					<0.09		<0.5	
Calcium	**mg/l Ca**	200			99.77				97.49				100.79				109.97				110				99					97.73		91.20	
C.O.D.	**mg/l O2**							6.8																					-				
Chloride	**mg/l Cl**	20	27	31	38	41	32	30	36	39	34	30	33	33	30	26	35.1	46	34	36	40	36	39	33	39	46	47	38.2	56.8	51.39	35.00	33.6	
Chromium	**µg/l**	30			<1				<0.5				<0.5				0.51				<1.0				<1.0					<2.14		<3	
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.02			
Coliform Bacteria	**No/ml**																																
Conductivity	**µS/cm @ 25**	800	636	637	660	661	578	643	690	632	716	660	657	730	735	647	675	705	672	668	669	673	654	600	616	664	636	648	669	580	605.0		
Copper	**µg/l**	30			1.4				1.1				<0.5				1.07				<1.0				<1.0					2.014		<4	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	**% Saturation**		44	24	45	nm	46	56	42	30	35	44	36	43	44	46	40	26	35	37	29	42	40	32	24	28	34	7.25		25			
E_ Coli	**no/100ml**																																
Fluoride	**mg/l**	1			0.15				<0.150				<0.150				0.12				0.17				<0.20					0.19			
Iron	**µg/l**				314.9				97				<10				<10				<10.0				<10.0					101.8		0.197	
Lead	**µg/l**	10			<1				<0.5				<0.5				<0.5				<1.0				<1.0					0.253		<0.5	
Magnesium	**mg/l Mg**	50			9.95				10.38				9.76				11.27				11				9.7					9.446		8.49	
Manganese	**µg/l**				38.9				60.5				2.1				1.24				<5.0				<5.0					25.26		11.9	
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02	
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5			
Nickel	**µg/l**	20			1.3				<0.5				<0.5				<0.5				<1.0				<1.0					0.513		0.677	
Ortho-Phosphate	**mg/l P**	0.03			0.03				<0.02				<0.02				0.004				<0.010				<0.010					<0.005			
pH		>7 or <8	7.4	7.3	7.2	7.2	7.3	7.5	7.4	7.2	7.4	7.4	7.3	7.2	7.2	6.9	7.3	7.2	7.2	7.3	7.1	7.2	7.2	7.2	7.3	7.2	7.2	7.25	7.15	7.6	7.12		
Potassium	**mg/l**	5			<1				0.48				0.46				0.78				0.77				0.43					0.568		0.22	
Residue on evap	**mg/l**				420				392				366				412				400				400								
Sampling Depth	**m**		6.8	6.7	6.7	6.9	7		6.7	7.1	7.2	7	6.9	6.8	6.9	6.8	6.63	6.8	7	6.8	6.8	6.9	6.1	6.9	6.7	6.9	7						
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.47			
Silver	**µg/l**												<0.5				nm																
Sodium	**mg/l**	150			20.82				20.31				16.54				19.77				21				20				-	22.08		21.50	
Strontium	**µg/l**												144.19				151.01				140				130				-	139.1			
Sulphate		50			21.1				19.2				18.2				15.86				16.4				13					11.48		13.4	
Suspended Solids	**mg/l**																																
Temp	**°C**		11	9	10.5	10	13	10.4	10	12.7	12	10	9	11	11	8	9.6	13.7		10	10.3	11	10.5	10.1	9.2	12.9	13.1			13			
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0								
Time			12.1	12.35	12.35	11.1	12:35	11.55	11:45	11:05	11:00	11:30	11:35	11:30	11:22	11:20	11:45	10:40	10:45	10:50	0.4861111	11:10	11:00	10:55	11:00	11:00	10:40							
Tin	**µg/l**												2.8				nm																
T.O.C.	**mg/l**	10	4	2.9	1.9	1.6	3.5	3.3	2.5	2.4	4	1.7	70.3	<1.5	3.8	2	1.09	1.5	<1.5	1.9	<1.5	3.2	2.1	<1.5	2.3	1.7	2.2	2.81	2.38	1.43	2.53		
T.O.N	**mg/l N**				1.1				1.23				1.06				0.75				0.43				<0.20					<0.28			
Total Suspended Solids	**mg/l**																													<2			
Uranium	**µg/l**												0.64				0.78				<1.0				<1.0					<0.42			
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Zinc	**µg/l**	100			17.3				19.4				6.1				14.51				20				6.2					29.47		20.5	
Water Level m OD	**119.94**		113.14	113.24	113.24	113.04	112.94	119.94	113.24	112.84	112.74	112.94	113.04	113.14	113.04	113.14	113.31	113.14	112.94	113.14	113.14	113.04	113.84	113.04	113.24	113.04	112.94						

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS		RESULTS																																		
Monitoring Point:		BH2A																																		
		UPSTREAM BEDROCK CRAWLEYS PRIVATE WELL- POTABLE SOURCE																																		
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	mg/lCaCO3	NAC			324				288				340				296				312				316					297.82		315		
Aluminium	µg/l												<5				<5				<10.0				<10.0					<0.79		<50		
Ammonia	mg/l N	0.2	0.05	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.14	<0.03	0.094	0.09	0.22	<0.020	0.029	0.039	0.033	<0.020	<0.020	<0.020	<0.020	<0.2	<0.11	<0.01	< 0.11				
Antimony	µg/l												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14				
Arsenic	µg/l												<0.5				<0.5				<1.0				<1.0					0.546		<2			
Barium	µg/l				<1								0.6				0.62				<1.0				<1.0					<1.62		1.08			
Beryllium	µg/l												<0.5				<0.5				<1.0				<1.0										
B.O.D.	mg/l O2																												-							
Boron	µg/l	1000			12.5				15.3				14.1				11				15				15					9.68		<135			
Cadmium	µg/l	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					<0.09		<0.5			
Calcium	mg/l Ca	200			63.33				69.74				65.21				62.35				68				65					65.65		71.30			
C.O.D.	mg/l O2							nm																					-							
Chloride	mg/l Cl	20	16	16	16	17	17	16	16	15	16	15	16	16	16	16	16.29	16	16	17	17	14	16	16	17	16	19	15.6	16.7	16.34	16.30	16.2			
Chromium	µg/l	30			<1				<0.5				<0.5				<0.5				<1.0				<1.0					<2.14		<3			
Cobalt	µg/l												<0.5				<0.5				<1.0				<1.0					<0.02					
Coliform Bacteria	no/100ml		34	0	7	18					20	0				1	1	61					nm													
Conductivity	µS/cm @ 25	800	611	616	615	610	549	627	608	610	657	632	614	674	644	611	609	614	613	615	612	610	613	587	591	614	611	634	625	558	619.0				
Copper	µg/l	30			1.6				1.5				0.7				1.32				4.3				1.3					2.877		<4			
Cyanide	mg/l	0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5					
D.O.	% Saturation		33	31	54	25	20	43	26	37	33	30	28	33	19	26	24	23	20	29	19	40	27	21	34	20	20	7.1		18						
E_ Coli	no/100ml		0	0	0	0					1	0				0	0	0					nm													
Fluoride	mg/l	1			<0.150				<0.150				<0.150		1		0.11				0.17				<0.20					0.21					
Iron	µg/l				<10				<10				<10				37.66				28				<10.0					8.715		<0.024			
Lead	µg/l	10			<1				<0.5				<0.5				<0.5				<1.0				<1.0					<0.02		<0.5			
Magnesium	mg/l Mg	50			31.3				34.16				31.42				30.6				28				31					32.44		25.60			
Manganese	µg/l				2.5				2.9				2.5				5				<5.0				<5.0					1.65		3.01			
Mercury	µg/l	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02			
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5					
Nickel	µg/l	20			<1				<0.5				<0.5				0.51				<1.0				<1.0					<0.14		0.677			
Ortho-Phosphate	mg/l P	0.03			<0.02				<0.02				<0.02				0.005				<0.010				<0.010					<0.005					
pH		>7 or <8	7.5	7.5	7.5	7.4	7.5	7.7	7.5	7.5	7.5	7.6	7.6	7.5	7.5	7.1	7.5	7.4	7.4	7.5	7.4	7.4	7.5	7.4	7.5	7.4	7.4	7.39	7.28	7.2	7.46				
Potassium	mg/l	5			1.06				1.13				1.16				1.29				1.4				1.1					1.085		2.18			
Residue on evaporation	mg/l				332				322				337				338				369				344										
Sampling Depth	m		nm	nm	nm	nm	nm		nm	nm	nm	nm	nm	nm	nm	0	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm								
Selenium	µg/l												<0.5				<0.5				<1.0				<1.0					<0.47					
Silver	µg/l												nm				nm																			
Sodium	mg/l	150			19.78				21.1				20.11				18.87				21				21				-	21.29		20.80			
Strontium	µg/l												226.68				222.14				220				230				-	224.2					
Sulphate		50			4.9				4.8				5.1				5.86				4.9				4					4.69		<2			
Suspended Solids	mg/l																																			
Temp	°C		11.7	7.5	7.8	15	11.4	8.7	14	13.5	16.2	10.1	11.7	15	14.5	7	8.8	15.4	11.1	6.2	10.7	13.8	13	10.1	8.3	15.2	12.6			12.6					
Thallium	µg/l												<0.1				<0.1				<1.0				<1.0										
Time			12.15	11.4	11.55	10.25	12:20	12.35	10:45	10:10	10:20	10:30	10:25	10:45	11:00	10:25	10:10	nt	11:10	10:30	10:30	10:45	10:30	09:50	10:35	10:55	10:45									
Tin	µg/l												<1				nm																			
T.O.C.	mg/l	10	<3.0	2.1	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	4.2	<1.5	77	<1.5	<1.5	<1.5	0.031	<1.5	1.5	<1.5	<1.5	2.4	<1.5	<1.5	<1.5	<1.5	<1.5	<1	1.84	0.5	< 1				
T.O.N	mg/l N				0.26				0.46				0.37				0.21				0.47				0.53					0.64					
Total Suspended Solids	mg/l																													<2					
Uranium	µg/l												1.81				1.86				1.9				2					1.275					
Vanadium	µg/l												<0.5				<0.5				<1.0				<1.0										
Zinc	µg/l	100			2.6				4.9				1.9				2.74				2.8				1.6					10.52		<3			

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS			RESULTS																																
Monitoring Point:			BH3																																
			UPSTREAM BEDROCK																																
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			308				308				320				308				328				312					306.38		315		
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					150.8		<50		
Ammonia	**mg/l N**	0.2	0.07	0.03	0.06	<0.03	0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	0.17	0.04	0.008	0.03	0.06	<0.020	<0.020	0.029	0.036	0.039	<0.020	0.022	0.036	<0.2	<0.11	0.015	< 0.11				
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14				
Arsenic	**µg/l**												0.69				0.62				<1.0				<1.0					0.837		<2			
Barium	**µg/l**												67				69.7				70				70					85.03		61.2			
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0										
B.O.D.	**mg/l O2**																												-						
Boron	**µg/l**	1000			17.6				18				18.8				16				18				18					94.37		<135			
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				0.02				<0.020					0.101		<0.5			
Calcium	**mg/l Ca**	200			78.89				72.76				73.59				73.05				78				74					63.45		71.20			
C.O.D.	**mg/l O2**							0																					-						
Chloride	**mg/l Cl**	20	33	23	17	15	15	15	15	14	15	15	15	15	15	15	14.71	15	15	15	15	13	15	15	15	15	17	14.4	15.1	15.11	14.60	14.6			
Chromium	**µg/l**	30			<1				<0.5				<0.5				0.54				<1.0				<1.0					7.767		<3			
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					0.269					
Coliform Bacteria	**no/100ml**																																		
Conductivity	**µS/cm @ 25**	800	797	696	649	623	559	634	616	621	709	638	626	686	716	619	617	622	620	625	618	618	624	589	596	615	617	639	629	555	627.0				
Copper	**µg/l**	30			<1				<0.5				2.7				0.64				<1.0				<1.0					13.8		<4			
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5					
D.O.	**% Saturation**		36	24	43	nm	40	42	28	26	27	31	27	29	27	34	30	16	20	26	23	30	35	27	21	29	25	5.92		21					
E_ Coli	**no/100ml**																																		
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.12				0.15				<0.20					0.17					
Iron	**µg/l**				<10				31.7				<10				<10				<10.0				<10.0					276.5		<0.024			
Lead	**µg/l**	10			<1				<0.5				<0.5				<0.5				<1.0				<1.0					1.089		<0.5			
Magnesium	**mg/l Mg**	50			26.64				25.92				25.74				25.33				22				26					22.44		25.60			
Manganese	**µg/l**				17.3				9.7				10.9				7.68				14				19					458.1		166			
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02			
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5					
Nickel	**µg/l**	20			<1				<0.5				1.1				<0.5				<1.0				<1.0					0.948		1.37			
Ortho-Phosphate	**mg/l P**	0.03			0.04				0.04				0.05				0.042				0.041				0.035					0.037					
pH		>7 or <8	7.3	7.4	7.4	7.5	7.6	7.7	7.5	7.5	7.6	7.6	7.6	7.5	7.5	7.2	7.6	7.5	7.4	7.5	7.5	7.4	7.5	7.5	7.7	7.5	7.5	7.4	7.42	7.5	7.59				
Potassium	**mg/l**	5			1.4				1.38				1.6				1.7				2				1.5					1.399		1.18			
Residue on evaporation	**mg/l**				357				348				370				352				363				356										
Sampling Depth	**m**		2.8	0.5	0	nm	0		nm	nm	nm	nm	nm	nm	nm	0	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm								
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.47					
Silver	**µg/l**												nm				nm													.					
Sodium	**mg/l**	150			21.71				20.6				21.03				20.37				23				21				-	17.94		20.30			
Strontium	**µg/l**												280.04				286.38				280				280				-	289.8					
Sulphate		50			17.6				4.9				4.6				5.43				5.3				4					4.21		<2			
Suspended Solids	**mg/l**																																		
Temp	**°C**		12	8.2	10.3	10	13	10.3	11	13.7	12	10	10	11	11	10	10	13.5	12.3	10	11.1	11	11	9.8	9.1	13.2	13			12.2					
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0										
Time			12.3	12.55	12.5	11.15	12:45	12.05	11:50	11:10	11:05	11:35	11:40	11:35	11:30	11:25	11:50	10:45	10:50	10:55	11:50	11:15	11:05	11:05	11:10	11:05	10:45									
Tin	**µg/l**												<1				nm																		
T.O.C.	**mg/l**	10	4.6	2.7	<1.5	<1.5	<1.5	2.5	<1.5	<1.5	8.5	<1.5	80.5	<1.5	<1.5	<1.5	0.26	<1.5	<1.5	<1.5	<1.5	2.8	1.5	<1.5	<1.5	<1.5	1.6	1.18	2.81	0.31	2.83				
T.O.N	**mg/l N**				0.21				0.28				0.2				0.19				0.31				0.31					0.42					
Total Suspended Solids	**mg/l**																													2					
Uranium	**µg/l**												2.23				2.37				2.3				2.3					1.981					
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0										
Zinc	**µg/l**	100			10.7				13				14.2				3.11				7.6				7					77.27		7.44			

	Whiteriver Landfill Site																																
	GROUNDWATER QUALITY																																
PARAMETERS	RESULTS																																
Monitoring Point:	BH4																																
	UPSTREAM BEDROCK																																
		Trigger Level	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			282				278				272				282				236				302					283.06		170	
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					62.13		<50	
Ammonia	**mg/l N**	0.2	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.07	0.03	0.011	0.03	0.05	<0.020	<0.020	0.065	<0.020	0.036	<0.020	<0.020	0.033	<0.2	<0.11	<0.01	< 0.11		
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	**µg/l**												<0.5				<0.5				<1.0				<1.0					2.615		<2	
Barium	**µg/l**												7.1				5.02				6.6				8.8					10.59		4.45	
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
B.O.D.	**mg/l O2**																												-				
Boron	**µg/l**	1000			11				12.4				11.5				<10				12				12					119		<135	
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					<0.09		<0.5	
Calcium	**mg/l Ca**	200			77.68				76.57				75.9				76.7				80				75					66.71		34.50	
C.O.D.	**mg/l O2**							nm																					-				
Chloride	**mg/l Cl**	20	13	14	13	14	14	21	14	13	16	14	14	15	14	14	14.29	14	14	14	14	12	14	14	14	14	17	13.2	13.9	14.94	13.70	14.3	
Chromium	**µg/l**	30			<1				<0.5				<0.5				<0.5				<1.0				<1.0					2.805		<3	
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					0.173			
Coliform Bacteria	**no/100ml**																																
Conductivity	**µS/cm @ 25**	800	560	566	588	599	540	905	563	559	645	562	576	627	675	587	560	560	560	569	569	572	559	545	555	576	593	620	591	523	573.0		
Copper	**µg/l**	30			11.3				<0.5				<0.5				<0.5				2.1				11					19.45		8.06	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	**% Saturation**		27	21	24	nm	14	29	16	23	40	15	nm	21	10	13	52	63	64	50	34	64	56	50	47	50	58	6.64		56			
E_ Coli	**no/100ml**																																
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.11				0.16				<0.20					0.2			
Iron	**µg/l**				1284.2				337.8				123.7				66.95				<10.0				730					11380		5.43	
Lead	**µg/l**	10			8.7				<0.5				<0.5				<0.5				<1.0				<1.0					2.147		<0.5	
Magnesium	**mg/l Mg**	50			20.56				20.99				20.01				20.8				21				20					18.08		16.00	
Manganese	**µg/l**				21.2				17.3				39.3				102.8				24				150					52.77		79.6	
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					0.088		<0.02	
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5			
Nickel	**µg/l**	20			1.1				<0.5				<0.5				<0.5				<1.0				<1.0					1.014		<0.5	
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0				<0.010				<0.010					<0.005			
pH		>7 or <8	7.5	7.5	7.3	7.3	7.3	7.4	7.4	7.5	7.3	7.4	7.6	7.4	7.3	7.2	7.6	7.6	7.5	7.4	7.4	7.4	7.5	7.5	7.5	7.4	7.3	7.23	7.3	7.4	7.19		
Potassium	**mg/l**	5			<1				0.91				0.98				1.22				1.3				0.97					0.757		0.75	
Residue on evaporation	**mg/l**				340				303				303				340				300				326								
Sampling Depth	**m**		0	0	nm	nm	0		nm	nm	nm	nm	nm	nm	nm	0	nm	nm	nm	nm	18.6	nm	nm	nm	nm	nm	nm						
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.47			
Silver	**µg/l**												nm				nm																
Sodium	**mg/l**	150			16.19				16.25				15.65				16.03				16				16				-	13.21		15.90	
Strontium	**µg/l**												201.78				195.79				190				200				-	215			
Sulphate		50			21.7				3.7				4.8				3.86				5				3					3.55		<2	
Suspended Solids	**mg/l**																																
Temp	**°C**		12	8.6	8.5	11	12	6.1	11	15	14	8	nm	14	11	8	5.8	13.8	12.4	2	8.8	16	8.5	4.7	8.5	15.3	13.3			11.9			
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0								
Time			13.2	13.2	14	11.55	13:00	12.2	12:10	10:55	11:55	12:00	nt	11:45	11:50	11:40	12:05	10:55	10:30	11:40	11:00	11:30	11:20	11:40	11:25	12:12	10:50						
Tin	**µg/l**												<1				nm																
T.O.C.	**mg/l**	10	<3.0	<1.5	<1.5	<1.5	<1.5	2.9	<1.5	1.6	5.5	3.9	69.7	<1.5	1.7	1.6	0.186	<1.5	<1.5	<1.5	1.5	3.1	<1.5	<1.5	1.8	<1.5	2	1.1	2.43	0.51	3.44		
T.O.N	**mg/l N**				<0.08				0.59				0.5				0.48				<0.20				<0.20					0.57			
Total Suspended Solids	**mg/l**																													8			
Uranium	**µg/l**												1.29				1.27				1.4				1.2					1.288			
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Zinc	**µg/l**	100			323.3				10.3				34.1				16.68				56				110					118.5		18.6	

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS			RESULTS																																
Monitoring Point:			BH5A																																
			DOWNSTREAM OVERBURDEN																																
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			240				192				232				210				274				242					286.01		295		
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					355.1		63.1		
Ammonia	**mg/l N**	0.2	0.08	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	0.015	0.03	0.04	<0.020	<0.020	<0.020	<0.020	0.032	0.062	<0.020	<0.020	<0.2	<0.11	0.012	< 0.11				
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14				
Arsenic	**µg/l**												0.5				<0.5				<1.0				<1.0					0.626		<2			
Barium	**µg/l**												81.4				91.8				94				100					129.1		124			
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0										
B.O.D.	**mg/l O2**																												-						
Boron	**µg/l**	1000			17				21.5				15.9				14				13				12					8.168		<135			
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					<0.09		<0.5			
Calcium	**mg/l Ca**	200			103.29				87.15				74.9				74.89				87				99					111.5		112.00			
C.O.D.	**mg/l O2**							7.8																					-						
Chloride	**mg/l Cl**	20	25	46	54	49	30	48	57	44	42	60	28	26	25	41	34.81	33	33	46	48	28	33	52	39	32	37	43.3	35.9	31.18	32.50	34.5			
Chromium	**µg/l**	30			4.6				0.6				<0.5				<0.5				<1.0				<1.0					<2.14		<3			
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					0.418					
Coliform Bacteria	**no/100ml**																																		
Conductivity	**µS/cm @ 25**	800	638	605	671	640	534	584	645	631	666	660	564	627	609	608	559	592	620	778	630	608	630	627	643	673	674	669	737	672	743.0				
Copper	**µg/l**	30			6.2				1.3				2.5				1.71				2				<1.0					3.472		<4			
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5					
D.O.	**% Saturation**		36	92	81	nm	56	97	53	37	54	90	75	98	65	115	66	30	38	70	53	46	50	62	84	81	83	9.51		79					
E_ Coli	**no/100ml**																																		
Fluoride	**mg/l**	1			0.23				0.19				0.19				0.19				0.23				<0.20					0.26					
Iron	**µg/l**				3272.3				312.1				<10				<10				<10.0				<10.0					594.3		0.283			
Lead	**µg/l**	10			5.2				<0.5				<0.5				<0.5				<1.0				<1.0					0.711		<0.5			
Magnesium	**mg/l Mg**	50			15.01				12.9				10.81				11.66				12				13					15.91		14.90			
Manganese	**µg/l**				263.2				12.3				<1				<1				<5.0				<5.0					38.98		133			
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02			
Molybdenum (µg/l)													0.6				<0.5				<1.0				<1.0					<5					
Nickel	**µg/l**	20			9.6				<0.5				0.7				1.06				<1.0				<1.0					2.109		<0.5			
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0				<0.010				<0.010					<0.005					
pH		>7 or <8	7.5	8.1	7.7	7.5	7.7	8.1	7.7	7.6	7.8	8.1	8	7.9	7.7	7.8	7.8	7.6	7.5	7.7	7.6	7.5	7.5	7.7	7.7	7.4	7.4	7.36	7.32	7.3	7.27				
Potassium	**mg/l**	5			1.38				1.31				1.41				1.6				1.5				0.76					0.876		0.48			
Residue on evaporation	**mg/l**				2099				456				956				975				664				411										
Sampling Depth	**m**		7.2	7.8	7.9	8.1	8		7.9	8.2	8.1	7.4	3.5	7.7	7.6	7.5	7.43	7.5	7.3	7.1	6.9	6.9	6.8	6	5.8	6.2	6.3								
Selenium	**µg/l**												<0.5				<0.5				<1.0				1.4					0.693					
Silver	**µg/l**												nm				nm																		
Sodium	**mg/l**	150			29.11				29.31				26.89				27.31				31				23				-	21.95		19.00			
Strontium	**µg/l**												143.55				151.72				150				160				-	184.1					
Sulphate		50			42				42				32.3				31.58				44				44					54.33		47.9			
Suspended Solids	**mg/l**																																		
Temp	**°C**		11	8.7	11	11	11	10.0	11	12.4	13	10	11	11	11	9	10.3	13.5	11.7	8	10.8	10	11	10.1	9.9	13.1	13.3			11.8					
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0										
Time			13.1	12	13.2	10.15	12:10	12.55	12:10	11:15	11:15	11:45	12:00	11:10	12:00	11:05	11:15	10:30	11:15	11:20	12:10	10:25	10:10	10:05	10:20	10:50	10:25									
Tin	**µg/l**												2.02				nm																		
T.O.C.	**mg/l**	10	4.4	5.7	3.4	3.9	4.9	5.3	3.5	3.2	11.5	5.4	67	4.4	4.7	7.8	2.86	2.5	4.1	4.5	4.6	5.1	3.8	3.8	2.8	1.6	1.9	4.62	2.22	1.17	4.71				
T.O.N	**mg/l N**				<0.08				0.08				0.17				0.07				<0.20				0.45					0.42					
Total Suspended Solids	**mg/l**																													7					
Uranium	**µg/l**												0.99				0.89				<1.0				<1.0					0.726					
Vanadium	**µg/l**												0.64				<0.5				<1.0				<1.0										
Zinc	**µg/l**	100			17.3				4.2				3.9				4.75				11				4.5					25.77		6.98			
Water Level m OD	**107.88**		100.68	100.08	99.98	99.78	99.88	107.88	99.98	99.68	99.78	100.48	104.38	100.18	100.28	100.38	100.45	100.38	100.58	100.78	100.98	100.98	101.08	101.88	102.08	101.68	101.58								

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS	RESULTS																																			
Monitoring Point:	BH6																																			
	DOWNSTREAM BEDROCK																																			
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			141				208				260				282				332				273					261.2		275		
Aluminium	**µg/l**												<5				17.21				<10.0				<10.0					2658		720		
Ammonia	**mg/l N**	0.2	0.28	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	0.03	<0.03	0.03	0.03	<0.03	0.05	<0.03	0.112		0.03	<0.020	<0.020	<0.020	<0.020	0.046	0.064	<0.020	<0.020	<0.2	<0.11	0.014	< 0.11				
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14				
Arsenic	**µg/l**												0.73				0.63				<1.0				<1.0					2.016		<2			
Barium	**µg/l**												209.3				230.06				230				200					281.2		297			
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0										
B.O.D.	**mg/l O2**																												-							
Boron	**µg/l**	1000			32.5				61.3				60.3				34.15				55				51					97.96		141			
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				0.02				0.15					0.572		<0.5			
Calcium	**mg/l Ca**	200			40.67				66.84				74.69				71.28				77				74					70.97		70.50			
C.O.D.	**mg/l O2**							13.4																					-							
Chloride	**mg/l Cl**	20	10	13	7	8	9	7	13	16	16	14	14	15	14	14	19.17		14	14	15	12	15	15	14	15	17	13.4	14.2	14.95	14.20	13.7			
Chromium	**µg/l**	30			1.9				2.1				<0.5				<0.5				<1.0				<1.0					9.903		<3			
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					2.613					
Coliform Bacteria	**no/100ml**																																			
Conductivity	**µS/cm @ 25**	800	638	240	301	273	262	281	464	528	584	544	538	575	610	536	538		536	550	537	538	543	504	520	536	539	567	551	489	548.0				
Copper	**µg/l**	30			6.1				3.1				<0.5				1.26				<1.0				<1.0					16.29		<4			
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5					
D.O.	**% Saturation**		48	75	24	32	37	45	35	59	43	58	42	60	42	63	39		33	27	28	65	66	43	49	67	57	7.07		48					
E_ Coli	**no/100ml**																																			
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.14				0.17				<0.20					0.23					
Iron	**µg/l**				1694				1983				<10				25.33				<10.0				<10.0					3879		1.69			
Lead	**µg/l**	10			6.9				1.8				<0.5				0.54				<1.0				<1.0					5.667		1.61			
Magnesium	**mg/l Mg**	50			8.86				15.58				16.46				15.39				18				17					16.97		16.90			
Manganese	**µg/l**				425.7				59.7				252.3				84.97				<5.0				210					1172		1270			
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02			
Molybdenum (µg/l)													0.8				0.58				<1.0				3.2					<5					
Nickel	**µg/l**	20			3.6				16.7				0.6				0.65				<1.0				<1.0					6.402		2.36			
Ortho-Phosphate	**mg/l P**	0.03			0.03				0.03				0.04				0.027				0.031				0.027					0.026					
pH		>7 or <8	7.5	7.5	7.5	7.4	7.6	7.6	7.6	7.7	7.5	7.8	7.8	7.7	7.5	7.8	7.5		7.5	7.5	7.6	7.5	7.5	7.5	7.6	7.5	7.6	7.46	7.38	7.4	7.37				
Potassium	**mg/l**	5			2.67				6.2				2.18				2.66				2.1				1.7					2.242		1.34			
Residue on evaporation	**mg/l**				580				378				370				1006				465				373										
Sampling Depth	**m**		13.8	13.9	13.3		13.9		13.8		13.9		0	nm	nm	nm	nm		nm	nm	nm	nm	26	nm	nm	nm	nm								
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.47					
Silver	**µg/l**												nm				nm																			
Sodium	**mg/l**	150			7.98				21.44				14.82				13.48				16				16				-	15.78		15.10			
Strontium	**µg/l**												199.45				187.5				190				190				-	225.8					
Sulphate		50			6				8.9				10.4				11.04				9.6				3					9.78		9.3			
Suspended Solids	**mg/l**																																			
Temp	**°C**		12.3	10	10.3	11	10.9	9.3	11	15	14.6	10.9	11	13	14.5	6	8.9		11.6	9	9.8	14	11	8.5	10.2	14.6	13			13.1					
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0										
Time			12.5	12.35	13.2	11.3	13.15	13.45	12:20	12:00	12:25	11:20	11:20	11:30	12:00	11:15	13:00		12:20	11:45	11:50	11:25	11:45	11:45	11:25	12:30	11:20								
Tin	**µg/l**												<1				nm																		
T.O.C.	**mg/l**	10	8.2	43.3	19.8	47.1	36.2	5.9	3.4	12.3	4	3.3	68	2.2	2.4	3.4	1.3		5.7	9.4	3.1	6.4	4.2	3.9	2.1	3.6	2.5	2.95	2.21	1.27	1.39				
T.O.N	**mg/l N**				0.33				0.31				0.14				0.04				0.64				<0.20					<0.28					
Total Suspended Solids	**mg/l**																													67					
Uranium	**µg/l**												0.95				1.26				1.1				1					1.284					
Vanadium	**µg/l**												<0.5				0.97				<1.0				1.5										
Zinc	**µg/l**	100			14.6				12.2				10.4				13.5				<1.0				21					56.98		18.8			
Water Level m OD	**105.01**		91.21	91.11	91.71		91.11		91.21		91.11	105.01	105.01									#VALUE!	79.01	#VALUE!											

Whiteriver Landfill Site

GROUNDWATER QUALITY

RESULTS

BH9

DOWNSTREAM BEDROCK

PARAMETERS	Units	Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
Monitoring Point:			06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			440				408				336				328				368				366					331.09		195	
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					1397		<50	
Ammonia	**mg/l N**	0.2	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	0.03	0.18	<0.03	0.11	0.06	0.35	<0.020	0.074	0.024	0.23	0.049	0.031	<0.020	<0.020	<0.2	<0.11	<0.01	< 0.11		
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	**µg/l**												0.56				0.57				<1.0				<1.0					3.112		6.99	
Barium	**µg/l**												163				169.16				210				180					277.7		335	
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
B.O.D.	**mg/l O2**																												-				
Boron	**µg/l**	1000			17.3				37.3				19.2				17.26				23				20					68.43		<135	
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					0.116		<0.5	
Calcium	**mg/l Ca**	200			151.69				148.74				102.87				107.6				120				110					106.2		59.30	
C.O.D.	**mg/l O2**							23.3																					-				
Chloride	**mg/l Cl**	20	15	16	16	17	19	19	19	15	16	16	17	17	16	17	20.18	17	18	18	18	15	16	18	17	16	19	16.9	17.3	17.4	16.40	24.7	
Chromium	**µg/l**	30			<1				1.8				<0.5				0.54				<1.0				<1.0					7.583		<3	
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					3.305			
Coliform Bacteria	**no/100ml**																																
Conductivity	**µS/cm @ 25**	800	919	961	905	936	898	1002	891	625	706	632	677	740	771	705	711	719	763	763	755	681	656	684	690	680	687	780	772	662	737.0		
Copper	**µg/l**	30			1.2				1				1.5				<0.5				<1.0				<1.0					15.03		109	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	**% Saturation**		47	54	68	nm	62	65	35	67	54	67	61	78	65	68	90	81	66	51	46	57	45	45	64	43	61	7.46		67			
E_ Coli	**no/100ml**																																
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.12				0.22				<0.20					0.25			
Iron	**µg/l**				6454.7				1116.4				<10				<10				<10.0				<10.0					2612		2.43	
Lead	**µg/l**	10			<1				1.1				<0.5				<0.5				<1.0				<1.0					5.889		15.2	
Magnesium	**mg/l Mg**	50			21.98				27.48				18				20.44				24				21					19.51		15.40	
Manganese	**µg/l**				941.6				199.3				3.1				<1				<5.0				7.4					3693		8900	
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02	
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5			
Nickel	**µg/l**	20			<1				2				<0.5				<0.5				<1.0				<1.0					8.986		5.08	
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0.002				0.01				<0.010					<0.005			
pH		>7 or <8	7.1	7.1	7.1	7	7.1	7.2	7.1	7.4	7.5	7.6	7.5	7.4	7.4	7.5	7.4	7.2	7.3	7.3	7.3	7.3	7.4	7.3	7.4	7.3	7.3	7.22	7.2	7.2	7.16		
Potassium	**mg/l**	5			<1				3.39				1.2				1.99				1.8				1.2					1.296		3.63	
Residue on evaporation	**mg/l**				604				754				486				702				638				428								
Sampling Depth	**m**		23	22.9	23	23	22.9		23.1	23.3	23.3	23.4	22.9	23	22.8	22.7	22.56	22.8	22.8	22.6	22.7	22.7	23.6	22.5	22.5	22.6	22.6						
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Silver	**µg/l**												nm				nm																
Sodium	**mg/l**	150			14.25				23.78				15.24				15.15				18				15				-	12.79		16.30	
Strontium	**µg/l**												213.38				232.5				250				230				-	256.6			
Sulphate		50			46.9				35.5				13.7				18.84				27.4				54					21.14		16.4	
Suspended Solids	**mg/l**																																
Temp	**°C**		11	8.4	11.1	10	11	9.5	10	13.7	13	10	9	11	11	8	9.7	13.9	12.4	8	11.6	10	11	9.3	10.1	13.6	13.9			12.8			
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0								
Time			10.5	11.25	9.45	10.3	11:30	11.15	11:10	10:30	10:45	11:00	10:50	10:45	11:00	10:40	10:40	10:23	11:05	11:05	10:40	10:30	10:20	11:55	10:10	10:40	10:15						
Tin	**µg/l**												<1				nm																
T.O.C.	**mg/l**	10	5.4	9	5.6	4.3	4.6	5.7	8.4	3.5	6.5	1.7	83.3	<1.5	<1.5	2.3	1.13	1.6	2.7	3	2.2	4.1	2.1	2.1	2.5	1.5	2.4	1.49	2.55	0.94	2.17		
T.O.N	**mg/l N**				<0.08				0.08				0.21				0.1				<0.20				<0.20								
Total Suspended Solids	**mg/l**																													64			
Uranium	**µg/l**												1.61				2.43				2.9				2.2					1.946			
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Zinc	**µg/l**	100			7.2				3.5				4.2				0.75				<1.0				3.3					42.99		195	
Water Level m OD	**103.47**		80.47	80.57	80.47	80.47	80.57	103.47	80.37	80.17	80.17	80.07	80.57	80.47	80.67	80.77	80.91	80.67	80.67	80.87	80.77	80.77	79.87	80.97	80.97	80.87	80.87						

Whiteriver Landfill Site

GROUNDWATER QUALITY

RESULTS

BH10

DOWNSTREAM OVERBURDEN

PARAMETERS		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
Monitoring Point:																																	
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			284				308				270				288				304				309					289.7		305	
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					33030		434	
Ammonia	**mg/l N**	0.2	0.06	0.04	<0.03	<0.03	<0.03	<0.03	0.03	0.16	<0.03	0.04	0.05	0.03	0.61	0.03	0.203	0.21	0.05	<0.020	<0.020	0.37	<0.020	0.048	<0.020	<0.020	0.11	<0.2	<0.11	<0.01	< 0.11		
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	**µg/l**												<0.5				2.41				<1.0				<1.0					22.04		<2	
Barium	**µg/l**												209.3				318.97				240				200					627		266	
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
B.O.D.	**mg/l O2**																												-				
Boron	**µg/l**	1000			<10				11.2				<10				<10				11				14					147.1		<135	
Cadmium	**µg/l**	5			0.1				<0.1				<0.1				<0.1				<0.020				<0.020					0.322		<0.5	
Calcium	**mg/l Ca**	200			114.18				112.14				102.54				121.1				130				130					214.6		124.00	
C.O.D.	**mg/l O2**							3.0																					-				
Chloride	**mg/l Cl**	20	21	16	17	22	27	27	35	25	24	25	18	21	23	15	29.25	24	21	27	26	21	21	21	23	22	24	16.6	21.1	20.23	22.20	20.7	
Chromium	**µg/l**	30			5.4				1.9				<0.5				0.67				<1.0				<1.0					67.09		<3	
Cobalt	**µg/l**												<0.5				0.84				<1.0				<1.0					26.01			
Coliform Bacteria	**no/100ml**																																
Conductivity	**µS/cm @ 25**	800	716	614	637	667	604	640	682	683	776	686	606	850	825	591	719	754	670	775	717	781	754	692	681	735	716	705	727	660	789.0		
Copper	**µg/l**	30			9				1.4				1.6				<0.5				<1.0				<1.0					65.93		<4	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	**% Saturation**		54	61	45	nm	53	74	66	51	70	63	67	67	47	90	65	42	87	65	38	50	58	40	60	57	74	8.41		73			
E_ Coli	**no/100ml**																																
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.12				0.16				<0.20					0.3			
Iron	**µg/l**				4062.2				1001.3				<10				12.92				<10.0				<10.0					55940		0.935	
Lead	**µg/l**	10			10.1				1.3				<0.5				<0.5				<1.0				<1.0					41.04		<0.5	
Magnesium	**mg/l Mg**	50			12.43				13.17				7.91				12.6				13				10					24.17		13.30	
Manganese	**µg/l**				686.1				673.5				12.1				1779.98				59				5.6					1893		49.5	
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					0.04		<0.02	
Molybdenum (µg/l)													<0.5				0.82				<1.0				<1.0					<5			
Nickel	**µg/l**	20			10.9				0.8				<0.5				4.11				<1.0				2.4					79.89		2.84	
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0.002				<0.010				<0.010					<0.005			
pH		>7 or <8	7.3	7.4	7.3	7.3	7.4	7.5	7.4	7.2	7.3	7.4	7.3	7	7	7.4	7.3	7.1	7.1	7.3	7.2	7	7.2	7.2	7.3	7.2	7.3	7.21	7.08	7.1	7.13		
Potassium	**mg/l**	5			1.26				1.22				1.08				1.64				1.4				1.3					6.34		1.48	
Residue on evaporation	**mg/l**				941				15250				741				542				4577				1528								
Sampling Depth	**m**		3.6	1.7	2.9	3.3	4		4.1	4.5	4	3.8	3.7	3.6	4.6	3.1	4.62	4.6	3.7	3.8	4.4	4.8	4.2	2.7	3.5	3.8	3.7						
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					1.62			
Silver	**µg/l**												<0.5				nm																
Sodium	**mg/l**	150			11.59				12.91				8.53				12.74				14				12				-	10.74		13.40	
Strontium	**µg/l**												159.17				205.79				200				190				-	276			
Sulphate		50			60.6				36.7				31.5				39.98				57.8				78					66.95		71	
Suspended Solids	**mg/l**																																
Temp	**°C**		11	7.8	10	10	11	9.1	10	13.6	12	10	9	11	11	8	8.9	14.6	12.8	10	9.8	11	11	8.7	10.3	13.4	13.5			12.7			
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0								
Time			11.55	10.3	12.15	10.5	0.451389	10.30	10:40	10:05	10:35	10:40	10:15	10:20	10:35	10:20	10:15	10:03	10:35	10:40	11:30	10:55	10:50	10:45	10:45	10:30	10:10						
Tin	**µg/l**												2.63				nm																
T.O.C.	**mg/l**	10	3.6	6.6	3.7	1.8	5.1	9.3	14.6	3.2	6.6	12.2	70	2.7	21.3	5.4	1.88	2.7	5.4	3.8	12.8	34.1	2.7	5.9	4.7	3.8	6.8	5.69	95.1	4.39	< 1		
T.O.N	**mg/l N**				0.13				0.18				1.4				0.54				0.77				0.35					0.85			
Total Suspended Solids	**mg/l**																													1670			
Uranium	**µg/l**												0.7				2.01				1.7				<1.0					2.237			
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Zinc	**µg/l**	100			19.3				3.5				1.9				0.95				2.2				3.2					134.3		8.85	
Water Level m OD	**105.6**		102	103.9	102.7	102.3	101.6	105.6	101.5	101.1	101.6	101.8	101.9	102.0	101.0	102.5	101.0	101.0	101.9	101.8	101.2	100.8	101.4	102.9	102.1	101.8	101.9						

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS		RESULTS																																		
Monitoring Point:		BH11																																		
		DOWNSTREAM OVERBURDEN																																		
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16					
Alkalinity	**mg/lCaCO3**	NAC			236				296				328				364				340				362					320.97		355				
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					14210		233				
Ammonia	**mg/l N**	0.2	0.04	0.04	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	0.21	<0.03	0.009	0.09	0.42	<0.020	<0.020	<0.020	<0.020	<0.020	0.063	<0.020	<0.020	0.73	<0.2	0.15	0.011	< 0.11				
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14					
Arsenic	**µg/l**												<0.5				<0.5				<1.0				<1.0					9.735		<2				
Barium	**µg/l**												141.7				222.37				170				190					461.5		249				
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0											
B.O.D.	**mg/l O2**																												-							
Boron	**µg/l**	1000			10.1				28.8				25.2				19.94				30				27					57.81		<135				
Cadmium	**µg/l**	5			<0.1				0.2				<0.1				<0.1				<0.020				<0.020					1.356		<0.5				
Calcium	**mg/l Ca**	200			37.04				75.87				78.74				105.54				92				94					234.3		91.90				
C.O.D.	**mg/l O2**							9.4																					-							
Chloride	**mg/l Cl**	20	10	7	10	10	9	4	14	13	16	15	15	16	15	13	12.82	16	16	12	15	13	16	14	14	15	17	13	14.1	15.57	14.10	13.9				
Chromium	**µg/l**	30			<1				0.5				<0.5				0.56				<1.0				<1.0					45.15		<3				
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					19.61						
Coliform Bacteria	**no/100ml**																																			
Conductivity	**µS/cm @ 25**	800	617	490	550	609	568	559	644	624	740	664	665	785	835	729	718	698	680	675	677	697	698	640	661	662	696	691	704	622	696.0					
Copper	**µg/l**	30			1.8				1.2				<0.5				0.55				<1.0				<1.0					37.48		<4				
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5						
D.O.	**% Saturation**		83	89	75	nm	80	97	33	27	29	47	35	28	54	63	50	35	79	68	25	94	71	50	40	56	49	6.18		49						
E_ Coli	**no/100ml**																																			
Fluoride	**mg/l**	1			0.17				<0.150				<0.150				0.19				0.16				<0.20					0.26						
Iron	**µg/l**				147.8				801.8				<10				<10				<10.0				<10.0					26890		0.901				
Lead	**µg/l**	10			<1				1.1				<0.5				<0.5				<1.0				<1.0					17.44		<0.5				
Magnesium	**mg/l Mg**	50			11.16				22.98				20.87				24.31				24				23					30.29		24.10				
Manganese	**µg/l**				212.9				154.1				19.7				4.31				<5.0				<5.0					7836		1880				
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02				
Molybdenum (µg/l)													0.8				0.56				<1.0				<1.0					<5						
Nickel	**µg/l**	20			1.3				<0.5				<0.5				0.73				<1.0				<1.0					74.72		5.75				
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0.004				<0.010				<0.010					<0.005						
pH		>7 or <8	7.6	8	7.9	7.6	7.7	7.9	7.5	7.5	7.5	7.5	7.5	7.3	7.2	7.3	7.3	7.4	7.4	7.3	7.3	7.5	7.4	7.4	7.4	7.4	7.4	7.25	7.17	7.2	7.39					
Potassium	**mg/l**	5			1.4				1.39				1.35				1.7				1.9				1.4					3.994		1.37				
Residue on evaporation	**mg/l**				380				464				426				655				689				491											
Sampling Depth	**m**		9.1	9.1	9.3	9.3	9.3		9.2	9.2	9.4	9.7	9.1	9.3	9.4	9.5	9.26	9.4	9.4	9.3	9.6	9.5	9.5	9.5	9.4	9.4	9.6									
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					1.067						
Silver	**µg/l**												<0.5				nm																			
Sodium	**mg/l**	150			72.3				32.36				24.5				22.12				29				23				-	18.49		22.60				
Strontium	**µg/l**												204.5				261.25				220				230				-	362.6						
Sulphate		50			42.1				15.7				11.2				12.23				12.9				10					11.57		10.3				
Suspended Solids	**mg/l**																																			
Temp	**°C**		11	8.1	11	11	11	9.2	10	13.4	12	10	9	11	11	8	9.4	14.3	12.2	8	10.6	12	11	9.1	9	13.8	14			13.5						
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0											
Time			11.1	11.1	11.45	10.4	11:00	11.00	10:55	10:15	10:25	10:55	10:30	10:35	10:40	10:35	10:30	10:10	10:30	10:30	11:10	10:40	10:40	10:30	10:30	10:15	10:00										
Tin	**µg/l**												<1				nm																			
T.O.C.	**mg/l**	10	3.2	6.3	3	1.7	2.4	6.3	1.8	2.9	7.6	1.9	83.6	1.5	2.8	3.3	1.48	2.6	2.4	3.1	2.3	4.3	2	4.6	2.3	2.1	4.0	3.88	3.77	3.4	1.65					
T.O.N	**mg/l N**				0.21				0.75				0.64				0.28				0.85				0.7					0.97						
Total Suspended Solids	**mg/l**																													205						
Uranium	**µg/l**												2.52				3.61				3				3.2					0.617						
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0											
Zinc	**µg/l**	100			14.2				23.7				2.5				1.05				1.2				2.2					133.1		12.4				
Water Level m OD	**95.66**		86.56	86.56	86.36	86.36	86.36	95.66	86.46	86.46	86.26	85.96	86.56	86.36	86.26	86.16	86.4	86.26	86.26	86.36	86.06	86.16	86.16	86.16	86.26	86.26	86.06									

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS		RESULTS																																
Monitoring Point:		BH12																																
		DOWNSTREAM OVERBURDEN																																
		Trigger Level	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			396				324				408				400				352				403					405.45		455	
Aluminium	**µg/l**												<5				<5				<10.0				<10.0					11870		2720	
Ammonia	**mg/l N**	0.2	<0.03	0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.04	0.03	<0.03	0.3	<0.03	0.003	0.05	0.03	<0.020	<0.020	<0.020	<0.020	0.035	0.05	<0.020	0.027	<0.2	<0.11	<0.01	< 0.11		
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	**µg/l**												0.52				0.62				<1.0				<1.0					8.889		2.42	
Barium	**µg/l**												242				263.31				190				170					349.2		258	
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
B.O.D.	**mg/l O2**																												-					
Boron	**µg/l**	1000			<10				10.9				10.1				<10				<10.0				<10.0					28.52		<135	
Cadmium	**µg/l**	5			0.2				0.4				<0.1				<0.1				0.02				0.12					0.795		<0.5	
Calcium	**mg/l Ca**	200			143.83				141.79				139.21				168.97				130				140					165.3		164.00	
C.O.D.	**mg/l O2**							5.7																					-					
Chloride	**mg/l Cl**	20	11	14	12	12	19	16	15	21	21	15	17	21	16	11	13.37	12	14	13	12	11	15	12	11	14	16	10.8	12.8	11.96	11.60	12.9		
Chromium	**µg/l**	30			1.1				1.9				<0.5				1.03				<1.0				<1.0					42.95		7.11	
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					8.639			
Coliform Bacteria	**no/100ml**									nm																								
Conductivity	**µS/cm @ 25**	800	793	727	766	762	709	768	806	792	883	769	865	1160	1117	906	864	881	855	755	692	793	830	637	720	879	828	878	835	789	866.0			
Copper	**µg/l**	30			2.6				1.9				2.2				1.71				2.2				3.2					33.54		9.43	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	**% Saturation**		58	74	68	nm	73	85	66	61	46	54	38	40	44	69	62	64	64	65	49	77	70	57	66	60	68	7.32		65				
E_ Coli	**no/100ml**									nm																								
Fluoride	**mg/l**	1			<0.150				<0.150				<0.150				0.18				0.19				<0.20					0.31			
Iron	**µg/l**				565.4				878.5				<10				<10				<10.0				16					15420		6.59	
Lead	**µg/l**	10			<1				<0.5				<0.5				<0.5				<1.0				<1.0					11.06		6.55	
Magnesium	**mg/l Mg**	50			12.99				14.32				16.44				15.53				12				14					19		16.70	
Manganese	**µg/l**				606.6				3463.8				3.1				118.7				<5.0				260					1693		698	
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02	
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5			
Nickel	**µg/l**	20			2.9				3.6				1				1.84				<1.0				2.4					33.89		14.9	
Ortho-Phosphate	**mg/l P**	0.03			<0.02				<0.02				<0.02				0.002				<0.010				<0.010					<0.005			
pH		>7 or <8	7.1	7.1	6.9	6.9	7	7.2	7	7.1	7	7.1	7	7.1	6.8	6.9	6.9	7	6	7	6.9	7	7	7	6.9	6.9	6.9	6.88	6.79	7	6.81		
Potassium	**mg/l**	5			<1				0.74				1.06				0.99				0.8				0.61					3.482		0.72	
Residue on evaporation	**mg/l**				519				1005				1081				1189				2732				1488								
Sampling Depth	**m**		5.5	5.5	5.6	5.7	5.7		5.7	5.8	5.6	5.7	5.1	5.3	6.3	5.4	5.27	5.4	5.1	5.2	5.3	5.1	6	4.9	4.7	4.8	5						
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					<0.47			
Silver	**µg/l**												nm				nm																	
Sodium	**mg/l**	150			7.01				9.04				10.39				8.7				8.5				8.5				-	7.152		8.98	
Strontium	**µg/l**												247.23				256.24				180				210				-	272.8			
Sulphate		50			34				44.8				55.6				28.06				28				33					36.9		35	
Suspended Solids	**mg/l**																																	
Temp	**°C**		11	8.4	11	10	11	9.6	10	13.8	12	10	9	11	11	8	9.7	14.9	12.4	9	10.7	12	11	9.4	8.2	13.4	13.8			13.2				
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0								
Time			10.35	11.4	10	12.25	11:45	11.30	11:15	10:35	10:50	11:10	10:55	10:50	10:55	10:45	10:45	10:20	11:10	11:00	10:35	10:33	10:15	11:50	10:15	10:45	10:20							
Tin	**µg/l**												<1				nm																	
T.O.C.	**mg/l**	10	5.6	7.8	4.3	3.7	6.9	8.3	18.1	4.9	7.3	10.4	109	4.5	6	7.3	5.12	4.6	5.5	8.4	10.2	7.4	4.6	25.6	13.9	4	5.3	5.72	9.49	4.94	1.81			
T.O.N	**mg/l N**				<0.08				<0.08				1.25				0.06				0.27				<0.20					<0.28				
Total Suspended Solids	**mg/l**																													203				
Uranium	**µg/l**												1.25				1.21				<1.0				1.1					<0.42			
Vanadium	**µg/l**												<0.5				<0.5				<1.0				<1.0								
Zinc	**µg/l**	100			18.1				31.2				5.2				5.92				3.3				30					154.4		59	
Water Level m OD	**103.38**		97.88	97.88	97.78	97.68	97.68	103.38	97.68	97.58	97.78	97.68	98.28	98.08	97.08	97.98	98.11	97.98	98.28	98.18	98.08	98.28	97.38	98.48	98.68	98.58	98.38							

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS			RESULTS																																
Monitoring Point:			BH13A																																
			DOWNSTREAM BEDROCK																																
	Units	Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
Alkalinity	mg/lCaCO3	NAC	06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	10-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16				
Aluminium	µg/l				344				264				320				304				348				320					294.52		325				
Ammonia	mg/l N	0.2											<5				<5				<10.0				<10.0					99.04		86.1				
Antimony	µg/l		0.03	0.04	<0.03	0.04	0.05	0.05	0.03	0.04		<0.03	0.05	<0.03	0.15	0.03	0.027		0.08	<0.020	<0.020	<0.020	<0.020	0.066	<0.020	<0.020	<0.020	<0.2	<0.11	0.05	< 0.11				
Arsenic	µg/l												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14				
Barium	µg/l												<0.5				<0.5				<1.0				<1.0					1.796		<2			
Beryllium	µg/l												48.9				61.09				83				69					1031		70.7			
B.O.D.	mg/l O2												<0.5				<0.5				<1.0				<1.0										
Boron	µg/l	1000																											-						
Cadmium	µg/l	5			20.7				19.8				19.5				18.4				21				20					353.2		<135			
Calcium	mg/l Ca	200			<0.1				<0.1				<0.1				<0.1				0.03				0.02					0.124		<0.5			
C.O.D.	mg/l O2				76.87				75.45				77.57				78.02				84				79					76.5		76.30			
Chloride	mg/l Cl	20						25.6																					-						
Chromium	µg/l	30	21	22	21	33	22	23	23	22		22	22	26	21	22	21.47		22	23	22	19	23	22	21	21	24	19.4	21.7	22.22	21.90	21.8			
Cobalt	µg/l				<1				1				<0.5				0.53				<1.0				<1.0					3.699		<3			
Coliform Bacteria	no/100ml												<0.5				<0.5				<1.0				<1.0					<0.02					
Conductivity	µS/cm @ 25	800	662	668	663	665	602	688	672	660		672	654	723	772	656	651		664	666	667	663	661	627	632	643	650	665	663	592	663.0				
Copper	µg/l	30			1				1.9				0.5				<0.5				1.4				<1.0					4.389		<4			
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5					
D.O.	% Saturation		35	32	36	nm	41	39	38	51		67	48	38	54	62	49		112	44	22	55	61	42	33	69	55	6.82		57						
E_ Coli	no/100ml																																		
Fluoride	mg/l	1			<0.150				<0.150				<0.150				0.13				0.17				<0.20					0.24					
Iron	µg/l				230.4				691.2				<10				<10				<10.0				<10.0					222.1		0.183			
Lead	µg/l	10			<1				0.6				<0.5				<0.5				<1.0				<1.0					<0.02		<0.5			
Magnesium	mg/l Mg	50			25.53				25.36				26.14				24.5				22				25					24.4		25.30			
Manganese	µg/l				330.4				235.5				225.4				169.66				94				110					73.64		33			
Mercury	µg/l	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02			
Molybdenum (µg/l)													1.2				1.07				1.4				1.2					<5					
Nickel	µg/l	20			<1				<0.5				<0.5				0.62				<1.0				<1.0					0.94		<0.5			
Ortho-Phosphate	mg/l P	0.03			0.09				0.08				0.11				0.099				0.099				0.097					0.09					
pH		>7 or <8	7.6	7.5	7.5	7.5	7.6	7.6	7.5	7.5		7.6	7.7	7.6	7.4	7.3	7.5		7.6	7.5	7.5	7.4	7.5	7.5	7.6	7.5	7.5	7.42	7.36	7.3	7.44				
Potassium	mg/l	5			1.38				1.3				1.49				1.74				1.9				1.4					1.327		1.06			
Residue on evaporation	mg/l				421				524				414				417				436				411										
Sampling Depth	m		25.4	25.4	25.4	25.5	25.4		25.6	25.7		25.6	25.4	25.5	25.2	25.2	25.05		25.2	21.1	25.2	25.1	25.1	25	25.1	25.1	25.1								
Selenium	µg/l												<0.5				<0.5				<1.0				<1.0					<0.47					
Silver	µg/l												nm				nm																		
Sodium	mg/l	150			26.21				25.36				26.08				25.97				28				26				-	26.52		26.40			
Strontium	µg/l												241.3				241.97				230				240				-	254.9					
Sulphate		50			13				14				10.7				10.835				20.7				14					16.18		12.8			
Suspended Solids	mg/l																																		
Temp	°C		11	8.2	11	10	12	9.3	10	14		10	9	11	11	8	8.5		12	8	11.1	12	11	8.2	7.9	13.8	14.4			13						
Thallium	µg/l												<0.1				<0.1				<1.0				<1.0										
Time			11.35	10.45	12	10.55		10.10	10:35	10:00		10:30	10:20	10:15	10:25	10:15	10:20		10:38	10:35	11:20	11:00	10:55	10:40	10:50	10:25	10:05								
Tin	µg/l												<1				nm																		
T.O.C.	mg/l	10	<3.0	3.3	<1.5	2.6	<1.5	2.7	<1.5	1.6		<1.5	78.6	<1.5	<1.5	1.7	0.832		1.6	1.8	5.3	3.6	2.2	3.8	2.3	1.5	<1.5	1.82	2.08	0.64	1.50				
T.O.N	mg/l N				<0.08				<0.08				<0.08				0.03				<0.20				<0.20					<0.28					
Total Suspended Solids	mg/l																													18					
Uranium	µg/l												5.26				5.3				5.4				5.4					1.697					
Vanadium	µg/l												<0.5				<0.5				<1.0				<1.0										
Zinc	µg/l	100			12.3				5.1				2.1				1.15				16				3.5					379.4		8.62			
Water Level m OD	106.01		80.61	80.61	80.61	80.51	80.61	106.01	80.41	80.31	106.01	80.41	80.61	80.51	80.81	80.81	80.96		80.81	84.91	80.81	80.91	80.91	81.01	80.91	80.91	80.91								

Whiteriver Landfill Site

GROUNDWATER QUALITY

PARAMETERS		RESULTS																																		
Monitoring Point:		BH14																																		
		DOWNSTREAM BEDROCK																																		
		Trigger Level	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	mg/lCaCO3	NAC			356				352				332				332				292				357					291.87		330		
Aluminium	µg/l												<5				<5				<10.0				<10.0					9683		734		
Ammonia	mg/l N	0.2	<0.03	<0.03	<0.03	0.15	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	0.29	0.06	0.013	0.12	0.04	<0.020	<0.020	<0.020	<0.020	0.14	<0.020	<0.020	<0.020	<0.2	<0.11	<0.01	< 0.11			
Antimony	µg/l												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14			
Arsenic	µg/l												<0.5				0.53				<1.0				<1.0					10.11		<2		
Barium	µg/l												145.4				147.41				170				150					250.9		207		
Beryllium	µg/l												<0.5				<0.5				<1.0				<1.0									
B.O.D.	mg/l O2																												-					
Boron	µg/l	1000			30.7				29.7				36.6				30.43				30				37					108.1		<135		
Cadmium	µg/l	5			<0.1				<0.1				<0.1				<0.1				<0.020				0.02					0.18		<0.5		
Calcium	mg/l Ca	200			85.1				81.99				86.84				85.92				95				84					84.54		83.50		
C.O.D.	mg/l O2							19.0																					-					
Chloride	mg/l Cl	20	15	15	16	18	17	16	20	17	15	13	17	17	16	16	18.38	14	15	15	15	13	15	15	16	15	17	12.8	14.3	14.23	13.60	13.8		
Chromium	µg/l	30			<1				2.7				<0.5				0.65				<1.0				<1.0					27		<3		
Cobalt	µg/l												<0.5				<0.5				<1.0				<1.0					7.39				
Coliform Bacteria	no/100ml																																	
Conductivity	µS/cm @ 25	800	645	653	654	645	584	661	647	635	725	661	657	722	773	663	652	672	645	658	663	663	676	631	643	630	646	672	678	571	648.0			
Copper	µg/l	30			<1				1.9				1				1.15				<1.0				<1.0					25.01		<4		
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5				
D.O.	% Saturation		39	53	52	nm	50	67	41	66	55	75	64	67	65	75	69	44	76	63	42	76	68	50	70	79	79	9.46		77				
E_ Coli	no/100ml																																	
Fluoride	mg/l	1			<0.150				<0.150				<0.150				0.15				0.18				<0.20					0.26				
Iron	µg/l				<10				2070.3				<10				18.47				<10.0				30					13480		1.74		
Lead	µg/l	10			<1				1.5				<0.5				<0.5				<1.0				<1.0					10.12		1.21		
Magnesium	mg/l Mg	50			24.12				26				20.71				21.86				20				22					19.22		19.20		
Manganese	µg/l				324.7				111.3				2.3				6.22				<5.0				<5.0					1056		976		
Mercury	µg/l	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					<0.04		<0.02		
Molybdenum (µg/l)													1.8				1.71				1.5				2.1					<5				
Nickel	µg/l	20			<1				1.6				<0.5				0.99				<1.0				<1.0					24.64		3.55		
Ortho-Phosphate	mg/l P	0.03			<0.02				<0.02				0.02				0.017				<0.010				<0.010					0.006				
pH		>7 or <8	7.5	7.4	7.4	7.4	7.5	7.7	7.4	7.5	7.5	7.6	7.6	7.6	7.5	7.5	7.5	7.4	7.5	7.4	7.4	7.4	7.8	7.5	7.6	7.4	7.4	7.44	7.36	7.3	7.61			
Potassium	mg/l	5			1.34				1.53				1.62				2.02				1.5				1.6					3.501		0.81		
Residue on evaporation	mg/l				388				565				494				535				413				471									
Sampling Depth	m		18.8	18.7	18.8	18.8	18.8		19	19.1	19.2	19.2	18.8	18.9	18.7	18.6	18.48	18.7	18.7	18.5	18.6	18.6	18.6	18.4	18.5	18.5	18.6								
Selenium	µg/l												<0.5				<0.5				<1.0				<1.0					<0.47				
Silver	µg/l												nm				nm																	
Sodium	mg/l	150			24.79				22.69				26.84				25.55				24				29				-	16.37		22.20		
Strontium	µg/l												226.93				234.58				210				240				-	231.8				
Sulphate		50			9.9				8.6				11.3				12.09				11.3				10					17.02		15		
Suspended Solids	mg/l																																	
Temp	°C		11	8.1	11	11	11	9.6	10	13.5	nm	10	9	12	11	8	9.2	14.2	12	9	11.2	12	11	9.2	8.2	14.2	14.2			13.2				
Thallium	µg/l												<0.1				<0.1				<1.0				<1.0									
Time			11.2	10.55	11.2	10.35	11:15	10.45	10:50	10:20	10:20	10:45	10:35	10:30	10:50	10:30	10:35	10:15	10:25	10:25	11:00	10:45	10:45	10:20	10:25	10:30	09:55								
Tin	µg/l												<1				nm																	
T.O.C.	mg/l	10	<3.0	1.6	<1.5	<1.5	<1.5	4.6	<1.5	2.3	3.6	2.2	82	<1.5	2	<1.5	0.834	<1.5	2.3	1.8	1.7	3.5	2.4	2.7	2	2.3	2.3	2.89	3.25	2.83	2.05			
T.O.N	mg/l N				0.13				<0.08				0.16				0.14				0.26				<0.20					<0.28				
Total Suspended Solids	mg/l																													326				
Uranium	µg/l												5.67				4.9				5.1				6.7					2.03				
Vanadium	µg/l												<0.5				<0.5				<1.0				<1.0									
Zinc	µg/l	100			5.3				4.8				2.6				2.77				<1.0				2.3					102.6		13.8		
Water Level m OD	98.98		80.18	80.28	80.18	80.18	80.18	98.98	79.98	79.88	79.78	79.78	80.18	80.08	80.28	80.38	80.50	80.28	80.28	80.48	80.38	80.38	80.38	80.58	80.48	80.48	80.38							

Whiteriver Landfill Site

GROUNDWATER QUALITY

RESULTS

Monitoring Point: **BH17**

DOWNSTREAM DOMESTIC HOLCROFT'S PRIVATE WELLS -POTABLE SOURCE

PARAMETERS	Units	Trigger Lev	SWR 2007	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
				06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16							
Alkalinity	mg/lCaCO3	NAC	0.2							296				320				328													297.85		320							
Aluminium	µg/l													<5				<5													<0.79		<50							
Ammonia	mg/l N	0.2	0.3	0.03	<0.03			0.05	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.11	0.03	0.135	0.45	0.21	<0.020		0.061	0.041				<0.020	<0.2	<0.11	<0.01	< 0.11							
Antimony	µg/l													<0.5				<0.5													<3.96	< 0.14								
Arsenic	µg/l													<0.5				<0.5													0.988		<2							
Barium	µg/l													12.2				12.67													12.84		1.87							
Beryllium	µg/l													<0.5				<0.5																						
B.O.D.	mg/l O2																													-										
Boron	µg/l	1000	1000							16.1				15.8				11.13													<4.33		<135							
Cadmium	µg/l	5	5							<0.1				<0.1				<0.1													0.126		<0.5							
Calcium	mg/l Ca	200								61.09				53.79				50.93													45.22		61.00							
C.O.D.	mg/l O2								nm																					-										
Chloride	mg/l Cl	20	250	28	29			31	27	33	34	30	29	30	29	28	29	28.64	29	28	28		25	31				32	27.2	29.8	29.48	32.10	15.9							
Chromium	µg/l	30	50							<0.5				<0.5				<0.5													<2.14		<3							
Cobalt	µg/l													0.9				<0.5													<0.02									
Total/ Bact coliforms	no/100ml		0	613	0			4			0	0	0				0	0	0		0			nm															
Conductivity	S/cm @ 25	800	2500	673	702			606	681	693	689	725	707	684	738	763	667	678	676	676	680		674	671				670	691	694	615	699.0								
Copper	µg/l	30	2000							3.4				1.1				3.74													82.71		4.94							
Cyanide	mg/l	0.01	0.05							<0.05				<0.05				<0.05													<5									
D.O.	% Saturation			61	79			67	68	53	32	74	57	48	78	66	78	68	82	89	59		79	77				56	7.55		61								
Faecal coliforms	no/100ml		0	0	0			<1			0	0	0				0	0	0		0																		
Fluoride	mg/l	1	0.8							<0.150				<0.150		0		0.09						nm							0.31									
Iron	µg/l		200							304.8				37.5				19.5													1036		0.0242							
Lead	µg/l	10	25							2.2				<0.5				<0.5													0.563		<0.5							
Magnesium	mg/l Mg	50								45.96				46.35				46.52													45.04		31.60							
Manganese	µg/l		50							237.6				204				71.7													100.4		3.4							
Mercury	µg/l	1	1							<0.05				<0.05				<0.05													<0.04		<0.02							
Molybdenum	µg/l													<0.5				<0.5													<5									
Nickel	µg/l	20	20							1.8				2.6				5.17													7.197		<0.5							
Ortho-Phosphate	mg/l P	0.03								<0.02				<0.02				0.002													<0.005									
pH		>7 or <8	6.5 - 9.5	7.8	7.6			7.8	7.9	7.4	7.2	7.7	7.6	7.8	7.6	7.5	7.5	7.6	7.7	7.6	7.5		7.7	7.5				7.7	7.41	7.43	7.4	7.51								
Potassium	mg/l	5								1.26				1.39				1.53													1.228		0.60							
Residue on evap	mg/l									379				357				391																						
Depth	m		/	nm	nm			nm		13.3	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm		nm	nm				nm											
Selenium	µg/l													<0.5				<0.5													<0.47									
Silver	µg/l													nm				nm																						
Sodium	mg/l	150	200							20.88				19.9				19.12												-	18.84		19.10							
Strontium	µg/l													264.9				269.21												-	237.7									
Sulphate		50	250							16.4				8.9				11.15													14.4		<2							
Suspended Solids	mg/l																																						
Temp	°C			10.6	5.3			10.7	7.2	13.3	14	15	9.6	10	15.4	13.6	6	6.1	11.1	11.2	4		13.8	12				12.8			12.9									
Thallium	µg/l													<0.1				<0.1																						
Time				11.55	11.2			11:55	12.00	11:05	10:25	11:30	11:00	10:45	09:30	13:15	10:50	10:40	13:10	13:25	12:55		13:20	10:50				12:35												
Tin	µg/l													<1				nm																						
T.O.C.	mg/l	10	NAC	<3.0	1.5			<1.5	2.5	<1.5	2	3.2	<1.5	81.1	nm	<1.5	<1.5	0.473	<1.5	1.7	<1.5		2.9	<1.5				2.1		3.22	0.72	4.67								
T.O.N	mg/l N									<0.08				<0.08																	<0.28									
Total Suspended Solids	mg/l																														<2									
Uranium	µg/l													2.72				2.9													0.64									
Vanadium	µg/l													<0.5				<0.5																						
Zinc	µg/l	100								324.4				188.3				811.05													681.6		8.09							

Whiteriver Landfill Site

GROUNDWATER QUALITY

RESULTS

BH19

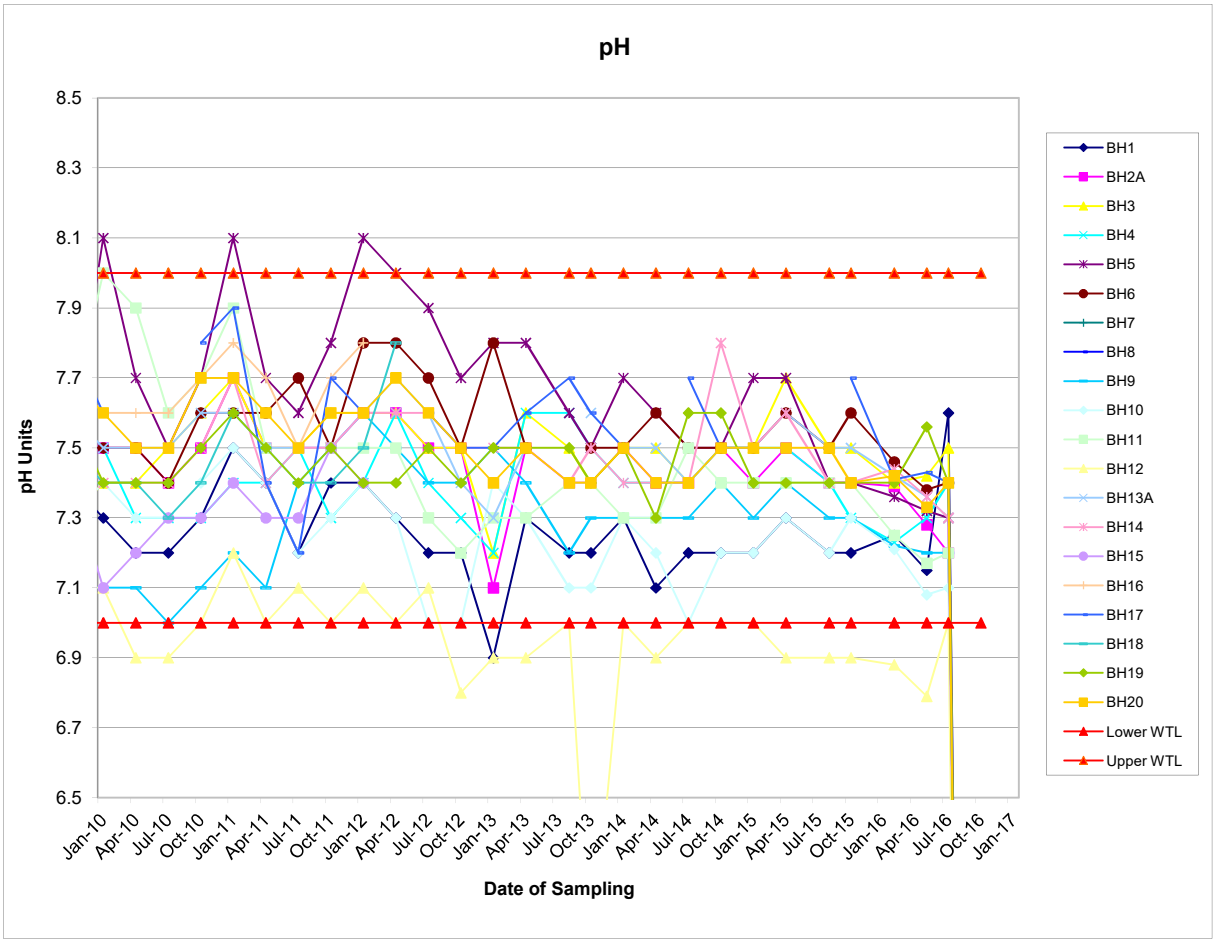
UPSTREAM AGRICULTURAL WATER SUPPLY ONLY

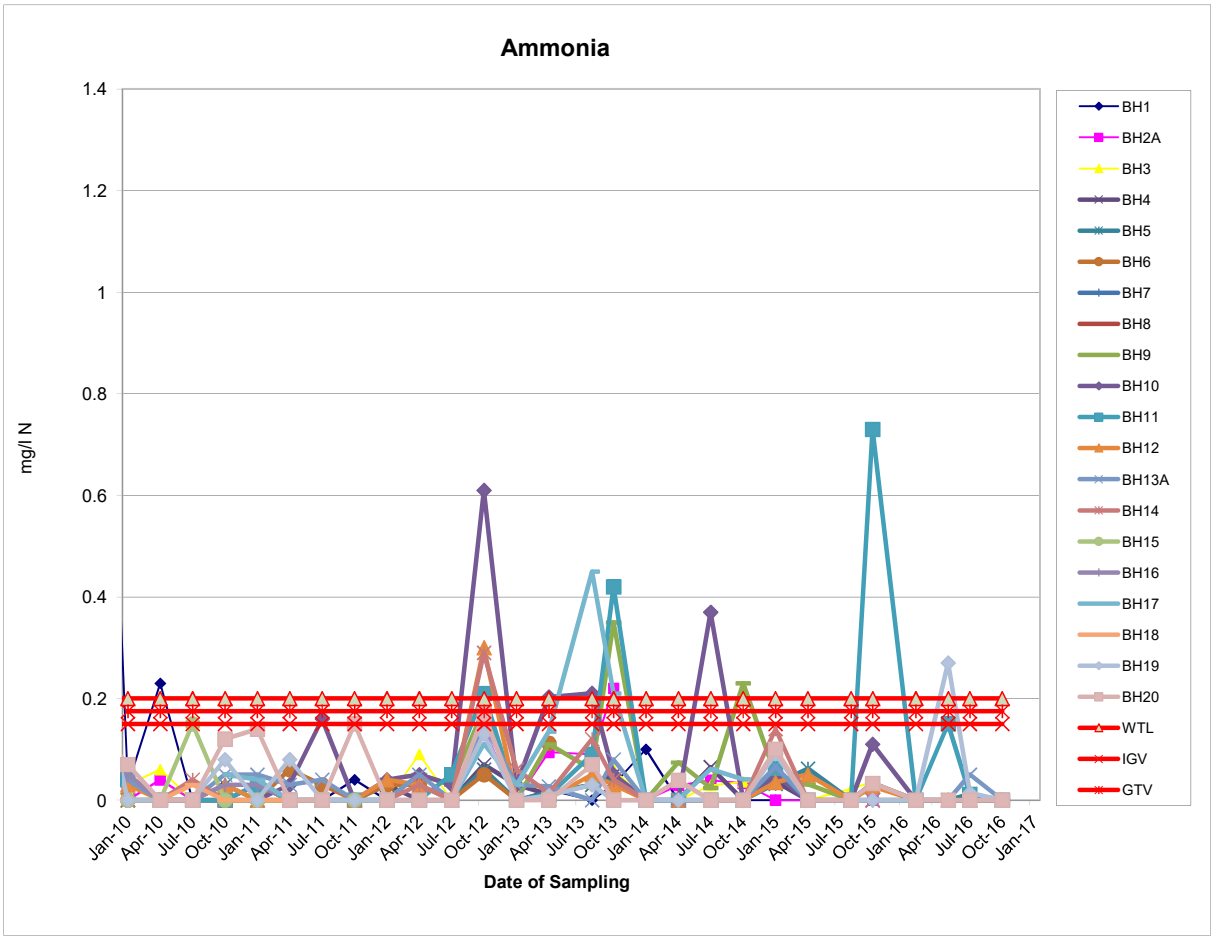
PARAMETERS	Units	Trigger Lev	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
Monitoring Point:			06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	mg/lCaCO3	NAC			298				198				284				276				304				296					309.14		290	
Aluminium	µg/l												<5				<5				<10.0				<10.0					39.23		<50	
Ammonia	mg/l N	0.2	0.15	<0.03	<0.03	<0.03	0.08	<0.03	0.08	<0.03	<0.03	<0.03	<0.03	<0.03	0.13	<0.03	0.009	0.03	<0.03	<0.020	<0.020	<0.020	<0.020	0.091	<0.020	<0.020	<0.020	<0.2	0.27	0.014	< 0.11		
Antimony	µg/l												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14		
Arsenic	µg/l												0.7				0.63				<1.0				<1.0					1.869		<2	
Barium	µg/l												2.2				4.02				2.9				3.8					4.364		3.58	
Beryllium	µg/l												<0.5				<0.5				<1.0				<1.0								
B.O.D.	mg/l O2																												-				
Boron	µg/l	1000			25.1				12.7				12				10.06				13				12					49.63		<135	
Cadmium	µg/l	5			0.1				<0.1				<0.1				<0.1				<0.020				<0.020					<0.09		<0.5	
Calcium	mg/l Ca	200			74.6				74.85				73.95				74.67				76				74					63.99		69.00	
C.O.D.	mg/l O2							0.0																					-				
Chloride	mg/l Cl	20	14	14	13	16	14	14	14	13	13	13	13	14	13	16	13.46	15	13	54	14	42	14	14	14	14	16	13	13.4	14.12	13.60	13.1	
Chromium	µg/l	30			<1				<0.5				<0.5				<0.5				<1.0				<1.0					8.105		<3	
Cobalt	µg/l												<0.5				<0.5				<1.0				<1.0					<0.02			
Coliform Bacteria	no/100ml					2	nm								34	1																		
Conductivity	S/cm @ 2	800	567	572	572	566	509	584	570	567	621	584	567	616	640	611	564	557	568	787	566	554	565	535	546	548	561	580	559	505	570.0		
Copper	µg/l	30			49.4				13.6				17.2				20.29				20				20					29.88		23.7	
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05				<0.05					<5			
D.O.	% Saturation		47	21	20	nm	34	28	29	24	20	15	10	29	10	26	18	25	17	37	10	52	27	16	11	27	23	5.57		28			
E_ Coli	no/100ml					0	nm									0																	
Fluoride	mg/l	1			<0.150				<0.150				<0.150		0		0.12				0.16				<0.20					0.21			
Iron	µg/l				38393.4				64.2				23.8				<10				<10.0				<10.0					623.9		0.12	
Lead	µg/l	10			6.3				<0.5				<0.5				<0.5				<1.0				<1.0					<0.02		<0.5	
Magnesium	mg/l Mg	50			21.28				22.46				20.73				21				21				21					18.76		21.00	
Manganese	µg/l				868.2				5.3				<1				<1				<5.0				<5.0					13.1		0.869	
Mercury	µg/l	1			<0.1				<0.05				<0.05				<0.050				<1.0				<0.020					<0.04		<0.02	
Molybdenum (µg/l)													<0.5				<0.5				<1.0				<1.0					<5			
Nickel	µg/l	20			<1				<0.5				<0.5				0.55				<1.0				<1.0					0.943		<0.5	
Ortho-Phosphate	mg/l P	0.03			<0.02				<0.02				<0.02				0.009				<0.010				<0.010					<0.005			
pH		>7 or <8	7.6	7.4	7.4	7.4	7.5	7.6	7.5	7.4	7.5	7.4	7.4	7.5	7.4	7.1	7.5	7.5	7.4	7.5	7.3	7.6	7.6	7.4	7.4	7.4	7.4	7.4	7.56	7.4	7.33		
Potassium	mg/l	5			1.11				0.94				1.01				1.37				1.4				0.96					0.842		0.52	
Residue on evaporation	mg/l				277				273				306				319				332				363								
Sampling Depth	m		3.2	nm	1	0.4	0		11	nm	5	nm	0	0	nm	0	nm	nm	nm	6.7	nm	nm	nm	nm	nm	nm	nm						
Selenium	µg/l												<0.5				<0.5				<1.0				<1.0					1.941			
Silver	µg/l												nm				nm																
Sodium	mg/l	150			24.04				16.75				16.09				16.12				17				16				-	13.83		16.50	
Strontium	µg/l												197.24				198.19				190				200				-	196.8			
Sulphate		50			4				3.6				3.3				3.48				3.9				3					3.12		<2	
Suspended Solids	mg/l																																
Temp	°C		11.8	8.8	10.4	11	11.8	9.6	11	14.4	15.5	11.5	11	15	14.3	7	9.1	16	11.6	11	10.9	16.1	11	7.6	10.1	13.8	12.6			13.1			
Thallium	µg/l												<0.1				<0.1				<1.0				<1.0								
Time			13.1	13.1	13.5	12.1	13:30	14.00	12:45	12:50	12:50	12:45	13:00	12:30	12:25	10:25	11:30	12:05	12:45	11:35	11:10	12:00	12:15	11:50	11:45	12:55	11:55						
Tin	µg/l												1.89				nm																
T.O.C.	mg/l	10	<3.0	1.6	<1.5	<1.5	<1.5	1.9	<1.5	<1.5	2.5	<1.5	70.5	<1.5	<1.5	<1.5	0.166	<1.5	1.5	6.6	<1.5	4.3	1.5	<1.5	<1.5	<1.5	1.7	3.91	4.19	0.38	2.46		
T.O.N	mg/l N				0.46				0.62				0.48				0.54				0.61				0.69					0.47			
Total Suspended Solids	mg/l																													8			
Uranium	µg/l												1.17				1.37				1.3				1.3					<0.42			
Vanadium	µg/l												<0.5				<0.5				<1.0				<1.0								
Zinc	µg/l	100			785.9				10.5				2.9				1.44				1				1.2					68.28		5.57	

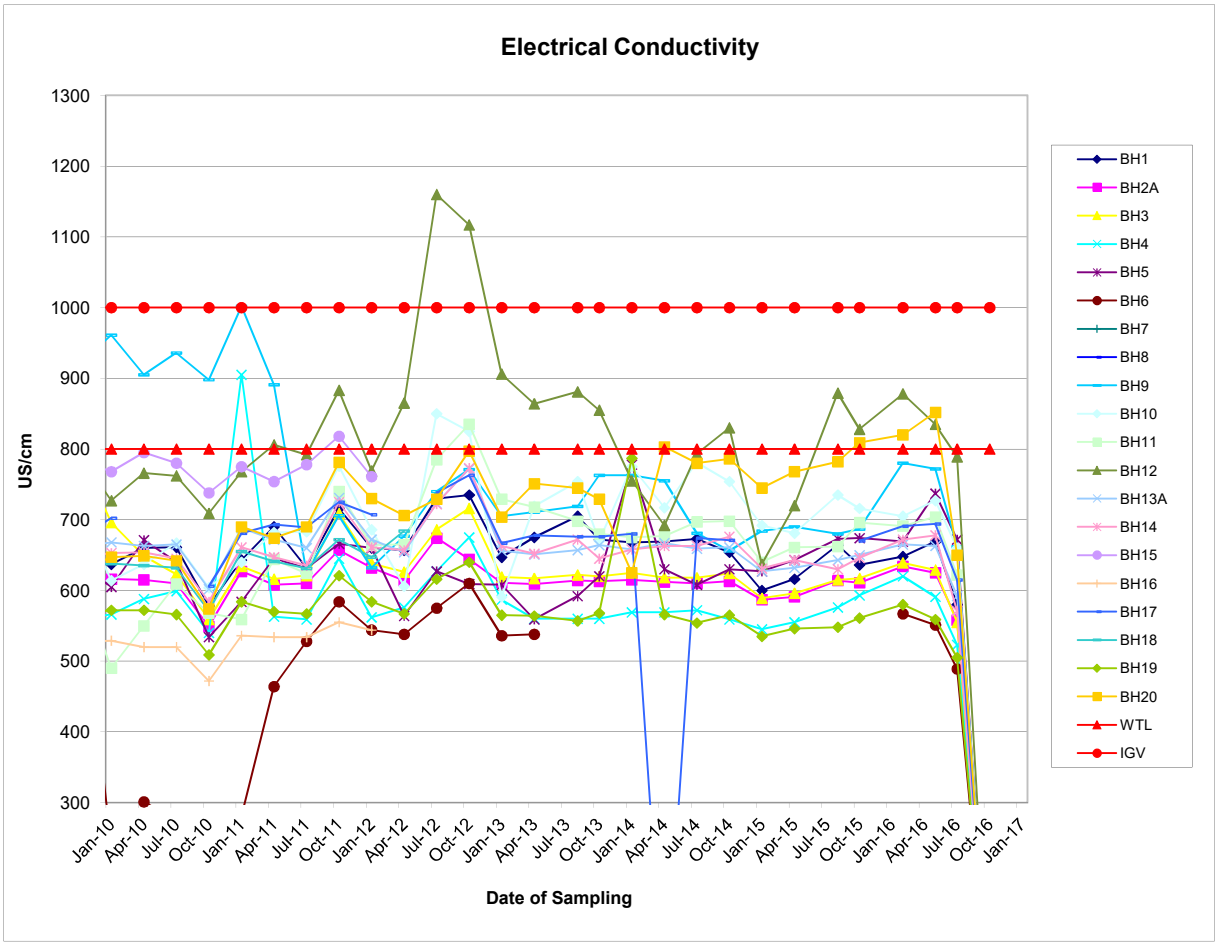
Whiteriver Landfill Site

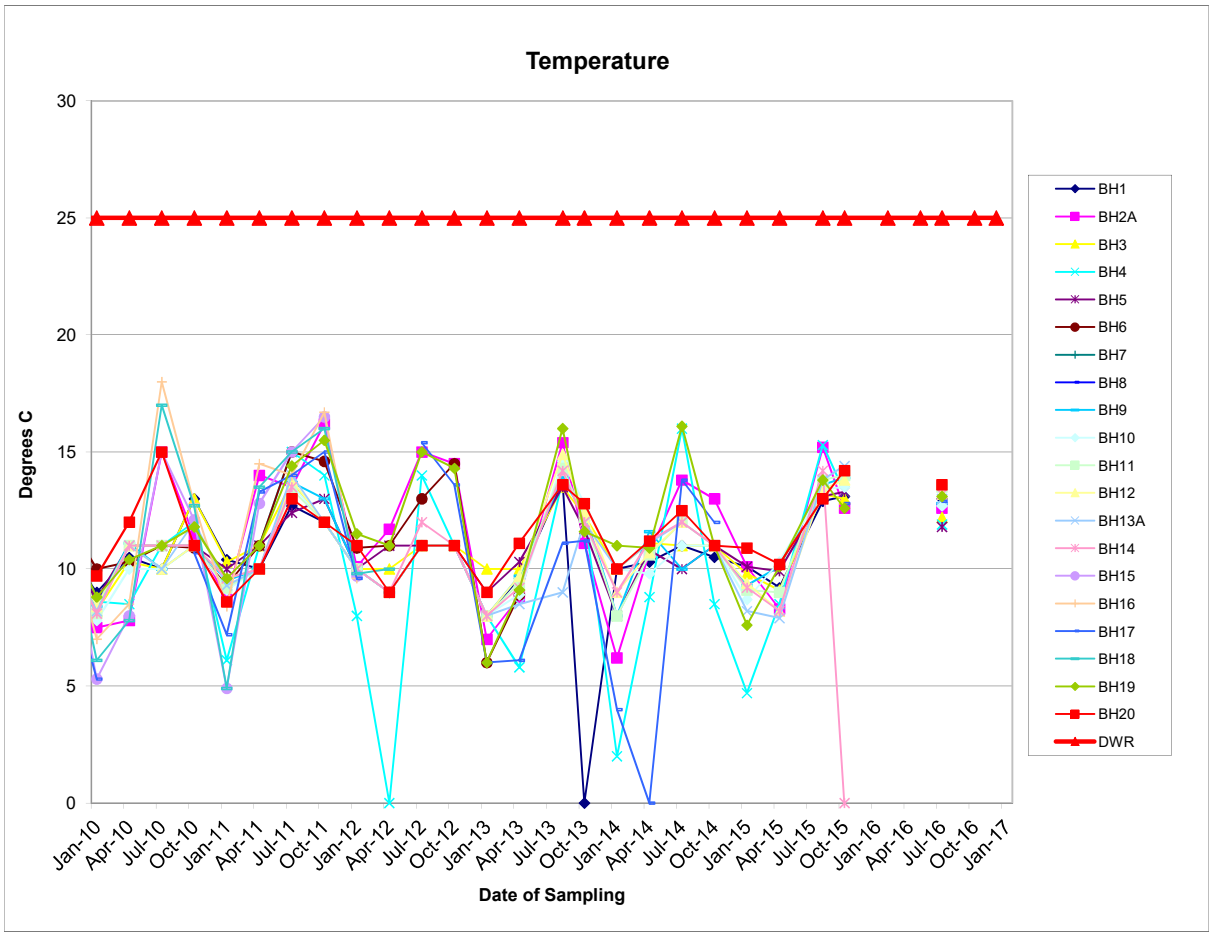
GROUNDWATER QUALITY

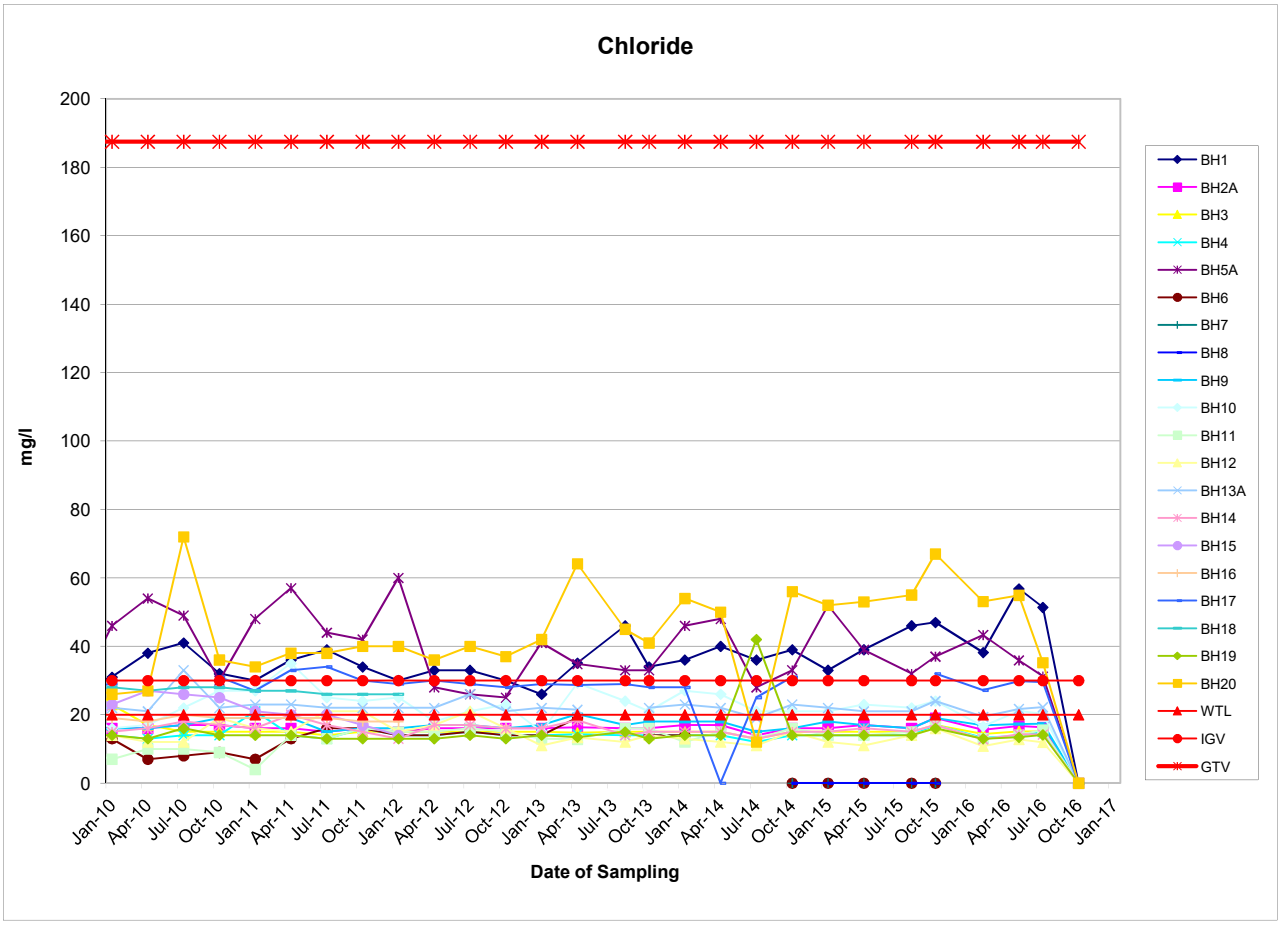
PARAMETERS		RESULTS																																		
Monitoring Point:		BH20																																		
		UPSTREAM OF LANDFILL, DOWN GRADIENT OF LEACHATE LAGOON, OVERBURDEN																																		
		Trigger levels	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
	Units		06-Oct-09	21-Jan-10	14-Apr-10	06-Jul-10	11-Oct-10	18-Jan-11	05-Apr-11	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	14-Apr-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**	NAC			328				312				344				320				352				464					309.14		370				
Aluminium	**µg/l**												<5				12.7				17				<10.0					64870		4820				
Ammonia	**mg/l N**	0.2	0.56	0.07	<0.03	0.05	0.12	0.14	<0.03	<0.03	0.15	<0.03	<0.03	<0.03	0.17	<0.03	0	0.07	<0.03	<0.020	0.039	<0.020	<0.020	0.1	<0.020	<0.020	0.033	<0.2	<0.11	<0.01	< 0.11					
Antimony	**µg/l**												<0.5				<0.5				<1.0				<1.0					<3.96	< 0.14					
Arsenic	**µg/l**												0.72				0.7				<1.0				<1.0					73.76		6.41				
Barium	**µg/l**												125.5				144.69				150				160					786		254				
Beryllium	**µg/l**												<0.5				<0.5				<1.0				<1.0											
B.O.D.	**mg/l O2**																												-							
Boron	**µg/l**	1000			240.2				252.1				210.1				168.06				150				150					219.5		147				
Cadmium	**µg/l**	5			<0.1				<0.1				<0.1				<0.1				<0.020				<0.020					0.961		<0.5				
Calcium	**mg/l Ca**	200			83.48				70.07				68.63				75.55				84				83					222.9		80.10				
C.O.D.	**mg/l O2**							nm																					-							
Chloride	**mg/l Cl**	20	29	26	27	72	36	34	38	38	40	40	36	40	37	42	64.16	45	41	15	50	12	56	52	53	55	67	53.1	54.9	35.23	49.30	56.4				
Chromium	**µg/l**	30			8.2				5.8				<0.5				0.5				<1.0				<1.0					161.9		12				
Cobalt	**µg/l**												<0.5				<0.5				<1.0				<1.0					67.01						
Coliform Bacteria	**no/100ml**						33																													
Conductivity	**µS/cm @ 25**	800	628	647	649	642	574	690	674	690	781	730	706	729	797	704	751	745	729	625	803	780	786	745	768	782	809	820	852	650	818.0					
Copper	**µg/l**	30			12.3				3				1				0.83				<1.0				<1.0					148.9		15				
Cyanide		0.01			<0.05				<0.05				<0.05				<0.05				<0.05		40		<0.05					<5						
D.O.	**% Saturation**		36	30	41	nm	37	34	42	35	35	42	38	44	41	48	50	27	23	26	26	38		31	28	37	37	5.68		39						
E_ Coli	**no/100ml**						<1																													
Fluoride	**mg/l**	1			0.28				0.21				0.2				0.19				0.22				<0.20					0.31						
Iron	**µg/l**				6302.7				3243.2				<10				18.81				19				<10.0					102300		10.6				
Lead	**µg/l**	10			8.9				1.5				<0.5				<0.5				<1.0				<1.0					80.26		9.58				
Magnesium	**mg/l Mg**	50			31.25				28.46				26.88				28.73				28				32					58.9		33.80				
Manganese	**µg/l**				943.9				69.3				<1				<1				<5.0				<5.0					6038		994				
Mercury	**µg/l**	1			<0.1				<0.05				<0.05				<0.05				<0.050				<0.020					0.102		<0.02				
Molybdenum (µg/l)													3.8				2.69				2.6				2.4					5.749						
Nickel	**µg/l**	20			15.4				2.7				0.7				0.75				<1.0				2.8					220.9		22.7				
Ortho-Phosphate	**mg/l P**	0.03			0.02				0.03				0.02				0.019				0.019				<0.010					0.022						
pH		>7 or <8	7.7	7.6	7.5	7.5	7.7	7.7	7.6	7.5	7.6	7.6	7.7	7.6	7.5	7.4	7.5	7.4	7.4	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.4	7.42	7.33	7.4	7.53					
Potassium	**mg/l**	5			3.02				3.54				3.18				4.7				3.1				2.7					11.9		2.41				
Residue on evaporation	**mg/l**				8666				3390				1642				6134				4526				1667											
Sampling Depth	**m**		11.1	10.2	10.1	10.1	9.9		10	10	10	9.6	9.5	9.7	9.6	10.5	9.14	6.8	6.6	nm	6.6	6.4	6.4	6.3	6.3	6.3	6.4										
Selenium	**µg/l**												<0.5				<0.5				<1.0				<1.0					8.456						
Silver	**µg/l**												nm				nm																			
Sodium	**mg/l**	150			44.22				46.74				43.12				42.13				44				42				-	31.02		40.20				
Strontium	**µg/l**												447.74				478.17				450				460				-	647.2						
Sulphate		50			20				19.5				19.9				19.66				23.9				19					24.22		19.5				
Suspended Solids	**mg/l**																																			
Temp	**°C**		11	9.7	12	15	11	8.6	10	13	12	11	9	11	11	9	11.1	13.6	12.8	10	11.2	12.5	11	10.9	10.2	13	14.2			13.6						
Thallium	**µg/l**												<0.1				<0.1				<1.0				<1.0											
Time			13.3	13.1	13	11.25	12:25	14	13:45	11:20	12:00	11:20	11:30	11:20	11:35	11:30	12:00	11:00	10:50	10:55	12:00	11:20	11:15	12:15	11:20	11:15	10:35										
Tin	**µg/l**												2.77				nm																			
T.O.C.	**mg/l**	10	<3.0	28.6	2.6	12.4	7	6.7	13.7	12.7	4.5	3.1	95.8	<1.5	2.2	6	1.21	10.8	2.9	<1.5	7	3.1	5.2	8.1	4.5	2.3	2.9	4.55	17.1	5.71	< 1					
T.O.N	**mg/l N**				0.24				0.14				0.21				0.01				<0.20				0.28					0.35						
Total Suspended Solids	**mg/l**																													1688						
Uranium	**µg/l**												4.15				5.61				6.5				6.8					5.138						
Vanadium	**µg/l**												0.98				0.83				<1.0				<1.0											
Zinc	**µg/l**	100			27.1				8.5				4.2				5.08				1.2				4.9					349.5		37.3				

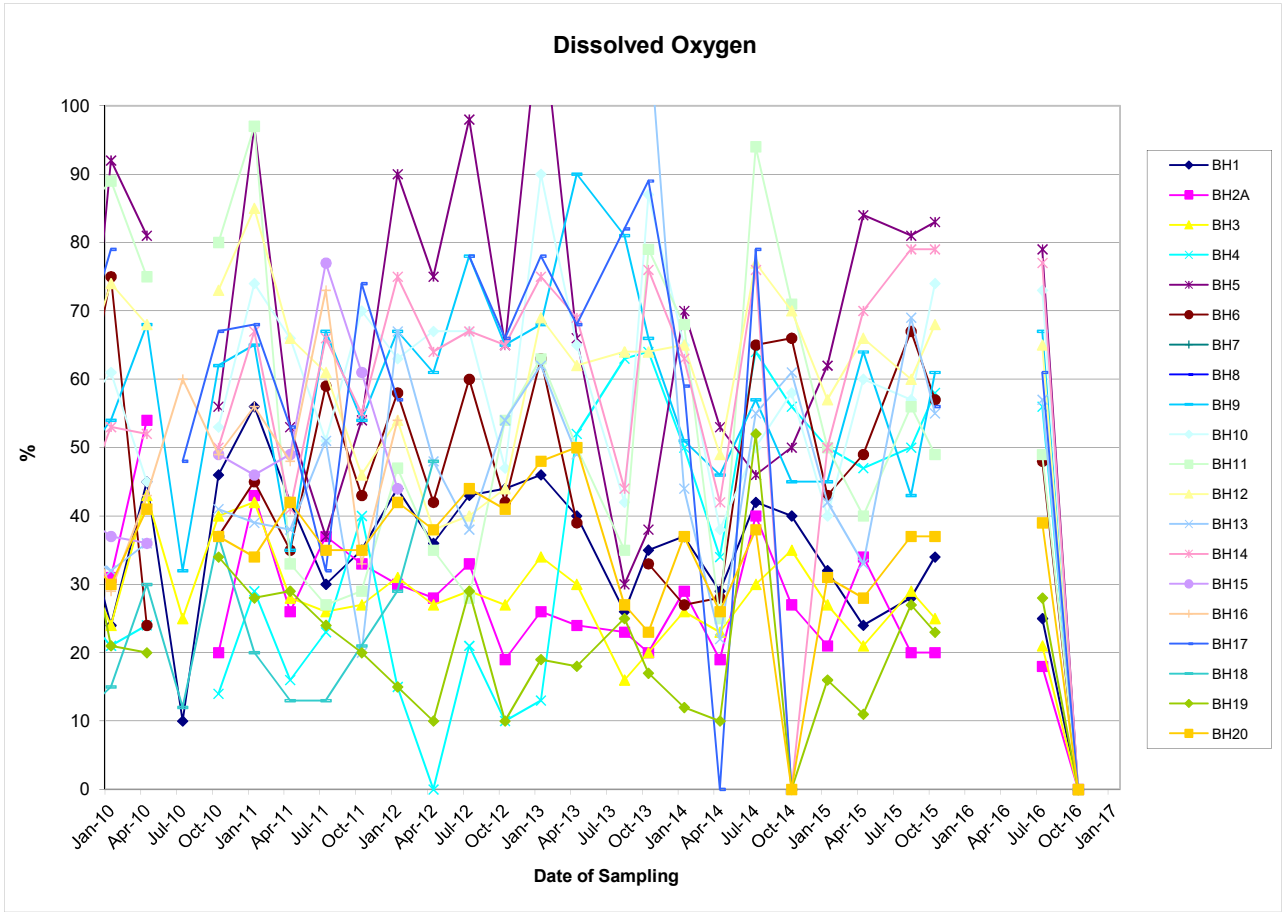

pH
pH Units
8.5
8.3
8.1
7.9
7.7
7.5
7.3
7.1
6.9
6.7
6.5
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
Lower WTL
Upper WTL

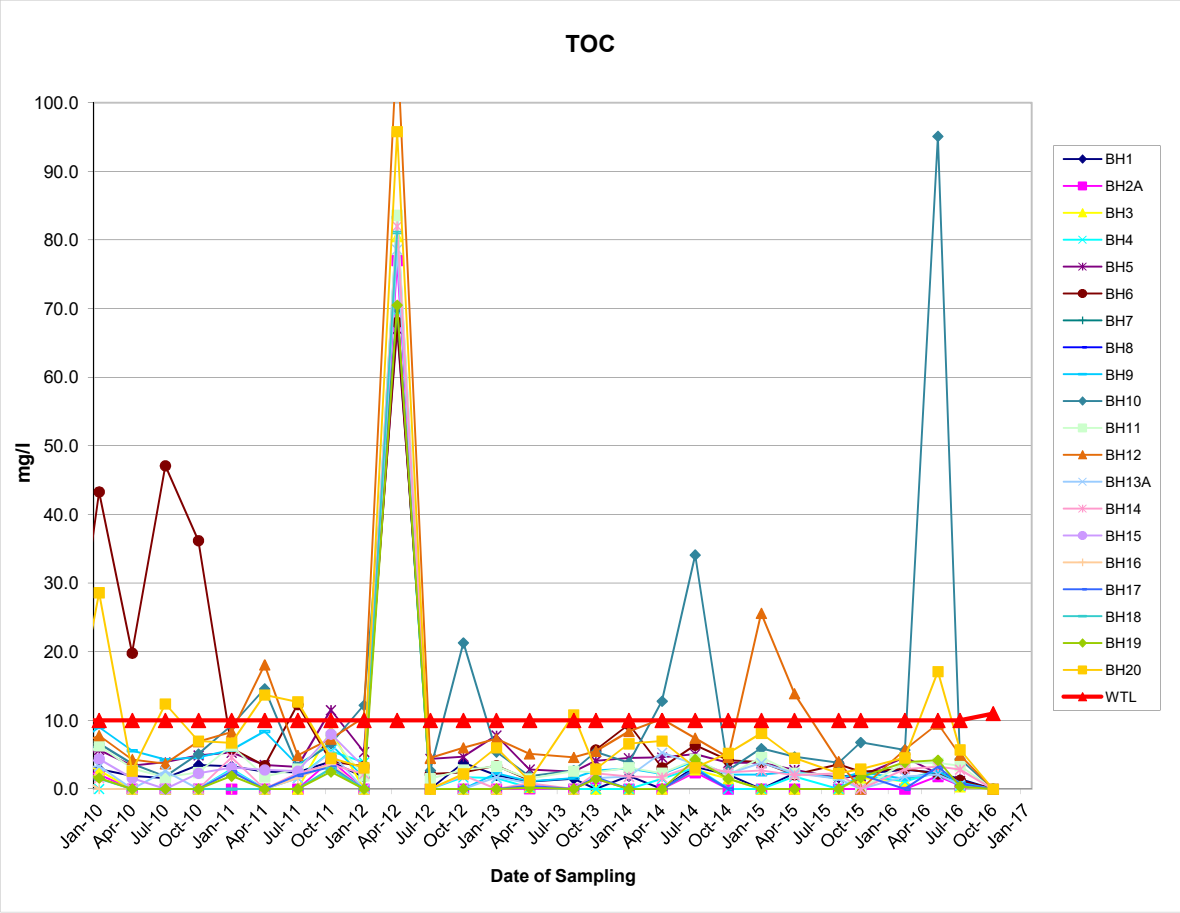

Ammonia
mg/l N
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
WTL
IGV
GTV


Electrical Conductivity
US/cm
1300
1200
1100
1000
900
800
700
600
500
400
300
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
WTL
IGV


Temperature
Degrees C
30
25
20
15
10
5
0
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
DWR


Chloride
mg/l
Date of Sampling
BH1
BH2A
BH3
BH4
BH5A
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
WTL
IGV
GTV


Dissolved Oxygen
%
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13
BH14
BH15
BH16
BH17
BH18
BH19
BH20


TOC
mg/l
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Date of Sampling
BH1
BH2A
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
BH13A
BH14
BH15
BH16
BH17
BH18
BH19
BH20
WTL

Appendix D

Surface Water Monitoring Results

Whiteriver Landfill Site

SURFACE WATER QUALITY

PARAMETERS

RESULTS

Monitoring Point:		SW1																							
		Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	11-Jun-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	**mg/lCaCO3**				280				296													301.51		290	
Aluminium	**µg/l**				15.2				10.55													2224		93	
Ammonia	**mg/l N**		0.48	1.84	0.32	1.24	2.69	0.16	1.225		0.09	0.56	0.093	0.73	0.13	0.52	0.56	0.35	0.1	0.493	2.21	0.054	0.19		
Antimony	**µg/l**				<0.5				<0.5													<2.9	0.24		
Arsenic	**µg/l**				1.48				1.98													5.279		<2	
Barium	**µg/l**				105.8				74.97													165.8		96.4	
Beryllium	**µg/l**				<0.5				<0.5																
B.O.D.	**mg/l O2**		13.1	174.7	4.9	15.5	9.5	2.6	4.97		9.4	1.4	7	<10	1.5	1.5	2.5	5.5	65	2.45	20.4	<2	1.3		
Boron	**µg/l**				20.1				<10													78.67		<135	
Cadmium	**µg/l**				<0.1				<0.1													<0.01			
Calcium	**mg/l Ca**				91.46				97.96													90.9		<0.5	
C.O.D.	**mg/l O2**		78	266	46	155	60	38	68		84	<20	57	70	20	21	<20	56	204	27	400	54	59	87.70	
Chloride	**mg/l Cl**		40	36	28	23	27	28	35.55		31	25		30	26	23	26	42	41	24.8	39.1	24.54	22.40		
Chromium	**µg/l**				<0.5				<0.5													14.26		<3	
Cobalt	**µg/l**				<0.5				0.5													1.54			
Coliform Bacteria	**no/100ml**																								
Conductivity	**µS/cm @ 25**		632	675	604	582	745	583	725		609	587	540	670	652	542	610	698	793	606	570	635	687.0		
Copper	**µg/l**				2.1				0.83													17.77		4.33	
Cyanide	**mg/l**																								
D.O.	**% Saturation**		78	51	77	43	75	104	78		75	72		60	71	73	83	80	83	9.18		82			
E_ Coli	**no/100ml**																								
Fluoride	**mg/l**																								
Iron	**µg/l**				98				121.2													4015		0.301	
Lead	**µg/l**				<0.5				<0.5													4.018		<0.5	
Magnesium	**mg/l Mg**				10.17				13.33													12.69		15.00	
Manganese	**µg/l**				108.8				137.9													473		23.8	
Mercury	**µg/l**				<0.05				<0.05													<0.03		<0.02	
Molybdenum (µg/l)					<0.5				<0.5													<5			
Nickel	**µg/l**				1.5				1.78													9.432		2.11	
Ortho-Phosphate	**mg/l P**				0.14				0.583								0.2					0.587		0.403	
pH			7.6	7.4	8.2	7.6	7.9	7.8	7.9		7.5	7.8	7.6	7.7	7.9	7.8	7.8	7.9	7.9	7.77	7.57	7.9	7.94		
Potassium	**mg/l**				8.15				9.86													11.23		14.50	
Residue on evaporation																									
Sampling Depth	**m**																								
Selenium	**µg/l**				<0.5				<0.5													4.223			
Silver	**µg/l**				nm				nm																
Sodium	**mg/l**				15.26				30.16													13.06		16.40	
Strontium	**µg/l**				151.61				178.29													219.5			
Sulphate	**mg/l SO4**				22.9				23.04					10			18					18.07		24.9	
Suspended Solids	**mg/l**										12	<4			<4	4	<4	11	97	5	600	231	8		
Temp	**°C**		16.7	9.6	9.9	15.8	14.2	5	6.2		11.4	3.8	8	nm	13	1.2	11	15.4	12.6			8.2			
Thallium	**µg/l**				<0.1				<0.1																
Time			10:00	13:05	10:00	10:15	10:45	09:50	11:00		10:45	10:20		nt	10:15	10:15	10:15	10:20	10:20						
Tin	**µg/l**				<1				nm																
T.O.C.	**mg/l**																								
T.O.N	**mg/l N**				1.77				1.19								0.82					1.67		1.99	
Total Suspended Solids	**mg/l**		30	11	66	54	93	25	144																
Uranium	**µg/l**				0.55				0.64													<0.17			
Vanadium	**µg/l**				0.51				<0.5																
Zinc	**µg/l**				2.5				3.23													97.38		8.32	

Whiteriver Landfill Site

SURFACE WATER QUALITY

RESULTS

PARAMETERS																									
Monitoring Point:		SW2A																							
		Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	11-Jun-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	mg/lCaCO3				220				328													291.42		270	
Aluminium	µg/l				13.9				11.61													15.53		62.5	
Ammonia	mg/l N		0.1	0.03	0.05	5.84	0.16	0.41	0.314		0.25	1.3	0.037	0.054	0.046	0.6	0.36	0.05	0.092	0.399	0.87	0.041	< 0.11		
Antimony	µg/l				<0.5				<0.5													<2.9	< 0.14		
Arsenic	µg/l				1.35				1.59													3.947		<2	
Barium	µg/l				86.2				99.23													108.3		97.3	
Beryllium	µg/l				<0.5				<0.5																
B.O.D.	mg/l O2		5.3	22.6	3.3	6.7	2.1	2.3	1.795		2.1	1.1	<2	<1.0	<1.0	<1.0	2.7	1.5	<1.0	1.47	8.31	<2	< 1		
Boron	µg/l				19.7				11.86													<5.51		<135	
Cadmium	µg/l				<0.1				<0.1													<0.01			
Calcium	mg/l Ca				90.03				100.24													109.6		<0.5	
C.O.D.	mg/l O2		36	59	23	68	24	29	16		36	91	34	30	<20	<20	<20	26	24	<25	99	<5	< 25	85.70	
Chloride	mg/l Cl		48	47	37	35	31	37	52.91		46	45		35	31	28	32	25	31	24.9	24.9	25.41	20.50		
Chromium	µg/l				<0.5				<0.5													16.29		<3	
Cobalt	µg/l				<0.5				<0.5													<0.02			
Coliform Bacteria	no/100ml																								
Conductivity	µS/cm @ 25		615	664	626	676	705	619	701		564	662	530	679	668	570	605	473	645	627	390	623	682.0		
Copper	µg/l				2				1.24													1.746		<4	
Cyanide	mg/l																								
D.O.	% Saturation		93	67	88	85	66	101	116		92	75		77	76	73	112	84	87	9.4		90			
E_ Coli	no/100ml																								
Fluoride	mg/l																								
Iron	µg/l				58.9				78.71													225.5		0.193	
Lead	µg/l				<0.5				<0.5													<0.02		<0.5	
Magnesium	mg/l Mg				10.73				12.77													12.94		10.60	
Manganese	µg/l				134.2				223.38													150		18.4	
Mercury	µg/l				<0.05				<0.05													<0.03		<0.02	
Molybdenum (µg/l)					0.9				<0.5													<5			
Nickel	µg/l				1.6				1.52													1.158		1.23	
Ortho-Phosphate	mg/l P				0.04				0.061								0.11					0.473		0.302	
pH			8.1	7.8	8.3	7.7	7.7	7.7	8.2		7.8	7.9	7.9	7.8	7.9	7.8	8.1	7.8	7.9	7.82	7.65	7.9	8.05		
Potassium	mg/l				5.04				5.4													7.803		9.70	
Residue on evaporation																									
Sampling Depth	m																								
Selenium	µg/l				<0.5				<0.5													<0.54			
Silver	µg/l				nm				nm																
Sodium	mg/l				20.34				24.57													17.28		14.00	
Strontium	µg/l				170.5				191.03													225.3			
Sulphate	mg/l SO4				55				31.83								27					31.18		34.9	
Suspended Solids	mg/l										4	9	<2	<4	<4	<4	<4	6	6	3	97	5	< 3		
Temp	°C		16.6	9.5	10.4	16.1	13.5	5	6.1		11.6	3.7		nm	13	6.2	10.7	14.8	12.2			8.4			
Thallium	µg/l				<0.1				<0.1																
Time			12:15	11:45	11:05	11:45	11:35	11:50	11:15		11:25	11:15		nt	11:15	10:40	11:00	12:10	nt						
Tin	µg/l				<1				nm																
T.O.C.	mg/l																								
T.O.N	mg/l N				1.42				0.8								0.67					0.61		1.55	
Total Suspended Solids	mg/l		40	10	19	10	7	11	13																
Uranium	µg/l				1.24				1.26													<0.17			
Vanadium	µg/l				<0.5				<0.5																
Zinc	µg/l				2.4				3.83													6.567		5	

Whiteriver Landfill Site

SURFACE WATER QUALITY

PARAMETERS

RESULTS

Monitoring Point:		SW3																							
		Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Units	19-Jul-11	11-Oct-11	10-Jan-12	25-Apr-12	18-Jul-12	10-Oct-12	09-Jan-13	09-Apr-13	08-Aug-13	17-Oct-13	14-Jan-14	11-Jun-14	15-Jul-14	14-Oct-14	19-Jan-15	16-Apr-15	05-Aug-15	19-Oct-15	24-Feb-16	11-May-16	20-Jul-16	27-Oct-16	14-Dec-16	
Alkalinity	mg/lCaCO3				135				110													179.18		190	
Aluminium	µg/l				15.8				6.61													407.3		<50	
Ammonia	mg/l N		0.04	<0.03	0.04	0.55	0.13	1.28	1.022		0.63	7.8	0.014		0.058	0.77	0.16			<0.2	0.14	<0.01	< 0.11		
Antimony	µg/l				0.56				1.33													<2.9	< 0.14		
Arsenic	µg/l				2.06				1.35													1.768		<2	
Barium	µg/l				66.1				84.34													85.54		92.2	
Beryllium	µg/l				<0.5				<0.5																
B.O.D.	mg/l O2		<1.5	<1.5	3.7	3.8	<1.5	2	1.15		2	1.7	<2		<1.0	<1.0	<1.0			2.14	3.99	<2	< 1		
Boron	µg/l				30.3				21.81													171.7		<135	
Cadmium	µg/l				<0.1				<0.1													0.055			
Calcium	mg/l Ca				69.86				70.9													42.05		<0.5	
C.O.D.	mg/l O2		13	14	25	32	12	20	15		29	26	29		22	<20	<20			<25	29	15	< 25	67.40	
Chloride	mg/l Cl		18	21	22	27	19	32	29.55		42	42			15	10	10			9.7	7.34	9.49	7.43		
Chromium	µg/l				<0.5				<0.5													19.77		<3	
Cobalt	µg/l				<0.5				1.05													<0.02			
Coliform Bacteria	no/100ml																								
Conductivity	µS/cm @ 25		599	506	515	518	601	563	502		680	677	382		462	486	417			456	325	356	473.0		
Copper	µg/l				2.3				2.08													9.159		<4	
Cyanide	mg/l																								
D.O.	% Saturation		nm	86	77	112	62	94	47		66	68			76	85	80			10		98			
E_ Coli	no/100ml																								
Fluoride	mg/l																								
Iron	µg/l				20				20.85													179.7		0.0729	
Lead	µg/l				<0.5				<0.5													0.221		<0.5	
Magnesium	mg/l Mg				9.01				7.81													8.589		12.30	
Manganese	µg/l				68.7				949.3													51.11		42.6	
Mercury	µg/l				<0.05				<0.05													<0.03		<0.02	
Molybdenum (µg/l)					2.2				1.76													<5			
Nickel	µg/l				2				3.54													0.491		1.81	
Ortho-Phosphate	mg/l P				<0.02				0.009								<0.010					<0.006		<0.02	
pH			7.8	8	8.2	8.2	8.2	7.9	7.7		7.5	7.8	7.8		7.7	8.1	7.9			8.05	7.66	7.7	7.50		
Potassium	mg/l				3.23				4.06													0.79		2.31	
Residue on evaporation																									
Sampling Depth	m																								
Selenium	µg/l				<0.5				<0.5													2.041			
Silver	µg/l				nm				nm																
Sodium	mg/l				18.75				15.97													6.102		8.90	
Strontium	µg/l				171.79				167.78													142.9			
Sulphate	mg/l SO4				103.8				64.51								30					17.49		50.7	
Suspended Solids	mg/l										<4	<4	<2		<4	4	<4			5	10	11	10		
Temp	°C		14	7	10	17	11	7	5.3		11	2			11.5	1.9	10.6					8.4			
Thallium	µg/l				<0.1				<0.1																
Time			13:25	12:30	11:15	11:00	11:10	10:55	12:00		12:00	11:10			10:30	12:30	10:55								
Tin	µg/l				<1				nm																
T.O.C.	mg/l																								
T.O.N	mg/l N				0.14				0.31								<0.20					0.07		<0.1	
Total Suspended Solids	mg/l		<5	8	5	<5	<5	28	3																
Uranium	µg/l				1.07				1.05													<0.17			
Vanadium	µg/l				<0.5				<0.5																
Zinc	µg/l				2.3				1.43													62.05		19.5	

Appendix E

Gas Monitoring Results

	26/01/2016			24/02/2016			31/03/2016			21/04/2016		
	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2
PZ1	0	1.4	19.6	0	1.5	19.5	0	1.3	19.6	0	1.4	16.6
PZ2	0	1.1	20.4	0	1.2	20.2	0	1.2	19.8	0	1.2	20.2
PZ3	0	0.6	20.1	0	0.6	20.1	0	0.5	20	0	0.5	20.2
PZ4	0	1.2	19.6	0	1.2	19.5	0	1.2	19.5	0	1.3	19.4
PZ5	0	2.5	19.1	0	2.6	19.1	0	2.8	18.8	0	3.1	18.6
PZ54	0	1.2	19.2	0	1.1	19.3	0	1.2	19.2	0	1.1	19.4
PZ53	0	0.4	20.2	0	0.4	20.1	0	0.2	20.2	0	0.3	20.2
PZ52	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2	0	0	20.4
PZ51	0	0	20.6	0	0	20.6	0	0.2	20.4	0	0	20.4
PZ50	0	0.6	19.8	0	0.6	19.8	0	0.2	20.2	0	0.5	20
PZ49	0	2.2	19.6	0	2.2	19.6	0	2.2	19.6	0	2.1	19.5
PZ48	0	1	19.8	0	1	19.8	0	1.2	19.6	0	0.8	19.6
PZ47	0	0.9	20.1	0	0.9	20.1	0	0.6	20	0	1.2	20
PZ46	0	3.6	18.4	0	3.5	18.6	0	3.2	18.4	0	3.3	18.4
PZ45	0	1.2	19.6	0	1.2	19.6	0	1.2	19.4	0	1.1	19.6
PZ44	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ43	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6
PZ42	0	0.8	20.4	0	0.4	20.1	0	0.4	20.1	0	0.4	20
PZ41	0	0.4	20.4	0	0.2	20.4	0	0.2	20.4	0	0.2	20.2
PZ40	0	0.4	20.1	0	0.4	20.1	0	0.4	20.1	0	0.4	20.2
PZ39	0	0.4	20.2	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ38	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2
PZ37	0	0.4	20.2	0	0.4	20.2	0	0.4	20.2	0	0.2	20.4
PZ36	0	1.2	19.8	0	1.1	20	0	0.6	20.4	0	1.2	19.9
PZ35	0	0.4	20.6	0	0.4	20.4	0	0.4	20.4	0	0.2	20.6
PZ34	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6
PZ33	0	0.4	20.2	0	0.4	20.2	0	0.4	20.2	0	0.2	20.4
PZ32	0	0.4	20.4	0	0.4	20.4	0	0.4	20.4	0	0.2	20.4
PZ31	0	0.6	20.4	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ30	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2	0	0.2	20.4
PZ29	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ28	0	2.2	19	0	2.1	19.2	0	2.3	19.2	0	2.2	19.1
PZ27	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2
PZ26	0	1.2	19.8	0	1.3	19.6	0	1.4	19.4	0	1.2	19.4
PZ25	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ24	0	0.4	20.6	0	0.4	20.6	0	0.4	20.6	0	0.4	20.2
PZ23	0	0.4	20.2	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2
PZ22	0	0.4	19.8	0	0.4	19.8	0	0.2	20.2	0	0.4	19.8
PZ21	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6
PZ11	0	1.1	19.4	0	1.2	19.5	0	1.4	19.2	0	1.1	19.6
PZ12	0	0.2	20.8	0	0.2	20.8	0	0.2	20.8	0	0.2	20.8
PZ13	0	0.4	20.2	0	0.4	20.2	0	0.4	20.2	0	0.4	20.4
PZ14	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6	0	0.2	20.6
PZ15	0	0.2	21.2	0	0.2	21.2	0	0.2	21.2	0	0.2	21.2
PZ16	0	1.1	19.2	0	1	19.6	0	1.1	19.4	0	1.1	19.5

	27/04/2016			30/06/2016			07/07/2016			19/08/2016		
	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2
PZ1	0	1.4	19.2	0	1.5	19.5	0	1.2	19.8	0	1.6	19.1
PZ2	0	1.1	20	0	1.2	20	0	1.1	20.1	0	1.2	19.9
PZ3	0	0.6	20.1	0	0.4	19.8	0	0.2	20.1	0	0.4	20
PZ4	0	1.1	19.6	0	1.4	19.4	0	1.2	19.6	0	1.2	19.2
PZ5	0	2.9	19	0	2.2	19.2	0	2.3	19.1	0	2.7	19
PZ54	0	1.1	19.1	0	0.8	19.4	0	0.6	19.6	0	1.1	19.1
PZ53	0	0.4	20.4	0	0.2	20.5	0	0.2	20.2	0	0.4	20.5
PZ52	0	0.2	20.2	0	0.4	20	0	0.2	20.2	0	0.2	20.6
PZ51	0	0.2	20.4	0	0	20.6	0	0	20.5	0	0.2	20.5
PZ50	0	0.2	20.4	0	0.5	19.2	0	0.3	19.6	0	0.2	20.5
PZ49	0	2.5	18.9	0	2.1	19.4	0	1.9	19.2	0	2.3	18.6
PZ48	0	1.1	19.8	0	0.8	19.6	0	0.6	19.2	0	1	19.5
PZ47	0	0.4	20.1	0	0.6	20.2	0	0.4	20	0	0.2	20.5
PZ46	0	3.1	18.5	0	3.2	18.5	0	2.9	18.8	0	2.8	17.9
PZ45	0	1	19.8	0	1.1	19.4	0	1.2	19.5	0	0.8	19.6
PZ44	0	0.2	20.4	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ43	0	0.2	20.6	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ42	0	0.4	20.2	0	0.6	20.2	0	0.4	19.8	0	0.2	20.4
PZ41	0	0.2	20.4	0	0.4	20.4	0	0.2	20	0	0.2	20.6
PZ40	0	0.4	20.2	0	0.2	20.2	0	0.2	20.2	0	0.4	20.6
PZ39	0	0.2	20.4	0	0.2	20.4	0	0.2	20.5	0	0.2	20.6
PZ38	0	0.2	20.2	0	0.2	20.2	0	0.2	20.5	0	0.2	20.6
PZ37	0	0.4	20.2	0	0.4	20.2	0	0.2	20.2	0	0.4	20.6
PZ36	0	0.6	20.4	0	1.1	19.6	0	1.2	20	0	0.2	20.6
PZ35	0	0.4	20.4	0	0.2	20.2	0	0.2	20.2	0	0.4	20.4
PZ34	0	0.2	20.6	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ33	0	0.2	20.4	0	0.2	20.4	0	0.2	20.5	0	0.2	20.4
PZ32	0	0.4	20.4	0	0.2	20.4	0	0.2	20.5	0	0.4	20.6
PZ31	0	0.2	20.4	0	0.6	20.4	0	0.4	20.4	0	0.2	20.6
PZ30	0	0.2	20.2	0	0.2	20.4	0	0.2	20.5	0	0.2	20.6
PZ29	0	0.2	20.4	0	0.2	20.4	0	0.2	20.5	0	0.2	20.6
PZ28	0	1.8	19.8	0	1.8	19.2	0	1.6	19.4	0	1.5	19.6
PZ27	0	0.2	20.2	0	0.2	20.4	0	0.2	20.5	0	0.2	20.6
PZ26	0	1.5	19.6	0	1.1	19.6	0	1.1	19.5	0	1.6	19.2
PZ25	0	0.2	20.4	0	0.2	20.4	0	0.2	20.5	0	0.2	20.6
PZ24	0	0.2	20.6	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ23	0	0.2	20.2	0	0.2	20.2	0	0.2	20.4	0	0.2	20.6
PZ22	0	0.2	20	0	0.2	19.8	0	0.2	20.5	0	0.2	20.2
PZ21	0	0.2	20.6	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ11	0	1.2	19.5	0	1.2	19.2	0	1.3	19.4	0	1.3	19.2
PZ12	0	0.2	20.8	0	0.2	20.4	0	0.2	20.4	0	0.2	20.8
PZ13	0	0.2	20.6	0	0.4	20.2	0	0.2	20.5	0	0.2	20.6
PZ14	0	0.2	20.6	0	0.2	20.6	0	0.2	20.5	0	0.2	20.6
PZ15	0	0.2	21.2	0	0.2	21.2	0	0.2	20.5	0	0.2	20.8
PZ16	0	0.8	19.8	0	1	19.6	0	0.8	19.6	0	0.6	19.6

	29/09/2016			26/10/2016			29/11/2016			20/12/2016		
	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2	CH4	CO2	O2
PZ1	0	1.6	18.2	0	1.1	19.9	0	1.2	19.2	0	1.5	19.2
PZ2	0	1.2	19.6	0	1	19.9	0	1.1	19.4	0	1.2	19.6
PZ3	0	0.4	19.8	0	0.2	20.2	0	0.2	20.2	0	0.4	19.8
PZ4	0	1.1	19.4	0	1.3	19.7	0	1.1	19.2	0	0.8	19.2
PZ5	0	2.8	18.2	0	2.2	19.2	0	2.6	18.2	0	2.2	18.6
PZ54	0	1	18.8	0	0.4	19.6	0	1	19.4	0	0.9	19.6
PZ53	0	0.2	20.6	0	0.2	20.2	0	0.2	20.2	0	0.2	20.2
PZ52	0	0.2	20.8	0	0.2	20.2	0	0.2	20.4	0	0.2	20.2
PZ51	0	0.2	20.8	0	0.2	20.2	0	0	20.4	0	0	20.4
PZ50	0	0.2	20.6	0	0.2	19.6	0	0.2	20	0	0.4	20
PZ49	0	1.9	19.2	0	1.8	19.4	0	1.8	19	0	2.1	19.2
PZ48	0	0.6	19.2	0	0.2	19.2	0	0.4	19.4	0	1.1	19.6
PZ47	0	1.1	19.4	0	0.4	20	0	1.1	19.6	0	0.8	20
PZ46	0	2.9	18.2	0	2.9	19	0	2.5	18.2	0	2.8	18.6
PZ45	0	1	19.6	0	0.9	19.6	0	1.1	19.6	0	0.6	19.8
PZ44	0	0.2	20.8	0	0.2	20.2	0	0.2	20.4	0	0.2	20.2
PZ43	0	0.2	20.8	0	0.2	20.4	0	0.2	20.4	0	0.2	20.2
PZ42	0	0.2	20.6	0	0.4	20	0	0.2	20.2	0	0.8	20.4
PZ41	0	0.2	20.8	0	0.2	20	0	0.2	20.2	0	0.4	20.4
PZ40	0	0.4	20.6	0	0.2	20.2	0	0.4	20.2	0	0.2	20.2
PZ39	0	0.2	20.8	0	0.2	20.4	0	0.2	20.2	0	0.2	20.2
PZ38	0	0.2	20.2	0	0.2	20.4	0	0.2	20.2	0	0.2	20.2
PZ37	0	0.2	20.4	0	0.2	20.2	0	0.2	20.4	0	0.4	20.2
PZ36	0	1.3	19.4	0	1.2	20	0	1.3	19.2	0	1.1	19.6
PZ35	0	0.2	20.8	0	0.2	20.2	0	0.2	20.2	0	0.4	20.6
PZ34	0	0.2	20.8	0	0.2	20.4	0	0.2	20.2	0	0.2	20.4
PZ33	0	0.2	20.6	0	0.2	20.2	0	0.2	20.4	0	0.2	20.2
PZ32	0	0.2	20.6	0	0.2	20.2	0	0.2	20.4	0	0.4	20.4
PZ31	0	0.2	20.8	0	0.2	20.2	0	0.2	20.4	0	0.2	20.4
PZ30	0	0.2	20.8	0	0.2	20.5	0	0.2	20.4	0	0.2	20.2
PZ29	0	0.2	20.8	0	0.2	20.5	0	0.2	20.4	0	0.2	20.4
PZ28	0	2.3	18.1	0	1.4	19.6	0	1.9	19.2	0	22	18.8
PZ27	0	0.2	20.8	0	0.2	20.5	0	0.2	20.2	0	0.2	20.2
PZ26	0	1.3	19.2	0	1.1	19.6	0	0.9	19.2	0	1.3	19.2
PZ25	0	0.2	20.8	0	0.2	20.4	0	0.2	20.4	0	0.2	20.4
PZ24	0	0.4	20.8	0	0.2	20.4	0	0.4	20.2	0	0.2	20.4
PZ23	0	0.2	20.6	0	0.2	20.4	0	0.2	20.2	0	0.2	20.2
PZ22	0	0.2	20.6	0	0.2	20.5	0	0.2	20	0	0.2	20
PZ21	0	0.2	20.6	0	0.2	20.2	0	0.2	20.4	0	0.2	20.4
PZ11	0	0.9	19.8	0	1.3	19.4	0	1.1	19.4	0	1.2	19.2
PZ12	0	0.2	20.8	0	0.2	20.4	0	0.2	20.8	0	0.2	20.4
PZ13	0	0.4	20.6	0	0.2	20.4	0	0.4	20.4	0	0.2	20.2
PZ14	0	0.2	20.6	0	0.2	20.4	0	0.2	20.6	0	0.2	20.4
PZ15	0	0.2	21.2	0	0.2	20.5	0	0.2	21.2	0	0.2	20.4
PZ16	0	0.9	19.3	0	1	19.6	0	1.1	19.2	0	0.8	19.6

Appendix F

Water Balance Calculation

MONTHLY WATER BALANCE CALCULATION 2016																			
`	Active Phase	Active Area A(m2)	Waste Input t/month	Rainfall mm	Active Area Infilitration AR(A)(m3)	Liquid Waste LW(m3) Excess Water From Sludge	Temp Restored area	Temp Restored area(Temp) RCA(m2)	Restored area(Temp) infiltration IRCA(m3)	Leachate Lagoon AR(l)	Permanently Restored area	Permanently Restored area	Restored area RCA(m2)	Total Water	Cumulative Water	Absorptive Capacity aW(m3)	Cumulative Absorptive Capacity	Cumulative Leachate	Leachate produced Lo(m3)	Leachate tankered to WWTP
January	leachate lagoon	1,600		109					0	174	Whole site	129806	1412	1586	1586	0.00	0.00	1586	1586	2136
February	leachate lagoon	1,600		76					0	122	Whole site	129806	988	1110	2696	0.00	0.00	2696	1110	2138
March	leachate lagoon	1,600		48					0	76	Whole site	129806	620	697	3393	0.00	0.00	3393	697	1270
April	leachate lagoon	1,600		74					0	118	Whole site	129806	961	1079	4472	0.00	0.00	4472	1079	983
May	leachate lagoon	1,600		51					0	81	Whole site	129806	661	742	5214	0.00	0.00	5214	742	866
June	leachate lagoon	1,600		68					0	108	Whole site	129806	876	984	6198	0.00	0.00	6198	984	393
July	leachate lagoon	1,600		67					0	107	Whole site	129806	870	977	7175	0.00	0.00	7175	977	830
August	leachate lagoon	1,600		17					0	27	Whole site	129806	221	248	7423	0.00	0.00	7423	248	232
September	leachate lagoon	1,600		75					0	120	Whole site	129806	976	1096	8519	0.00	0.00	8519	1096	149
October	leachate lagoon	1,600		103					0	164	Whole site	129806	1332	1496	10015	0.00	0.00	10015	1496	608
November	leachate lagoon	1,600		24					0	38	Whole site	129806	310	348	10364	0.00	0.00	10364	348	246
December	leachate lagoon	1,600		45					0	72	Whole site	129806	584	656	11020	0.00	0.00	11020	656	804
Total				756					**0**	**1209**			**9811**	**11020**		**0**			**11020**	**10655**

Assumptions

IRCA	Temporarily capped/restored area infiltration of rainfall estimated %	30%	%
	Permanent capped/restored area infiltration of rainfall estimated %	10%	%
Absorptive Capacity	waste density of 0.8 tonnes/m3. Estimated absorptive capacity (water per tonne waste before leachate is produced) t/m3	0.06	t/m3
Landfill areas/cells	Area of landfill site restored (1,2)	41,000	m^2
	Area of Phase 3	11,500	m^2
	Area of Phase 1,2 and 3 remaining to be temp capped	7,000	m^2
	Area of Phase 4, Cell 1A	2,190	m^2
	Area of Phase 4, Cell 1	15,000	m^2
	Area of Phase 4, Cell 2	8,000	m^2
	Area of Phase 5, Cell 3A	7,974	m^2
	Area of Phase 5, Cell 3B	7,180	m^2
	Area of Phase 5, Cell 2A	13,761	m^2
	Area of Phase 5, Cell 2B	5,795	m^2
	Area of Phase 5, Cell 1A	10,083	m^2
	Area of Phase 5, Cell 1B	323	m^2
	Surface Area Leachate Lagoon	1,600	m^2
Rainfall	Rainfall taken from on site	755.8	mm

Appendix G

Estimated Annual Gas Yield

Environmental Protection Agency

A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2016

Please choose from the drop down menu the license number for your site	W0060
Please choose from the drop down menu the name of the landfill site	Whiteriver Landfill Site
Please enter the number of flares operational at your site in 2016	1
Please enter the number of engines operational at your site in 2016	2
Total methane flared	2,218 kg/year
Total methane utilised in engines	729,401 kg/year

Please note that the closing date for reciept of completed surveys is 31/03/2017

Introduction

The Office of Environmental Sustainability (OES) of the Environmental Protection Agency acts as the inventory agency in Ireland with responsibility for compiling and reporting national greenhouse gas inventories to the European Commission and the United Nations Framework Convention on Climate Change. In addition to meeting international commitments Ireland's national greenhouse gas inventory informs national agencies and Government departments as they face the challenge to curb emissions and meet Ireland's emission reduction targets under the Effort Sharing Decision (No. 406/2009/EC). The national inventory also informs data suppliers, making them aware of the importance of their contributions to the inventory process and a means of identifying areas where input data may be improved.

It is on this basis that the Environmental Protection Agency is asking landfill operators to partake in this survey so that the most uptodate information on methane flaring and recovery in utilisation plants at landfills sites is used in calculating the contribution of the landfill sector to national greenhouse gas emissions

The Environmental Protection Agency wishes to thank you for partaking in this survey. If you have any questions about the survey and how to complete it please view the "Help sheet" worksheet. If however, your query is not answered by viewing the "Help sheet" worksheet please contact:
LFGProject@epa.ie

Once completed please send the completed file as an attachment clearly stating the name and or license number of the landfill site (e.g. W000 Xanadu landfill_2015) to:
LFGProject@epa.ie

Environmental Protection Agency

A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2016

How to use the survey?

1) Please enter your license details in the title sheet

2) Please enter the landfill name in the title sheet

3) Please enter the number of flares present and in use at your site in 2016 in the title sheet

4) Please enter the number of engines present and in use at your site in 2016 in the title sheet

5) The survey consists of 6 worksheets for flares. Only complete the number of worksheets for the number of flares present and in use in 2016 at your site

6) The survey consists of 6 worksheets for utilisation engines. Only complete the number of worksheets for the number of engines present and in use in 2016 at your site

7) Data can either be directly enetered in each cell of the tables or chosen from the drop down menus. Where data is outside of the range of values presented in the drop down menus an error message will appear. Please check the value and try again. Where data or description is not provided in the drop down menus please type the answer in the box provided

8) Please view a copy of the worksheet for flare No. 1 below and click on the cells under each of the headings to help you fill out the survey questionnaire.

9) Please note under the method heading
M = Measured e.g. direct from scada
C = Calculated e.g from weekly/fortnightly/monthly checks/monitoring
E = Estimated e.g. based on operational design of flare/engine

10) Please note that data is only to be enetered in either the monthly or the yearly tables but not both

	to be filled in by licensee		calculated by spreadsheet	

Flare No. 1

Flare type ?	Haase 600	**If "other" enter flare description here**	
Is the flare an open or enclosed flare ?	Enclosed	**Rated flare capacity ?**	600 **m3/hr**
Month /year comissioned ?	May 2005		
Month decomissioned if decomissioned in 2016 ?	Select		
What is the function of the flare ?	Back-up to engines	**If "other" enter flare function here**	

Monthly	Method M/C/E	Runtime days/month	Runtime hrs/day	Downtime hrs	Total runtime hrs/month	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate (m^3/hr)	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
January	MCE	1	4.0		4	10	10	400	50.00	30.70	1.60	98.0	784	547
February	MCE				0	10	10					98.0	0	0
March	MCE				0	10	10					98.0	0	0
April	MCE	1	4.0		4	10	10	400	50.50	30.60	1.30	98.0	792	552
May	MCE				0	10	10					98.0	0	0
June	MCE				0	10	10					98.0	0	0
July	MCE	1	4.0		4	10	10	400	50.90	30.60	1.10	98.0	798	556
August	MCE				0	10	10					98.0	0	0
September	MCE				0	10	10					98.0	0	0
October	MCE				0	10	10					98.0	0	0
November	MCE	1	4.0		4	10	10	400	51.50	30.50	1.00	98.0	808	563
December	MCE				0	10	10					98.0	0	0
Total					16								3,181	2,218

Please note: Only fill the "Yearly" table if data is not availabe or cannot be calculated nor estimated on a monthly basis

Yearly	Method M/C/E	Runtime days/year	Runtime hrs/day	Downtime hrs	Total runtime hrs/year	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate m^3/hr	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
2016					0		10					98.0	0	0

	to be filled in by licensee		calculated by spreadsheet	

Flare No. 2

Flare type ?	Select	**If "other" enter flare description here**	
Is the flare an open or enclosed flare ?	Select	**Rated flare capacity ?** Select	**m3/hr**
Month /year comissioned ?	Select	Select	
Month decomissioned if decomissioned in 2016 ?	Select		
What is the function of the flare ?	Select	**If "other" enter flare function here**	

Monthly	Method M/C/E	Runtime days/month	Runtime hrs/day	Downtime hrs	Total runtime hrs/month	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate (m^3/hr)	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
January					0	Select	10					98.0	0	#N/A
February					0	Select	10					98.0	0	#N/A
March					0	Select	10					98.0	0	#N/A
April					0	Select	10					98.0	0	#N/A
May					0	Select	10					98.0	0	#N/A
June					0	Select	10					98.0	0	#N/A
July					0	Select	10					98.0	0	#N/A
August					0	Select	10					98.0	0	#N/A
September					0	Select	10					98.0	0	#N/A
October					0	Select	10					98.0	0	#N/A
November					0	Select	10					98.0	0	#N/A
December					0	Select	10					98.0	0	#N/A
Total					0								0	0

Please note: Only fill the "Yearly" table if data is not availabe or cannot be calculated nor estimated on a monthly basis

Yearly	Method M/C/E	Runtime days/year	Runtime hrs/day	Downtime hrs	Total runtime hrs/year	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate m^3/hr	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
2016					0		10					98.0	0	0

	to be filled in by licensee		calculated by spreadsheet	

Engine No. 1

Engine type ?	Other	**MWM Generating set TCG2016V16C (800KW)**
Month /year comissioned ?	July	2014
Month decomissioned if decomissioned in 2016 ?	July	

Monthly	Method M/C/E	Runtime days/month	Runtime hrs/day	Downtime hrs	Total runtime hrs/month	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate (m^3/hr)	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
January	MCE	19	24	0	456	100	10	300	50.10	30.70	1.60	98.0	67,166	50,952
February	MCE	22	24	0	528	100	10	285	50.00	30.70	1.50	98.0	73,735	55,935
March	MCE	25	24	0	600	100	10	275	50.40	30.60	1.40	98.0	81,497	61,823
April	MCE	21	24	0	504	100	10	270	50.50	30.60	1.30	98.0	67,346	51,088
May	MCE	30	24	0	720	100	10	255	50.60	30.60	1.20	98.0	91,044	69,065
June	MCE	14	24	0	336	100	10	250	50.80	30.60	1.20	98.0	41,819	31,723
July	MCE	8	24	0	192	100	10	235	50.90	30.50	1.00	98.0	22,507	17,073
August	MCE	19	24	0	456	100	10	225	51.10	30.50	1.00	98.0	51,380	38,976
September	MCE	5	24	0	120	100	10	220	51.20	30.50	1.00	98.0	13,246	10,049
October	MCE	21	24	0	504	100	10	200	51.40	30.50	1.00	98.0	50,775	38,517
November	MCE	13	24	0	312	100	10	195	51.50	30.50	1.00	98.0	30,706	23,293
December	MCE	13	24	0	312	100	10	235	48.40	29.50	1.00	98.0	34,777	26,382
Total					5,040								625,998	474,876

Please note: Only fill the "Yearly" table if data is not availabe or cannot be calculated nor estimated on a monthly basis

Yearly	Method M/C/E	Runtime days/year	Runtime hrs/day	Downtime hrs	Total runtime hrs/year	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate m^3/hr	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
2016					0	Select	10					98.0	0	0

	to be filled in by licensee		calculated by spreadsheet	

Engine No. 2

Engine type ?	Other	**MWM Generating set TCG2016V12C (600kw)**
Month /year comissioned ?	July	2014
Month decomissioned if decomissioned in 2016 ?	July	

Monthly	Method M/C/E	Runtime days/month	Runtime hrs/day	Downtime hrs	Total runtime hrs/month	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate (m^3/hr)	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
January	MCE	16	24	0	384	100	10	200	50.10	30.70	1.60	98.0	37,707	28,604
February	MCE	14	24	0	336	100	10	200	50.00	30.70	1.50	98.0	32,928	24,979
March	MCE	18	24	0	432	100	10	190	50.40	30.60	1.40	98.0	40,541	30,754
April	MCE	8	24	0	192	100	10	180	50.50	30.60	1.30	98.0	17,104	12,975
May	MCE	0	24	0	0	100	10	170	50.60	30.00	1.20	98.0	0	0
June	MCE	15	24	0	360	100	10	165	50.80	30.60	1.20	98.0	29,572	22,433
July	MCE	23	24	0	552	100	10	160	50.90	30.50	1.10	98.0	44,056	33,420
August	MCE	14	24	0	336	100	10	150	51.10	30.50	1.00	98.0	25,239	19,146
September	MCE	24	24	0	576	100	10	145	51.20	30.50	1.00	98.0	41,907	31,790
October	MCE	10	24	0	240	100	10	135	51.40	30.50	1.00	98.0	16,321	12,381
November	MCE	15	24	0	360	100	10	130	51.50	30.50	1.00	98.0	23,620	17,918
December	MCE	18	24	0	432	100	10	130	48.20	29.50	1.00	98.0	26,528	20,124
Total					4,200								335,522	254,524

Please note: Only fill the "Yearly" table if data is not availabe or cannot be calculated nor estimated on a monthly basis

Yearly	Method M/C/E	Runtime days/year	Runtime hrs/day	Downtime hrs	Total runtime hrs/year	Average Inlet Pressure (mbg)	Average Inlet Temp ◦ C	Average Flow Rate m^3/hr	Average CH_4 %v/v	Average CO_2 %v/v	Average O_2 %v/v	Combustion efficiency (%)	Total CH_4 m^3	Total CH_4 kgs
2016					0		10					98.0	0	0