Trood Lane Landfill Site
Annual Review

Permit No. VP3231SU

(May 2009 – April 2010)

Signed: RG Butcher

B.T.Jenkins Ltd
Report to **The Environment Agency**
Report Number: 0003 March 2010

Contents Page No.

List Of Tables

List Of Figures

1. Summary

This report complies with the requirements set out in condition 4.2 of the PPC Permit, VP3231SU for Trood Lane Landfill Site, and covers the third year of operation (May 2009 – April 2010). It assesses environmental monitoring data, improvements and performance targets, topographical changes and any incidents.

The environmental monitoring data showed no indication of methanogenic activity within the site. No discharge from the settlement lagoon was noted in this period. Groundwater quality determinands were below the set trigger levels, except when influences external to the site impacted on quality.

2. Introduction

The environmental monitoring schedule was adopted in May 2007 following the issue of the PPC Permit in September 2006. Discussions between the Environment Agency (EA), Exeter Environmental Consulting Services (EECS), Steven Sherry, and B.T Jenkins Ltd. led to the issuing of a variation to the permit in April 2007 *(Ref. Variation Notice: MP3138UH)*, incorporating modifications to the monitoring schedule. The modified schedule is the subject of this report. Following the annual review in 2008, some modified trigger levels were agreed by the EA in February 2009 *(EA Letter 04.02.2009, ref. MR/MP3138UH). .*

3. Annual Monitoring Review

3.1 Monitoring Schedule

Environmental monitoring of the site has been conducted by EECS in accordance with Schedule 4: Emissions & Monitoring, Tables S4.1, S4.2, S4.3 and S4.4 of the PPC Permit. Detailed monitoring results have been produced within the specified timescales given in Schedule 5 of the permit, and are attached to this report *(see Appendix 1).*

3.2 Landfill Gas Monitoring

Methane, carbon dioxide and oxygen were monitored at MP1, MP2, MP4 and MP5, quarterly as detailed in Table S4.3 of the Permit. No limits are set for landfill gases at any of the boreholes. Carbon dioxide (CO_2) was detected at all boreholes, with values peaking at 6.4% v/v at MP4 in August 2009. The highest mean value of 4.3% v/v was noted at MP1. No methane (CH_4) was detected above the Limit of Detection (LOD) of 0.1% at any of the boreholes *(Table 1)*. Full results can be found in Appendix I.

Table 1. Carbon dioxide and Methane summary

		MP1	MP2	MP4	MP5
May 2009 – Apr 2010 mean values	**CO_2** **CH_4**	4.3 <0.1	1.3 <0.1	2.6 <0.1	2.4 <0.1
May 2009 – Apr 2010 maximum values	**CO_2** **CH_4**	4.9 <0.1	3.9 <0.1	6.4 <0.1	4.1 <0.1

All results are % v/v.

3.3 Point Source Emissions to Water

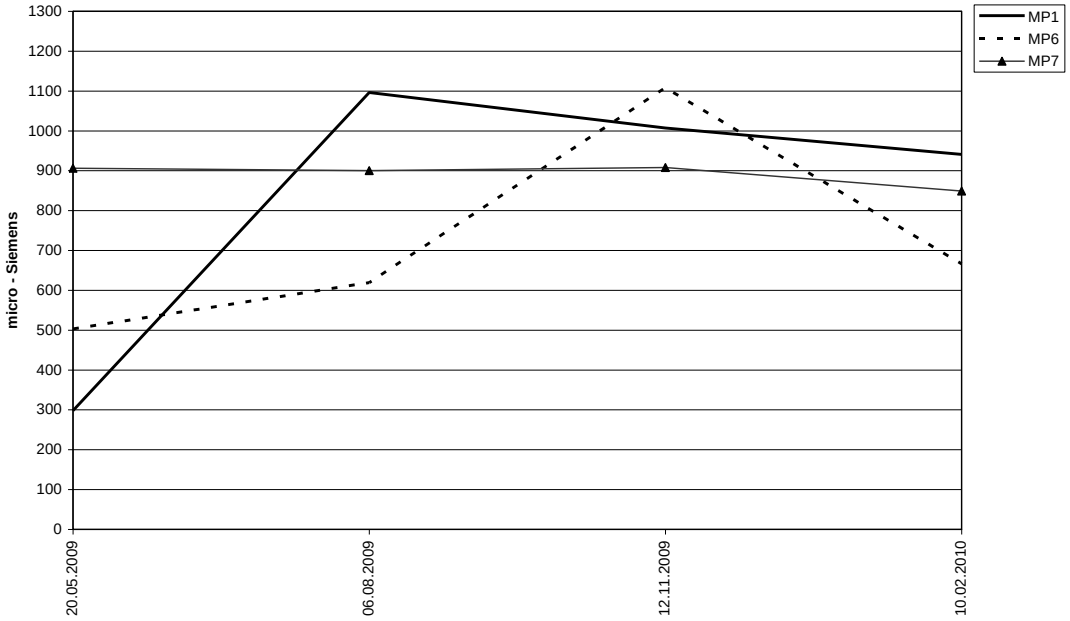
The lower silt lagoon discharges both site runoff and spring water, and has a limit of 50mg/l Suspended Solids (TSS). During this period, no discharge from the outfall pipe was observed.

3.4 Groundwater Monitoring

The groundwater monitoring schedule comprises quarterly monitoring at boreholes MP1 – MP7. MP1 is the up-gradient sample point and MP6 and MP7 are down-gradient points *(see Fig. 6)*. MP2 – MP5 are located within the waste. Parameters monitored are: pH, conductivity, chloride, ammonium as N, sulphate and water level on each visit, with Total Organic Nitrogen, Total Organic Carbon, Chemical Oxygen Demand and alkalinity measured bi-annually. Metals, including calcium, magnesium, potassium, sodium, cadmium, chromium, copper, iron, nickel, lead and zinc are measured annually. This differs slightly from the variation notice MP3231SU shown in Table S4.2 and S4.4, as MP1 is shown as an in-waste monitoring point, whereas it is up-gradient of the waste mass and thus has been monitored similarly to MP6 and MP7.

At boreholes MP6 and MP7, trigger levels were set for pH (6.5 – 8.5); for conductivity (1500μS/cm^{-1}); chloride (200mg/l); ammonium (0.39mg/l), and sulphate (150mg/l). Ammonium as Nitrogen and sulphate trigger levels were revised to 0.68mg/l and 444mg/l respectively, following the 2007 annual review and written agreement from the EA *(EA Letter 04.02.2009, ref. MR/MP3138UH).* The full results can be found in Appendix I.

Figure 1. Conductivity Analysis Results



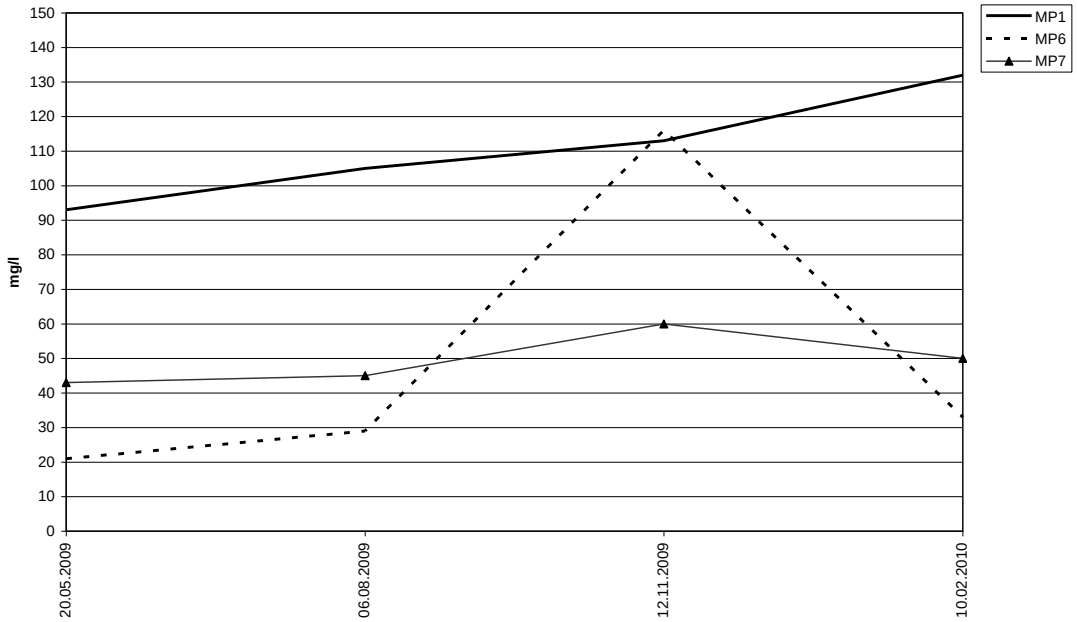
The upgradient borehole, MP1, showed higher conductivity results for 50% of the period and displayed the lowest value to date at this sample point in May 2009. Values at MP6 peaked in November 2009 with 1108μS/cm, while values at MP7 displayed the least variability, ranging from 849 – 908 μS/cm *(Fig. 1).* The set trigger level of 1500 μS/cm was not exceeded at either MP6 or MP7.

PH values remained within the trigger levels of 6.5 – 8.5 at both MP6 and MP7.

Chloride concentrations were highest at the up-gradient borehole (MP1) on all except one occasion, when MP6 displayed a slightly higher value in November 2009 *(Fig. 2).* The chloride curve for MP6 is very similar to the one for conductivity, suggesting a possible correlation at this sample point. MP7 again showed the least variability in values,

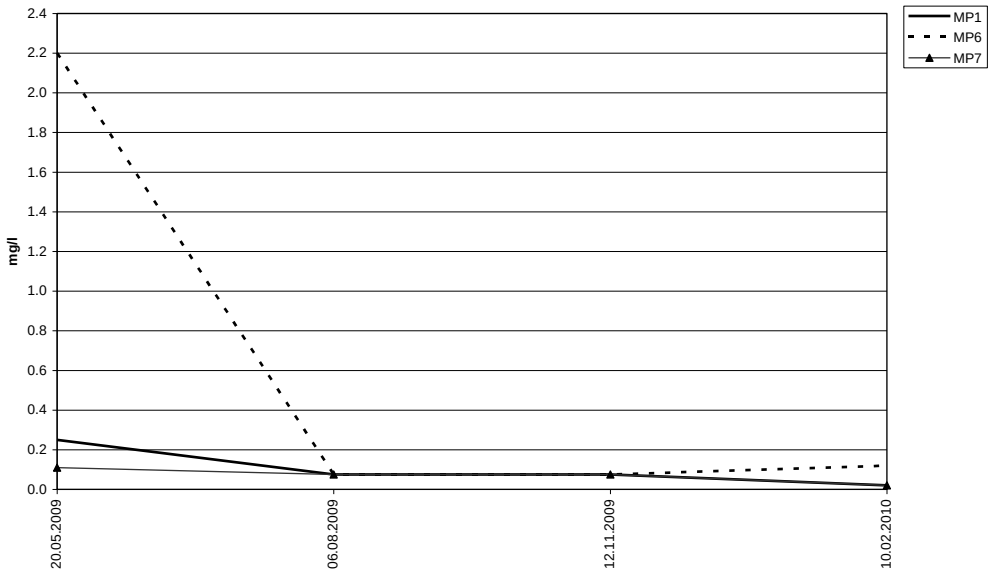
ranging from 43 - 60mg/l *(Fig. 2).* The chloride trigger level of 200mg/l was not exceeded at either MP6 or MP7.

Figure 2. Chloride Analysis Results



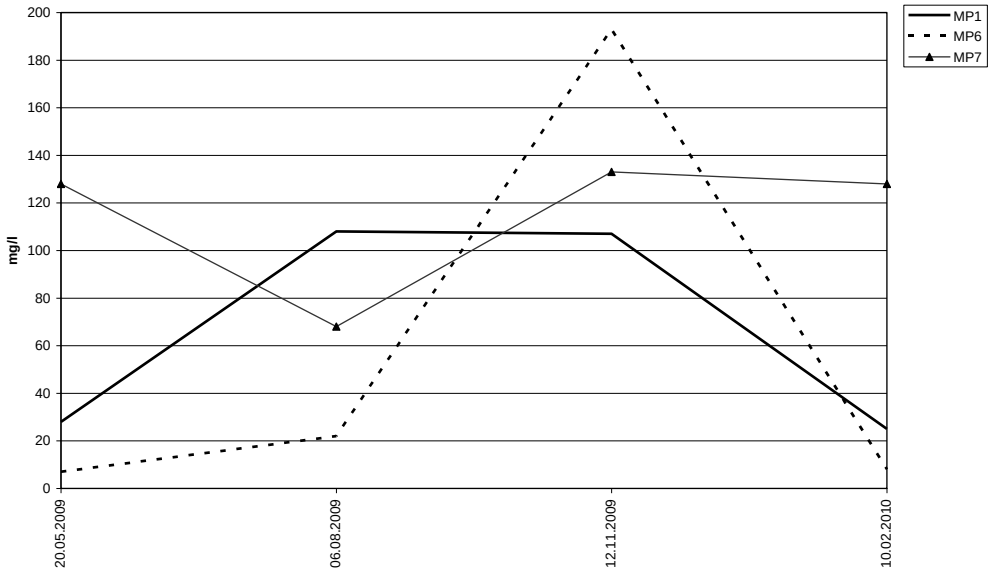
For the majority of the period, ammonium concentrations remained below the Limit of Detection (LOD) of 0.15mg/l at all three groundwater monitoring boreholes. However, when concentrations were above the LOD, MP6 continued to display the higher values and exceeded the trigger level of 0.68mg/l in May 2009 *(Fig. 3).* As noted in the previous year, it appears that this is a result of livestock activity around the borehole, as it was located adjacent to a cattle drinking trough, and not due to any impact from the landfill site. Following the removal of the drinking trough after the May 2009 visit, concentrations decreased to below the LOD for the next two visits *(Fig. 3).*

Figure 3. Ammonium as Nitrogen Analysis Results



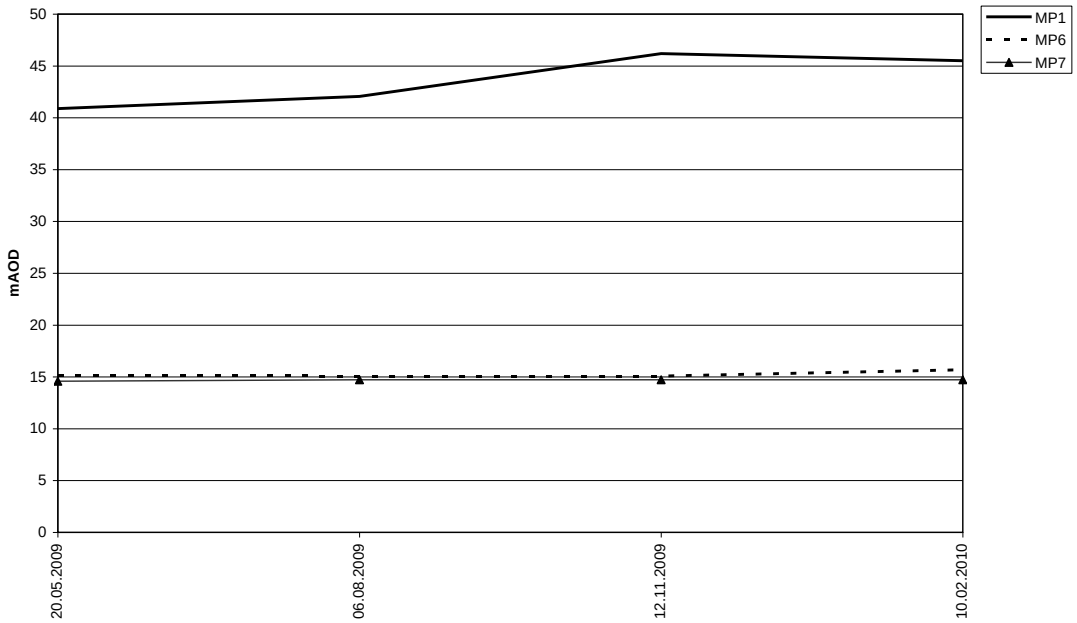
In this period, sulphate concentrations were variable at all three boreholes, with concentrations at MP1 ranging from 25 – 108mg/l, at MP6 from 7 – 193mg/l and at MP7 from 68 – 128mg/l. Thus MP6 displayed the highest concentrations in November 2009, while MP7 displayed the highest mean value. No trends in concentrations were identified, with each sample point showing the peak concentrations on different visits *(Fig. 4)*. The set trigger level was not exceeded at either MP6 or MP7.

Figure 4. Sulphate Analysis Results



As was noted in the previous review, groundwater levels changed little at the down-gradient boreholes (MP6 & MP7), but were more variable at MP1 (up-gradient) *(Fig. 5)*.

Figure 5. Groundwater Levels (mAOD)



Results for the bi-annual monitoring determinands showed that MP1 showed the highest COD, TOC and TON in August 2009; however in February 2010, MP1 displayed the highest TON, MP6 the highest TOC, and MP7 the highest COD *(See Appendix I, Table 2).* For the annual determinands, MP6 displayed the highest metal concentrations.

3.5 Monitoring Review Conclusions

The annual environmental monitoring review shows no indication of methanogenic activity within the site.

No sample material was available for analysis from the settlement lagoon outfall pipe, and therefore TSS measurements have not been conducted.

Groundwater quality results showed that only one of the trigger levels was exceeded on one occasion, and that this was likely to be due to influences unrelated to the landfill site

operations. This was resolved after the first visit of the period, and no trigger levels were exceeded thereafter.

4. Annual Improvement Targets

S1.3.1 Surface Water Management – Submitted on 31st Oct 2007

S1.3.2a Groundwater Monitoring – See Section 3 of this report

S1.3.2b Ditto

S1.3.2c Ditto

S1.3.3 Monitoring Boreholes – No new phases have commenced receiving fill, consequently no new boreholes have been installed.

S1.3.4 Stability – Material placement is routinely undertaken by means of Traxcavator and towed compactor to produce slopes not exceeding 1in3; final profiles have yet to be achieved. The topographical survey shows no indication of slippage or subsidence.

S1.3.5 Proposed Groundwater Drains – Yet to be agreed with E.A. as new phases have not commenced.

S1.3.6 EMS – Submitted with the permit application. Waste acceptance procedures detailed in appendix 5 QB2.1.8.

5. Annual Performance Parameters

Table 2. Annual Performance Parameters

	Potable Water Use (m^3)	Non potable water Use (m^3)	Energy (MW of electricity)
Predicted Consumption (in PPC Application)	**0**	**0**	**264.50**
Actual consumption[1] May 2009 – Apr 2010	**0**	**0**	**243.00**

Note 1. Energy consumption includes fuel used for vehicles on site, see attached document - EnergyTL.

6. Contamination and Decontamination Incidents

There have been no contamination or decontamination incidents in the past year (May 2009 – April 2010).

Table 3. Contamination and Decontamination Incidents

	Contamination	Decontamination	Details
Year			
May 2009 – Apr 2010	None	None	NA

7. Topographical Surveys and Assessment of Settlement

Details of the most recent topographical survey are shown in Appendix II. Remaining void space, change in void space and remaining capacity since the previous survey are shown in table 4. The annual topographical survey showed no significant signs of settlement.

Table 4. Landfill Void Space

Survey Date	Actual Void Space Volume (m^3)	Void Space Change from Previous Year (m^3)	Remaining Capacity (m^3)
07/01/2007 initial survey	620,000	N/A	620,000
01/02/2008 survey	620,000	2,922	617,078
01/02/2009 survey	620,000	7,431	609,647
01/02/2010 survey	620,000	12,677	596,970

8. Compliance Testing

All WAC Analysis Reports for materials received on site are are held on file in the B T Jenkins Ltd Head Office.

9. Conclusions

Continue introduction of new modern machinery to the site has managed to further reduce the percentage of material being sent to landfill and a greater variety of products being available for re-use.

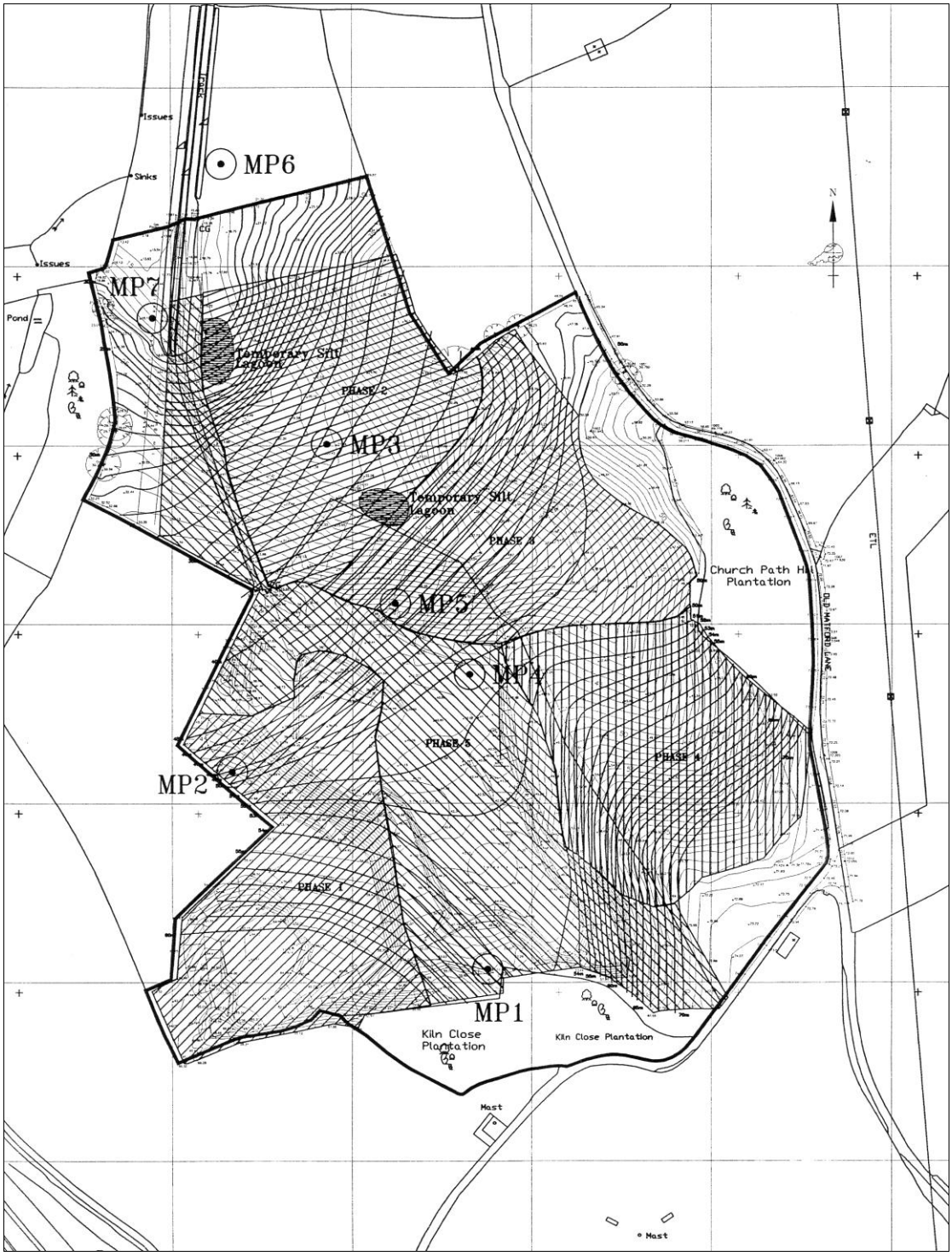
Areas that are designated and managed for Wildlife are continuing to become established and the newly planted Woodland areas are maturing well.

Continued attention to operational management has resulted in there being no incidents of contamination during the year.

10. References

Environment Agency, 2003	Hydrogeological Risk Assessments for Landfills
Environment Agency, 2002	Techniques for the Interpretation of Landfill Monitoring Data, R & D Technical Report P1-173/TR
Environment Agency, 2006	PPC Permit – Trood Lane Landfill Site - VP3231SU
Environment Agency, 2007	Variation notice MP3138UH for Permit Number VP3231SU
Environment Agency, 2009	Review of Monitoring and Improvement Conditions Letter Ref. MR/MP3138UH

Figure 6. **Site Plan**



Appendix I. Monitoring Results

Table 1. Gas Results

MP1					
Date	**CO_2**	**O_2**	**CH_4**	**LEL**	**DTW**
	% v/v	**% v/v**	**% v/v**	**% v/v**	**mAOD**
20.05.2009	4.6	17.1	<0.1	<0.1	40.89
06.08.2009	4.9	14.9	<0.1	<0.1	42.06
12.11.2009	2.9	17.2	<0.1	<0.1	46.19
10.02.2010	4.9	16.2	<0.1	<0.1	45.51

MP2					
20.05.2009	0.9	19.7	<0.1	<0.1	NW
06.08.2009	3.9	16.2	<0.1	<0.1	NW
12.11.2009	0.3	20.1	<0.1	<0.1	NW
10.02.2010	<0.1	20.7	<0.1	<0.1	NW

MP4					
20.05.2009	1.6	17.9	<0.1	<0.1	NW
06.08.2009	6.4	11.7	<0.1	<0.1	NW
12.11.2009	1.4	18.9	<0.1	<0.1	NW
10.02.2010	1.0	19.7	<0.1	<0.1	NW

MP5					
20.05.2009	3.1	16.7	<0.1	<0.1	NW
06.08.2009	4.1	17.0	<0.1	<0.1	NW
12.11.2009	No access due to modifications taking place.				
10.02.2010	<0.1	20.6	<0.1	<0.1	NW

Table 2. Water Quality Results

MP1	pH	Temperature	Conductivity	N	Cl-	SO4	BOD	COD	TOC	TON	Ca	Mg	K	Na
		oC	µS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	Mg/l
20.05.2009	6.79	11.0	298	0.25	93	28								
06.08.2009	6.40	14.0	1096	<0.15	105	108	<5	204	33.7	22.5				
12.11.2009	6.49	12.9	1007	<0.15	113	107								
10.02.2010	6.21	7.9	941	0.02	132	25	<4	<17	5	39.5	89	28	5.4	63
MP6														
20.05.2009	7.29	12.2	503	2.20	21	7								
06.08.2009	7.01	17.5	619	<0.15	29	22	6	142	29.7	<2				
12.11.2009	6.79	12.9	1108	<0.15	116	193								
10.02.2010	7.10	5.2	666	0.12	33	8	5	42	12.9	7.4	71	4.7	23	23
MP7														
20.05.2009	6.97	12.4	906	0.11	43	128								
06.08.2009	6.65	16.7	900	<0.15	45	68	<5	72	11.1	11				
12.11.2009	6.66	13.3	908	<0.15	60	133								
10.02.2010	6.85	6.7	849	0.02	50	128	<4	47	10.9	9.9	140	24	4	27

MP1	Fe	Mn	Cu	Zn	Pb	Cd	Cr	Ni
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
10.02.2010	13.3	9.64	3.58	36.2	<0.5	<0.4	<0.5	<1.5
MP6								
10.02.2010	115	17.2	11.2	84.2	0.79	<0.4	5.64	1.95
MP7								
10.02.2010	<9	14.1	<2.5	28.1	<0.5	<0.4	<0.5	<1.5

Lagoon	Tss
	mg/l
20.05.2009	No sample
06.08.2009	No sample
12.11.2009	No sample
10.02.2010	No sample

Appendix II. Topographical Survey *(04/2010)*