

Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Standard Landfill Site

Flintshire County Council Waste Management Services

Annual Monitoring Review 2015

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0987/1/002 - Environmental Monitoring Locations

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- Appendix 2:** Groundwater Level and Quality Summary Tables
- Appendix 3:** Leachate Level and Quality Summary Tables
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1.0 INTRODUCTION

1.1 Background

- 1.1.1 This report has been compiled in accordance with the Environmental Permit (previously Waste Management Licence) for Standard Landfill Site, Buckley, which requires an annual review of the monitoring data collected at the site. The data reviewed by this report was collected from the 1st of January to the 31st of December 2015.
- 1.1.2 This report records and discusses the monitoring data collected for landfill gas, groundwater, leachate, and surface water at the site.

1.2 Site Location and Surrounding Land-use

- 1.2.1 Standard Landfill Site is located approximately 1 km north-east of Buckley town centre, Flintshire, North Wales (NGR SJ 290 650). The site is accessed via the B5127 (Liverpool Road).
- 1.2.2 The site is bounded to the east by Burntwood Road where several residential properties have boundaries within 50m of the eastern extreme of the site. To the west of the site lies agricultural land, separated from the landfill boundary by a water course. The Spencer Industrial Estate, which comprises several small industrial units, is situated beyond the southern site boundary. The A55 dual carriageway runs adjacent to the northern boundary.
- 1.2.3 A Site of Special Scientific Interest (SSSI), namely The Buckley Claypits and Commons, is located close to the site. Standard Landfill is also surrounded by the Deeside and Buckley Newt Site Special Area of Conservation.

1.3 Site History and Development

- 1.3.1 Standard Landfill Site was developed in the void created by a former open cast coal mine extending to approximately 13.3 ha. The site was excavated to a depth of approximately 100 mAOD (metres Above Ordnance Datum), the site entrance being at 141 mAOD.
- 1.3.2 The site comprises six distinct cells. They were developed on the basis of containment of leachate by basal and side slope engineering with engineered clay, and subject to construction quality assurance.
- 1.3.3 Infilling at the site commenced in January 1990. Capping has been completed at site with a 1.0 mm welded flexible membrane cap. Restoration soils were installed over the plastic cap. The site restoration was completed in 2004.

2.0 ENVIRONMENTAL CONTEXT

2.1 Geology

2.1.1 The underlying geology of the site consists of a sequence of grey mudstone with sandstone bands, interbedded with coal. The coal bands are between 0.2 m and 1.5 m thick, while the mudstone / sandstone bands can be up to 26 m thick in places, but are more commonly found with thicknesses in the order of 10 m.

2.1.2 Bands of pure mudstone are also present at the site, indicating a heterogeneous nature to the mudstone/sandstone lithology. Shales are also noted as occurring in conjunction with the coal bands. In a few instances, bands of black mudstone are found at depths greater than 100 mAOD.

2.2 Hydrogeology

2.2.1 Groundwater flow at the site is predominantly through silt and mud bands. There is also potential groundwater flows at the site through adducts and old workings, present in the underlying coal measures.

2.3 Hydrology

2.3.1 The site is enclosed by streams to the west and north. There are several large bodies of surface water at the site. There is a pond situated approximately 500 m west of the site, in agricultural fields and there is also a large lake 500m south of the site.

3.0 LANDFILL GAS

3.1 Introduction

- 3.1.1 Routine landfill gas (LFG) monitoring was carried out on a weekly basis at 29 perimeter boreholes during the review period. Methane, carbon dioxide, oxygen, relative pressure and atmospheric pressure were all recorded during each monitoring visit.
- 3.1.2 Borehole locations are shown on Environmental Monitoring Locations drawing in Appendix 1.
- 3.1.3 A summary and time series graphs displaying methane and carbon dioxide concentrations and can be found in Appendix 2.

3.2 Perimeter Boreholes

Methane

- 3.2.1 Methane was only detected at BH22 during 2015 but remained below the trigger limit (1.0 %) with a maximum concentration of 0.7 %.
- 3.2.2 Higher methane concentration was observed in previous years at BH22 but has stabilised at a very low concentration during this review period.

Carbon Dioxide

- 3.2.3 Carbon dioxide was detected at all locations throughout the review period, but did not exceed trigger levels during 2015. Average carbon dioxide concentrations ranged from 1.4 % in BH5.2 and 2.1 % in BH6.0, BH7.0 and BH13.

3.3 Trace Gas Monitoring

- 3.3.1 Annual trace gas monitoring was carried out by Envirodat Air Quality and Environmental Consultants on 17th of March 2015 (see report included in Appendix 1). The sample point was described as Inlet Line to Utilisation Plant. The ambient temperature was 10 °C and the atmospheric pressure, 1001 mb.
- 3.3.2 Bulk landfill gas was sampled for methane, carbon dioxide and oxygen and was reported to contain:
- Methane 35 % v/v
 - Carbon dioxide 22 % v/v
 - Oxygen 0.3 % v/v

- 3.3.3 Laboratory analysis was undertaken for components identified in Table 1.1 of the Environment Agency document 'Guidance for Monitoring Trace Gas Components in Landfill Gas (LFTGN 04).
- 3.3.4 Of the 29 trace gases, 14 were detected. These were 1,2-dichloroethene, 1-pentene, benzene, carbon disulphide, chloroethene (vinyl chloride), dimethyl disulphide, dimethyl sulphide, ethanal (acetaldehyde), ethanethiol, hydrogen sulphide, methanol (formaldehyde), styrene, toluene and trichlorethene.
- 3.3.5 Of these, three exceeded their Environmental Assessment Levels (EALs¹). Those were carbon disulphide (short and long term EAL), hydrogen sulphide (short and long term EAL) and toluene (short and long term EAL).

3.4 Engine and Flare Emission Monitoring

- 3.4.1 Monitoring of the emissions from the flare and landfill gas engine was carried out by Envirodat Air Quality and Environmental Consultants on 17th of March 2015 (see report included in Appendix 1). Engine and flare exhausts were both sampled for oxides of nitrogen (as NO₂), carbon monoxide (CO), volatile organic compounds (VOCs as carbon), moisture and oxygen.
- 3.4.2 All substances remained below the respective Emission Limit Values at the flare and at the engine.

¹ Environment Agency, April 2010, H1 Annex F – Air Emissions, Table B5: Environmental Assessment Levels for Air (for the protection of human health).

4.0 GROUNDWATER

4.1 Introduction

4.1.1 During the review period groundwater levels were recorded on a monthly basis at groundwater monitoring boreholes GW1, GW2, GW3, GW4R, GW5, GW6 and GW7R.

4.1.2 Groundwater quality samples were taken on a quarterly basis and analysed for the range of determinants listed below:

Total organic carbon, alkalinity (as CaCO₃), ammoniacal nitrogen, chloride, chemical oxygen demand (COD), electrical conductivity, dissolved oxygen, pH, total oxidised nitrogen (TON), sulphate, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, zinc, total xylenes, toluene.

4.1.3 Samples collected in Q4 were analysed for a suite of metals and more extensive suite of hazardous substances.

4.1.4 An interim compliance limit of 6.4 mg/l has been agreed for ammoniacal nitrogen in groundwater locations.

4.2 Groundwater Levels

4.2.1 Groundwater level data was recorded on a monthly basis in metres below ground level (mBGL) and metres above Ordnance Datum (mAOD).

4.2.2 GW2 was mostly dry during 2015. Groundwater level remained stable in GW5, while GW1, GW3 and GW6 showed similar seasonal variation. Groundwater level within GW4 increased steadily over the year. GW7 did not show correlation to the trends at any of the other locations.

4.2.3 Time Series graphs of the groundwater levels, in metres below ground level (mBGL) and metres above Ordnance Datum (mAOD) are included in Appendix 3.

4.3 Groundwater Quality

4.3.1 In May 2013, a leachate outbreak was detected at the north west edge of the site, close to gas monitoring borehole 2.2. A faulty air pump allowed leachate to escape the site into a drainage ditch, which was overgrown. Elevated ammoniacal nitrogen, chloride, BOD, COD and heavy metal concentrations were subsequently detected within GW6. The air pump was replaced and pooled leachate within the drainage ditch was pumped back into the leachate collection system.

- 4.3.2 The ammoniacal nitrogen compliance limit of 6.4 mg/l was exceeded in GW6 throughout 2015. A summary of the groundwater quality within GW6 over the review period is displayed in Table 2 below:

Table 2: Groundwater Quality within GW6 during 2015

Parameter	Units	GW6			
Carbon		Q1	Q2	Q3	Q4
Organic Carbon, Total	mg/l	29.4	37.0	32.5	27.2
Inorganics		Q1	Q2	Q3	Q4
Alkalinity, Total as CaCO ₃	mg/l	90	130	140	35.7
Ammoniacal Nitrogen as N	mg/l	75.5	75	65.8	64.2
Chloride	mg/l	519	500	471	373
COD, unfiltered	mg/l	225	157	137	152
Conductivity @ 20 deg.C	mS/cm	2.82	2.91	2.78	2.83
Oxygen, dissolved	mg/l	3.39	5.15	5.09	4.39
pH	pH	6.43	5.88	5.72	5.65
Sulphate	mg/l	426	355	349	324
Total Oxidised Nitrogen as N	mg/l	>106	102	82.8	176
Filtered (Dissolved) Metals		Q1	Q2	Q3	Q4
Cadmium (diss.filt)	mg/l	0.00281	0.00238	0.00247	0.00325
Calcium (diss.filt)	mg/l	79.9	70.2	81.1	74.9
Chromium (diss.filt)	mg/l	0.00419	0.00176	0.00557	0.00521
Copper (diss.filt)	mg/l	0.0069	0.00811	0.00738	0.00693
Iron (diss.filt)	mg/l	0.0613	0.0563	0.0769	0.057
Lead (diss.filt)	mg/l	0.000229	0.000286	0.000106	0.000517
Magnesium (diss.filt)	mg/l	42.5	32.9	40.5	36.1
Manganese (diss.filt)	mg/l	8.3	8.8	8.44	8.26
Nickel (diss.filt)	mg/l	0.104	0.0791	0.0773	0.129
Potassium (diss.filt)	mg/l	64.3	56.2	58.3	58.5
Sodium (diss.filt)	mg/l	365	326	319	325
Zinc (diss.filt)	mg/l	0.0975	0.0662	0.0633	0.147
TPH Criteria Working Group (TPH CWG)		Q1	Q2	Q3	Q4
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011
Toluene	mg/l	<0.004	<0.004	<0.004	<0.004

- 4.3.3 Table 2 indicates that ammoniacal nitrogen concentration within GW6 peaked in the first and second quarters at 75.5 mg/l and 75.0 mg/l respectively and then decreased to 64.2 mg/l by Q4. Concentrations of chloride, COD, calcium, chromium, potassium and sodium also decreased between Q1 and Q4.
- 4.3.4 Ammoniacal nitrogen concentrations remained below the compliance limit of 6.4 mg/l in locations GW1, GW3, GW4, GW5 and GW7. Maximum concentrations at these locations were 1.12 mg/l, 2.01 mg/l, 0.41 mg/l, 5.61 mg/l and 1.12 mg/l respectively.
- 4.3.5 pH ranged between 6.01 and 7.75 at locations GW1, GW3, GW4, GW5 and GW7. pH in GW6 was lower, ranging between 5.65 and 6.43.

- 4.3.6 Chloride concentrations remained relatively low in GW1, GW3, GW4, GW5 and GW7, ranging between 10.6 mg/l and 77.6 mg/l. Chloride concentrations in GW6 ranged between 373 mg/l and 519 mg/l.
- 4.3.7 Concentrations of metals remained low in GW1, GW2, GW3, GW4, GW5 and GW7.
- 4.3.8 Cadmium, iron and lead concentrations were lowest and mostly undetected at GW1 and GW3. Concentrations were low at GW4, GW6 and GW7 during the review period. Iron concentration was highest at GW5 throughout 2015 with a maximum of 51.3 mg/l in the third quarter.
- 4.3.9 Magnesium, manganese and nickel concentrations were relatively low at all locations over the review period.
- 4.3.10 Potassium concentrations were notably higher in GW6 with a maximum of 64 mg/l in the first quarter. Concentrations at the remaining locations varied between 7.8 mg/l and 13.7 mg/l in GW7.
- 4.3.11 Sodium concentrations were notably higher in GW6 with a maximum of 365 mg/l in the first quarter. Concentrations at the remaining locations varied between 12.1 mg/l in GW5 and 80.8 mg/l in GW7.
- 4.3.12 No cyanide, mercury, mineral oil, xylenes, toluene, SVOCs or VOCs were detected in any of the groundwater locations with one exception at GW6. A low concentration of 0.00105 mg/l 1,1-Dichloropropene was detected at GW6. A trace concentration of the herbicide Mecoprop was also detected in GW6, 0.0027 mg/l.

5.0 LEACHATE

5.1 Introduction

- 5.1.1 Leachate levels at four leachate monitoring locations were recorded monthly. Samples from all chambers were collected and analysed quarterly.
- 5.1.2 Samples collected in Q4 were tested for a suite of metals and hazardous substances.
- 5.1.3 Well locations are shown on the Environmental Monitoring Location drawing in Appendix 1.

5.2 Leachate Levels

- 5.2.1 Leachate levels were recorded on a monthly basis. A time series graphs displaying leachate levels, in metres above cell base, can be found in Appendix 4.
- 5.2.2 All leachate levels remained relatively stable throughout the review period with no significant fluctuations at all locations, except LS6. LS6 showed a decreased in leachate level between March and April that was not visible in other wells. All leachate monitoring wells show leachate heads below 1.9 m.
- 5.2.3 Leachate is pumped from Standard Landfill to a holding tank. Leachate is then tankered to the leachate treatment plant at the nearby Brookhill Landfill Site.

5.3 Leachate Quality

- 5.3.1 Concentrations of ammoniacal nitrogen fluctuated throughout the review period. The highest concentration of ammoniacal nitrogen occurred in LC2 at 1530 mg/l.
- 5.3.2 COD concentrations fluctuated throughout the review period with no overriding trend observed, a similar result to 2014. The highest COD concentration was observed in LC2 where a concentration of 2490 mg/l was recorded in Q4.
- 5.3.3 pH remained relatively stable in all locations, ranging between 7.5 and 8.1.
- 5.3.4 Fourteen hazardous parameters were detected within the leachate as part of the annual suite, as detailed in Table 3 below.

Table 3: Hazardous Substances detected within the Leachate

Parameter	Unit	LC2	LC3	LC4	LC7
Semi-Volatile Organic Compounds (SVOCs)					
2,4-Dimethylphenol (aq)	mg/l	<0.004	0.00106	<0.001	<0.002
2-Methylphenol (aq)	mg/l	<0.004	0.00122	<0.001	<0.002
4-Methylphenol (aq)	mg/l	<0.004	0.00123	<0.001	<0.002
Volatile Organic Compounds (VOCs)					
1,2,4-Trimethylbenzene	mg/l	0.00219	<0.001	<0.001	0.00585
1,3,5-Trimethylbenzene	mg/l	0.00271	0.00118	<0.001	0.00181
4-iso-Propyltoluene	mg/l	0.00522	<0.001	<0.001	<0.001
Benzene	mg/l	0.00398	0.00281	0.00354	0.00345
Ethylbenzene	mg/l	<0.001	<0.001	<0.001	0.00371
m,p-Xylene	mg/l	0.00656	<0.001	0.00115	0.0145
Naphthalene	mg/l	0.0129	0.00422	0.0166	0.00605
o-Xylene	mg/l	0.00915	0.00537	0.00169	0.00557
Toluene	mg/l	0.00519	0.00214	<0.001	0.00241
Miscellaneous Organics					
Dibutyl tin	mg/l	<0.00015	<0.000005	<0.00003	0.000054
Mecoprop*	mg/l	0.0725	0.0545	0.0295	0.0355

6.0 SURFACE WATER

6.1 Introduction

6.1.1 Surface water samples are routinely taken from four locations; SW1, SW2, SW4 and SW5 which are shown on the Environmental Monitoring Locations drawing in Appendix 1.

6.1.2 Surface water samples are analysed on a quarterly basis for:

Alkalinity (as CaCO₃), ammoniacal nitrogen, biological oxygen demand (BOD), chemical oxygen demand (COD), cyanide, nitrate, nitrite, pH, total oxidised nitrogen (TON), arsenic, cadmium, copper, iron, lead, magnesium, mercury, nickel, potassium, sodium, zinc, total phenols and a detailed pesticides and herbicides suite.

6.1.3 In addition, samples are tested for a more extensive annual suite, comprising mineral oils, xylenes, toluene and hazardous substances suite of VOCs and SVOCs.

6.1.4 A results summary and time series graphs of the laboratory analysis of the surface water samples are presented in Appendix 5.

6.2 Surface Water Quality

6.2.1 Ammoniacal nitrogen concentrations in SW1, SW2 and SW5 generally remained low, with maximum concentrations of 0.6 mg/l, 0.4 mg/l and <0.2 mg/l respectively. A maximum concentration of 19 mg/l was detected at SW4 in Q2 but reduced to 0.27 mg/l by Q3.

6.2.2 COD concentration was highest in all locations during Q2 when an elevated peak was detected in SW1, SW2, SW4 and SW5 at 7000 mg/l, 48.1 mg/l, 2860 mg/l and 108 mg/l respectively.

6.2.3 pH in the surface water was stable and ranged between 7.2 (SW1) and 8.1 (SW5).

6.2.4 Three hazardous substances were detected in the annual suite in Q4. Mineral oils were detected at a concentration of 0.916 mg/l in SW1, the VOC carbon disulphide at a concentration of 0.00489 mg/l in SW1, and the herbicide Dicamba at a concentration of 0.00005 mg/l in SW5.

7.0 CONCLUSIONS

7.1 Landfill gas

- 7.1.1 Methane was only detected at BH22 during 2015 but remained below the trigger limit (1.0 %) with a maximum concentration of 0.7 %.
- 7.1.2 Carbon dioxide was detected at all locations throughout the review period, but did not exceed trigger levels during 2015.

7.2 Groundwater

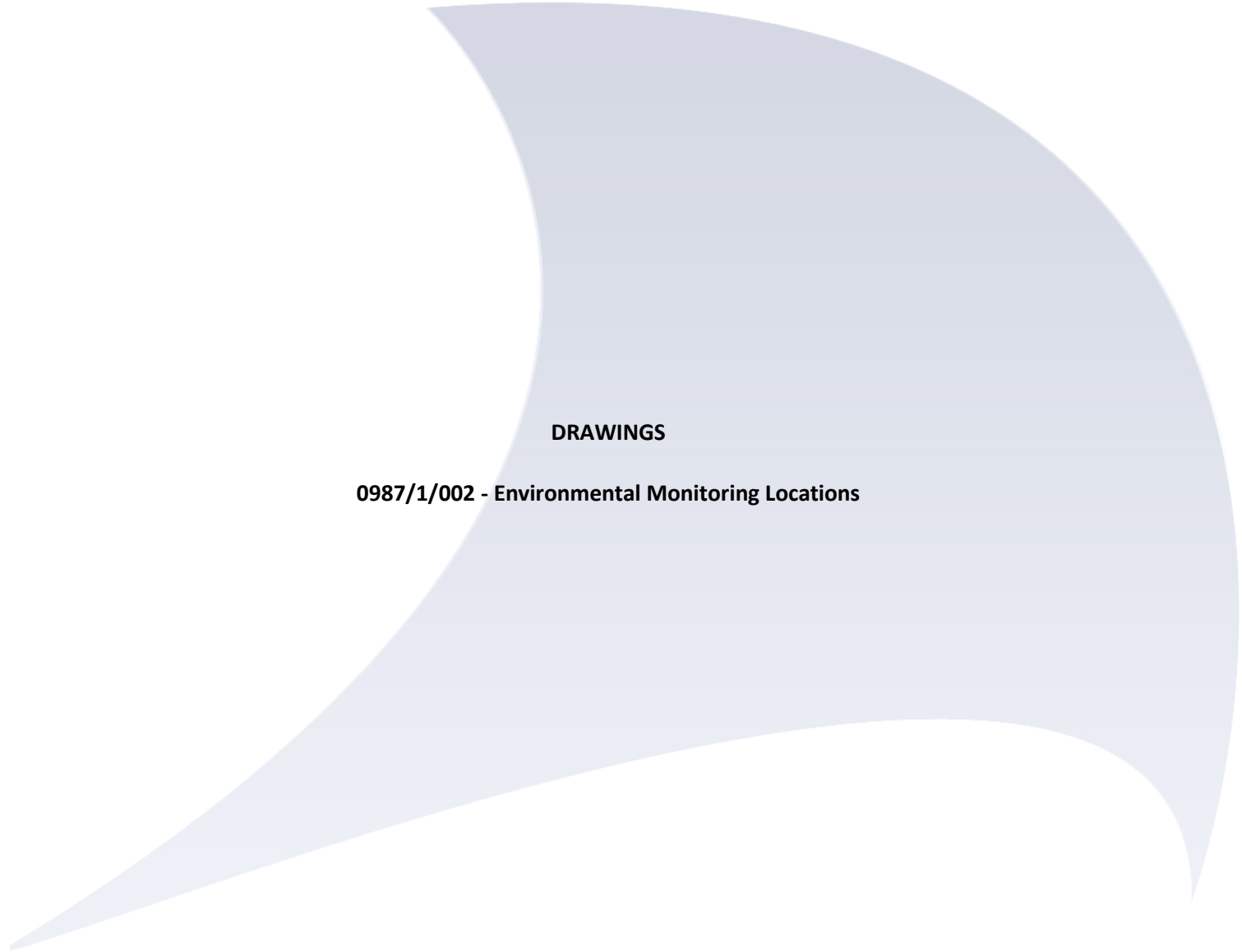
- 7.2.1 GW2 was mostly dry during 2015. Groundwater level remained stable in GW5, while GW1, GW3 and GW6 showed similar seasonal variation. Groundwater level within GW4 increased steadily over the year. GW7 did not show correlation to the trends at any of the other locations.
- 7.2.2 GW6 continues to display the highest concentrations of most parameters potentially due to the residual impact of the leachate outbreak close to this borehole which was detected in May 2013. Key leachate indicator parameters have however continued to decrease in concentration over 2015.
- 7.2.3 In a similar result to 2014, concentrations of chloride, iron, magnesium, manganese, nickel, potassium and sodium were detected in GW6 at concentrations considerably higher than those within the other groundwater locations during this review period.
- 7.2.4 No cyanide, mercury, mineral oil, xylenes, toluene, SVOCs or VOCs were detected in any of the groundwater locations with the exception of GW6. Low concentrations of 1,1-Dichloropropene and Mecoprop were detected at GW6.

7.3 Leachate

- 7.3.1 Leachate levels remained low for the duration of the review period. All leachate heads remained below 1.9 m.
- 7.3.2 Concentrations of ammoniacal nitrogen and COD fluctuated throughout the review period. pH remained relatively stable in all locations.
- 7.3.3 Fourteen hazardous parameters were detected within the leachate as part of the annual suite, as detailed in Table 3.

7.4 Surface Water

- 7.4.1 Ammoniacal nitrogen concentrations in SW1, SW2 and SW5 generally remained low, while a single peak was detected at SW4 in Q2. COD concentration was highest in all locations during Q2.
- 7.4.2 Three hazardous substances were detected in the annual suite in Q4. Mineral oils and the VOC carbon disulphide were detected in SW1, and the herbicide Dicamba was detected in SW5.



DRAWINGS

0987/1/002 - Environmental Monitoring Locations

Notes

-  Groundwater Borehole
-  Side Slope Riser
-  Leachate Chamber
-  Surface Water Monitoring Point
-  Cross Section
-  Ground Water Contours

Notes

Monitoring Point Height (mOD)
Given Below Identity Number

Ground Water Contour Based on
2005 Levels



Bold Business Centre, Bold Lane,
Sutton, St Helens WA9 4TX

Client



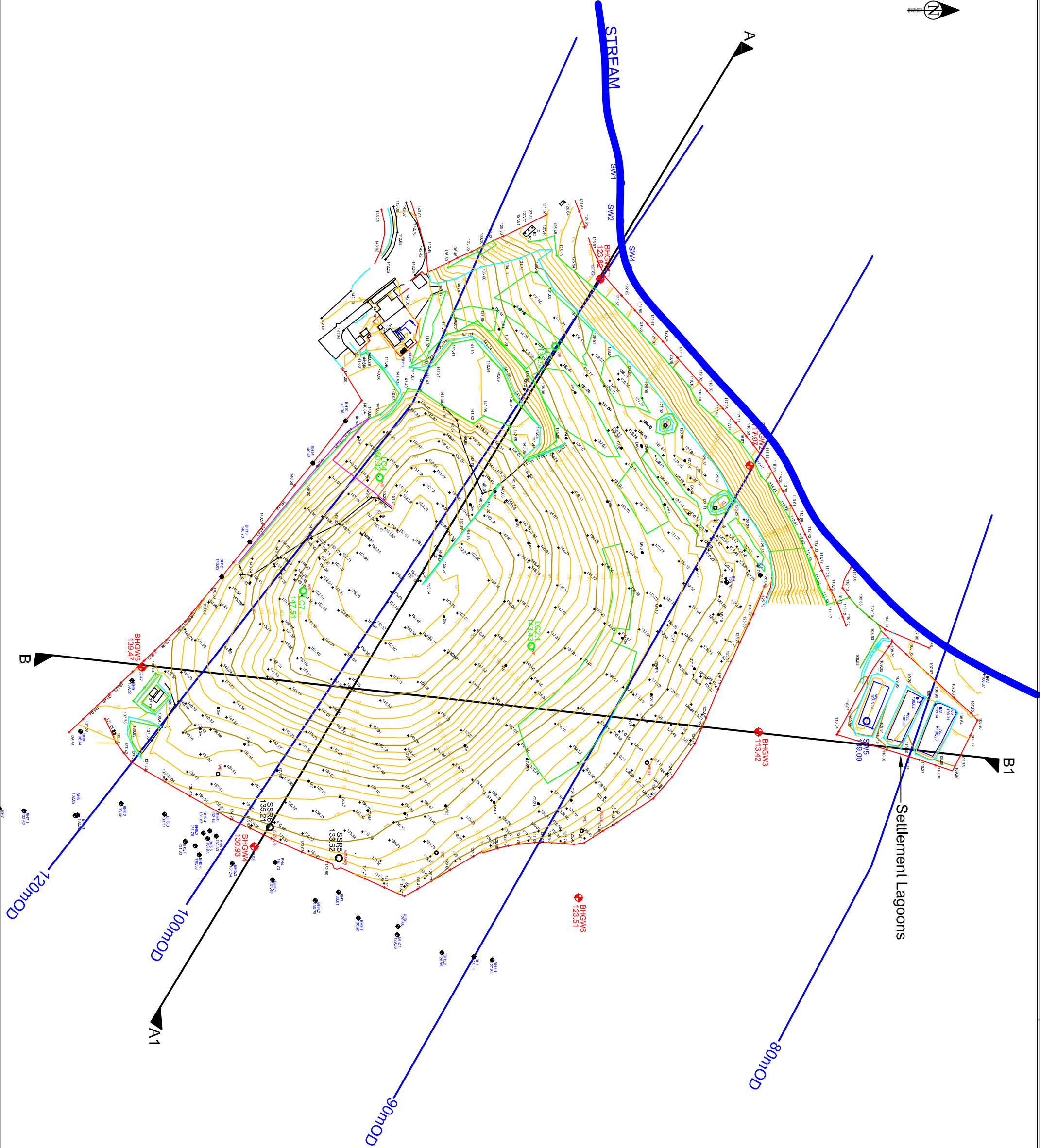
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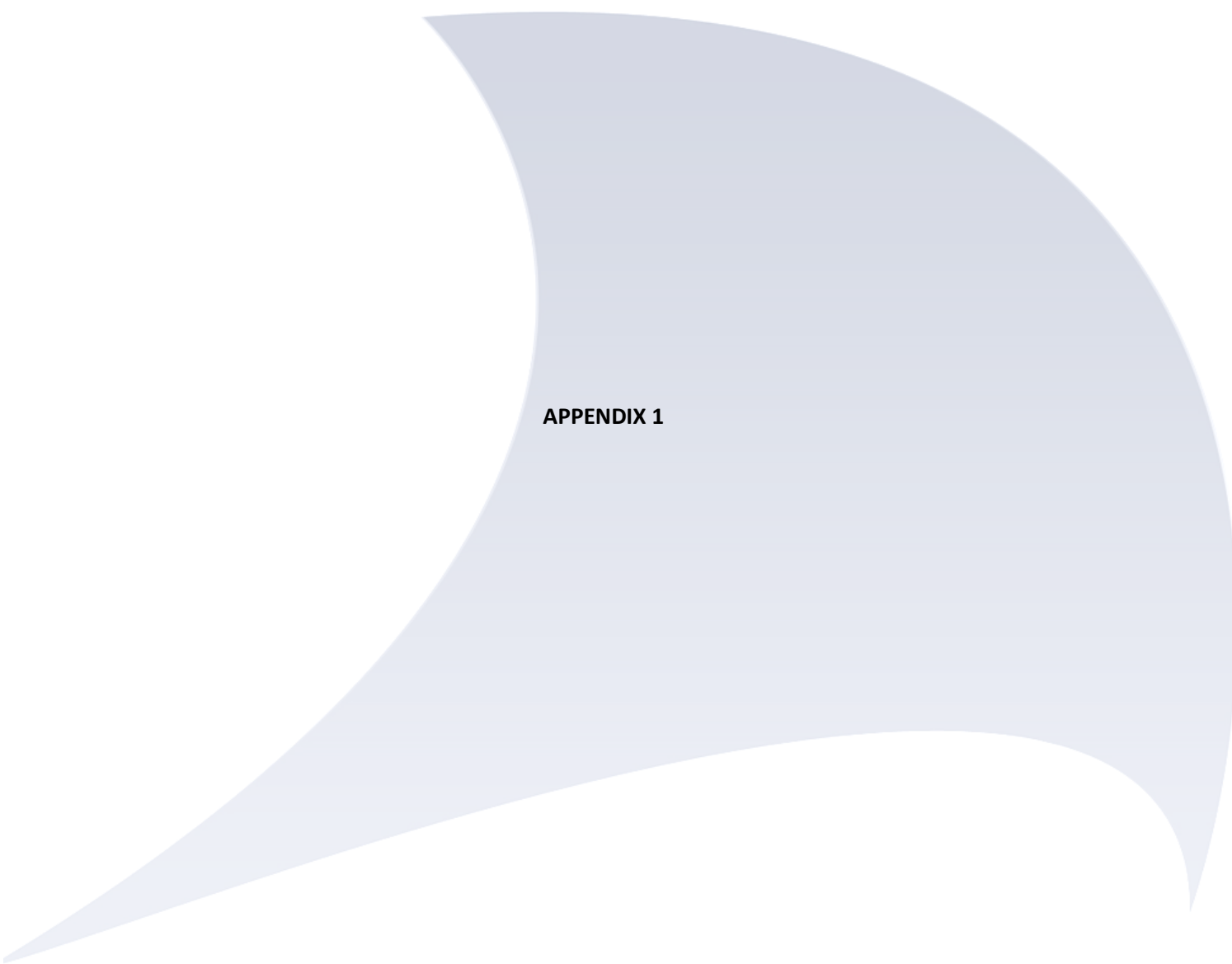
**Standard Landfill
Buckley**

Title

**Environmental Monitoring
Locations**

Scale	1:1500	@ A2
Drawing No.	0987/1/002	
Rev	Date	Description
File	Standard Landfill3863a-TCL Revision001.dwg	
Date	03/09	Engineer CB
Drawn	SH	Checked JB





APPENDIX 1

APPENDIX 1 – LANDFILL GAS

Table 1: Perimeter Landfill Gas

Location		CH4 (%v/v)	Trigger (%v/v)	CO2 (%v/v)	Trigger (%v/v)	Location		CH4 (%v/v)	Trigger (%v/v)	CO2 (%v/v)	Trigger (%v/v)
BH 1	Min	0.0	1.0	1.0	5.37	BH 4.1	Min	0.0	1.0	1.0	7.12
	Max	0.0		3.2			Max	0.0		2.6	
	Ave	0.0		1.9			Ave	0.0		1.7	
	Count	52		52			Count	52		52	
BH 1.1	Min	0.0	1.0	0.9	5.35	BH 4.2	Min	0.0	1.0	0.5	8.59
	Max	0.0		3.2			Max	0.0		2.5	
	Ave	0.0		1.6			Ave	0.0		1.7	
	Count	52		52			Count	52		52	
BH 2.0	Min	0.0	1.0	0.8	7.05	BH 5.0	Min	0.0	1.0	0.9	19.42
	Max	0.0		3.2			Max	0.0		3.0	
	Ave	0.0		1.7			Ave	0.0		1.8	
	Count	52		52			Count	52		52	
BH 2.1	Min	0.0	1.0	0.9	7.57	BH 5.1	Min	0.0	1.0	0.6	5.8
	Max	0.0		2.2			Max	0.0		2.6	
	Ave	0.0		1.5			Ave	0.0		1.6	
	Count	52		52			Count	52		52	
BH 2.2	Min	0.0	1.0	0.9	5.82	BH 5.2	Min	0.0	1.0	0.9	9.64
	Max	0.0		3.2			Max	0.0		2.3	
	Ave	0.0		1.7			Ave	0.0		1.4	
	Count	52		52			Count	52		52	
BH 3.0	Min	0.0	1.0	0.9	6.7	BH 5.3	Min	0.0	1.0	1.0	6
	Max	0.0		3.3			Max	0.0		2.9	
	Ave	0.0		1.9			Ave	0.0		1.8	
	Count	52		52			Count	52		52	
BH 3.1	Min	0.0	1.0	1.0	7.76	BH 5.4	Min	0.0	1.0	0.9	16.03
	Max	0.0		3.5			Max	0.0		2.8	
	Ave	0.0		1.7			Ave	0.0		1.7	
	Count	52		52			Count	52		52	
BH 4.0	Min	0.0	1.0	0.9	10.65	BH 5.5	Min	0.0	1.0	1.0	17.06
	Max	0.0		2.6			Max	0.0		2.6	
	Ave	0.0		1.6			Ave	0.0		1.7	
	Count	52		52			Count	52		52	

APPENDIX 1 – LANDFILL GAS

Location		CH4 (%v/v)	Trigger (%v/v)	CO2 (%v/v)	Trigger (%v/v)	Location		CH4 (%v/v)	Trigger (%v/v)	CO2 (%v/v)	Trigger (%v/v)
BH 5.7	Min	0.0	1.0	1.3	7.07	BH 12	Min	0.0	10	1.0	6.48
	Max	0.0		2.6			Max	0.0		2.3	
	Ave	0.0		2.0			Ave	0.0		1.5	
	Count	52		52			Count	52		52	
BH 6.0	Min	0.0	1.0	1.1	8.92	BH 13	Min	0.0	10	1.0	5.2
	Max	0.0		3.5			Max	0.0		2.6	
	Ave	0.0		2.1			Ave	0.0		2.1	
	Count	52		52			Count	52		52	
BH 6.1	Min	0.0	1.0	0.8	3.72	BH 15	Min	0.0	1	1.0	8.3
	Max	0.0		2.6			Max	0.0		4.0	
	Ave	0.0		1.8			Ave	0.0		1.9	
	Count	52		52			Count	52		52	
BH 6.2	Min	0.0	1.0	0.9	6.12	BH 16	Min	0.0	1	1.0	3
	Max	0.0		2.8			Max	0.0		2.8	
	Ave	0.0		1.8			Ave	0.0		1.8	
	Count	52		52			Count	52		52	
BH 6.3	Min	0.0	1.0	1.0	8.24	BH 22	Min	0.1	1	1.1	3.1
	Max	0.0		2.6			Max	0.7		2.6	
	Ave	0.0		1.8			Ave	0.4		1.8	
	Count	52		52			Count	52		52	
BH 7.0	Min	0.0	1.0	1.1	6.2						
	Max	0.0		3.2							
	Ave	0.0		2.1							
	Count	52		52							
BH 7.1	Min	0.0	1.0	0.9	5.49						
	Max	0.0		3.0							
	Ave	0.0		1.8							
	Count	52		52							
BH 9.0	Min	0.0	1.0	1.0	10.72						
	Max	0.0		3.6							
	Ave	0.0		2.0							
	Count	52		52							



4251

ANALYSIS OF THE TRACE LANDFILL GAS

AT

Standard Landfill Site
Spencers Industrial Estate
Buckley
Flintshire
CH7 3LY

Commissioned by: Mr Phil Mulhall

Of

Flintshire County Council
Alltami Depot
Mold Road - Alltami
Flintshire
CH7 6LG

Date of Survey:

17th March 2015

Compiled By:

Yu Shen
Project Manager

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Mcerts Level II (TE1, 2, 3 & 4)

Signed:



Dated: 2nd April 2015

CONTENTS

- 1.** INTRODUCTION
- 2.** PLANT DESCRIPTION
- 3.** SAMPLING PROCEDURES
- 4.** RESULTS
- 5.** DISCUSSION & CONCLUSION

APPENDICES:

APPENDIX A: Site Information & Preliminary Gas Measurements
APPENDIX B: Trace Gas Results
APPENDIX C: Historical Trace Gas Chart

1. INTRODUCTION

- 1.1 EnviroDat Limited was commissioned by Mr Phil Mulhall, on behalf of Flintshire County Council, to measure the trace gas components from landfill gas located at Standard Landfill Site. Sampling was performed on the 17th March 2015.
- 1.2 The sampling was conducted in response to PPC Permit requirements (Permit No. 37073). Monitoring was conducted with reference to the Environment Agency document 'Guidance for Monitoring Trace Components in Landfill Gas' (LFTGN 04).

2. PLANT DESCRIPTION

- 2.1 Landfill gas is currently utilised by CHP plant. Samples of the fuel gas were taken from a feed system for trace gas analysis after the gas booster.

3. SAMPLING PROCEDURES

- 3.1 Trace gas sampling was performed from the fuel gas inlet, with analysis for components identified in Table 1.1 of the EA LFTGN04 guidance note. General site information is presented in Appendix A.
- 3.2 Mixed bed, automated thermal desorption (ATD) tubes were used for sampling of the priority volatile organic species prior to analysis by gas chromatography with mass spectrometry (GC/MS), in accordance with EA recommendations and documented EnviroDat protocol, SPTGN04. The analytical component of the work was conducted at SAL Ltd, Manchester.

- 3.3 The LFTGN04 designated 'priority' carbonyl components (i.e. methanal and ethanal) were sampled onto dinitrophenylhydrazine (DNPH) impregnated, silica gel sorbent tubes prior to analysis by high performance liquid chromatography (HPLC) incorporating an ultraviolet (UV) detection system, in accordance with EA recommendations and SPTGN04. The results are presented in Appendix B. The analytical component of the work was conducted at SAL Ltd, Manchester.
- 3.4 Arsenic was sampled onto an activated charcoal sorbent tube prior to analysis by inductively coupled plasma/optical emission spectrometry (ICP/OES), in accordance with EA recommendations and SPTGN04. The results are presented in Appendix B. The analytical component of the work was conducted at SAL Ltd, Manchester.
- 3.5 Hydrogen sulphide was sampled into a Tedlar bag with analysis by GC/MS (by SAL Ltd) in accordance with SPTGN04. The results are presented in Appendix B.

4. RESULTS

- 4.1 Field measurements of the 'bulk gases' are given in Appendix A.
- 4.2 Measured concentrations of the EA 'priority' trace components for the landfill are also given in Appendix B.

5. DISCUSSION AND CONCLUSION

- 5.1 The aim of the survey was to measure trace components from the landfill gas at Standard Landfill Site.
- 5.2 The levels of trace components within the landfill gas are of a range and magnitude not dissimilar to what would be expected and can be regarded as comparable with biogenic gas of this nature from other sources. Appendix C shows the variation of trace gas parameters over time.

APPENDIX A

Site Information & Preliminary Gas Measurements

TABLE A: Site Information & Preliminary Gas Measurements

Sample Position Details			
Date	17/03/2015	Site	Standard Landfill Site
Ambient Temperature	8.5°C	Atmospheric Pressure	1001mbar
Monitoring Organisation (s)	EnviroDat Ltd	Analytical Laboratory	SAL Ltd
Location of Sampling Point	Inlet Line to Utilisation Plant	Area of Influence of collection system sampled	All capped areas of the site
Type of Sampling Point	Valve	Temperature of gas	10°C, at sample flow meter
Vacuum on Sampling	None, Positive pressure	Type of waste	Domestic, Industrial, Commercial & Hazardous
		Age of Waste	-
Status of Gas System	Fully Operational, Steady State	Other	-
Parameter	Concentration	Units	Comments
Methane*	35	%	-
Carbon Dioxide*	22	%	-
Oxygen*	0.3	%	-
Nitrogen*	42.7	%	Assumed to be balance of gas
Hydrogen Sulphide*	-	ppmv	Not required
Carbon Monoxide*	-	ppmv	

Notes: * Raw result obtained from client.

APPENDIX B

Trace Gas Results

TABLE B: Trace Gas Results

Trace Gases - Test 1							
	Test Duration	Flow Rate	Flowmeter	Volume	Ambient T	Barometric P	Volume
	(min)	(ml/min)	CAL Factor	(l as sampled)	(°C)	(kPa)	(l @ STP)
VOC	5	50	0.9764	0.2441	10	100.1	0.23
Aldehydes	15	200	0.9727	3	10	100.1	2.86
Arsenic	64	200	1.0148	12.8	10	100.1	12.20

Compound	Mass of TG (ng)	LoD of TG (ng)	Concentration	Units	Analysis Notes (See below)	Analysis UKAS Accredited (Y/N)
1, 1 - dichloroethane		10	< 43	µg/m3	-	Y
1, 2 - dichloroethane		10	< 43	µg/m3	-	N
1, 1 - dichloroethene		10	< 43	µg/m3	-	Y
1, 2 - dichloroethene	170	30	731	µg/m3	-	Y
1, 3 - butadiene		10	< 43	µg/m3	-	Y
1 - butanethiol		10	< 43	µg/m3	-	Y
1 - pentene	100	10	430	µg/m3	-	Y
1 - propanethiol		10	< 43	µg/m3	-	Y
2 - butoxyl ethanol		10	< 43	µg/m3	-	N
Arsenic (as As)		1000	< 82	µg/m3	-	Y
Benzene	490	10	2106	µg/m3	-	Y
Butyric acid		10	< 43	µg/m3	-	N
Carbon disulphide ^(a)	590	10	2536	µg/m3	-	N
Chloroethane		30	< 129	µg/m3	-	N
Chloroethene (vinyl chloride)	160	10	688	µg/m3	-	Y
Dimethyl disulphide	22	10	95	µg/m3	-	N
Dimethyl sulphide	51	10	219	µg/m3	-	Y
Ethanal (acetaldehyde)	200	100	70	µg/m3	-	N
Ethanethiol	270	10	1161	µg/m3	-	N
Ethyl butyrate		25	< 107	µg/m3	-	N
Furan (1,4-epoxy-1,3 butadiene)		10	< 43	µg/m3	-	N
Hydrogen sulphide (ppm)*	13	10	19732	µg/m3	-	N
Methanal (formaldehyde) ^(a)	200	100	70	µg/m3	-	N
Methanethiol		30	< 129	µg/m3	-	N
Styrene	44	10	189	µg/m3	-	N
Tetrachloromethane		10	< 43	µg/m3	-	Y
Toluene ^(b)	2100	10	9027	µg/m3	-	N
Trichloroethene	20	10	86	µg/m3	-	Y

*H2S value is equivalent to 13 ppm

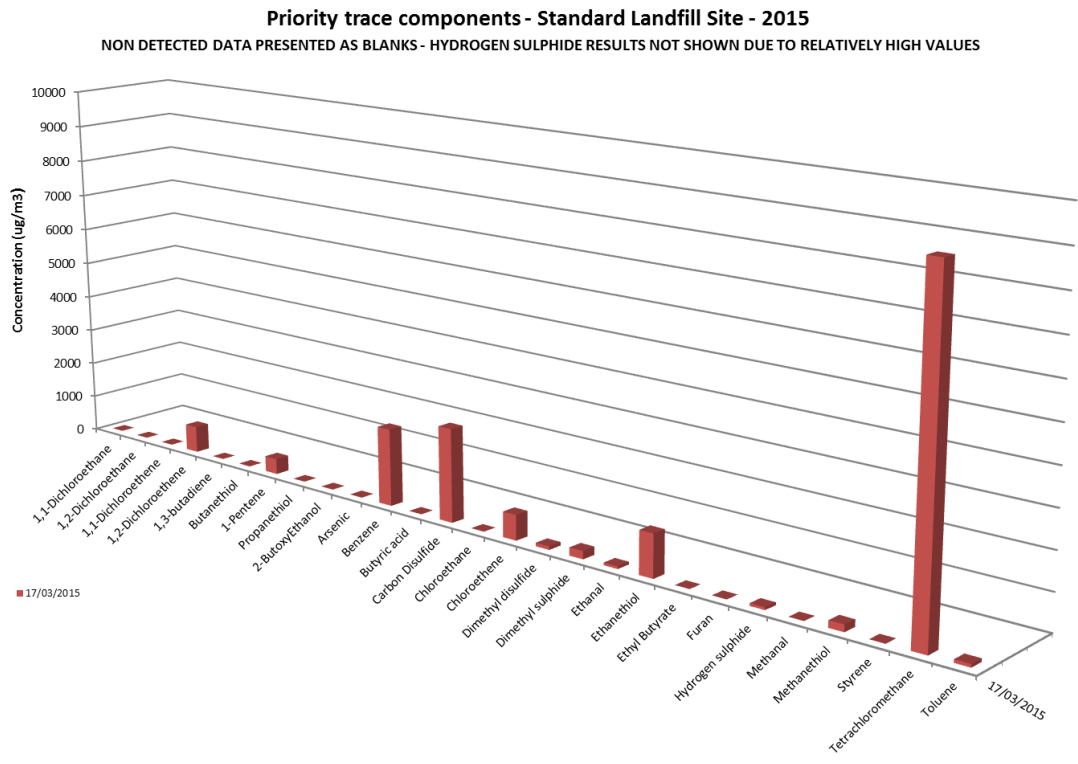
(a) – Results have been blank corrected
(b) – Results should be viewed with caution due to being outside of the instrument calibration range

Reference to UKAS (final column) relates to the accreditation status of the analysis only, sampling is covered under EnviroDat UKAS Accreditation scope.

APPENDIX C

Historical Trace Gas Chart

TABLE C: Historical Trace Gas Chart



**Report for the Periodic Monitoring of Emissions to Air from the Landfill
Gas Engine and Flare Stack Located at Standard Landfill Site, Buckley.**

Part 1: Executive Summary

Permit Number: 37073

Operator: Flintshire County Council

Installation: Standard Landfill Site (Engine & Flare)



4251

Monitoring dates: 17th March 2015

Job Number: **R15099**

Version: 1

Address: **Flintshire County Council**

Alltami Depot

Mold Road - Alltami

Flintshire, CH7 6LG

Monitoring Organisation: **EnviroDat Ltd**

Address: Science & Technology Centre

Earley Gate

Whiteknights Road

Reading RG6 6BZ

Date of Report: 2nd April 2015

Report Approved By: Yu Shen

MCERTS Registration Number: MM 06 727 (Level II, TE1, 2, 3 & 4)

Function: Project Manager (Team Leader)

Signed:

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PART 1: EXECUTIVE SUMMARY

1.1 Monitoring Objectives

Flintshire County Council operates a landfill gas engine and a flare stack at its facility located at Standard Landfill site. This combustion plant has the potential to release pollution to the atmosphere. As a result of this, the site is subject to authorisation under the Environmental Permitting Regulations and is regulated by the Environment Agency.

Methane is produced as a by-product of the decomposition of waste that is buried, and is collected and piped to flare stack for destruction.

EnviroDat Limited was requested to undertake a monitoring campaign on the engine and flare stacks. This work forms part of the annual compliance test. The pollutants monitored within the engine and flare emissions, as required under permit 37073 are summarised below:

Substances to be monitored	Emission Point Identification		
	Engine		Flare Stack
Oxides of Nitrogen (as NO ₂)	✓		✓
Carbon Monoxide	✓		✓
Oxygen (for correction)	✓		✓
Volatile Organic Compounds (VOCs)	✓		✓
Moisture (for correction)	✓		✓
Special requirements	None requested		

1.2 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Estimate of Uncertainty (2σ at 95% confidence)	Units	Reference Conditions	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method (see note below)	Operating Status
Engine	Oxides of Nitrogen (as NO ₂)	650	278	±18	mg(N)m ⁻³	101.3kPa, 273K, dry gas, 5% Oxygen	17/03/2015	12:30-13:30	BS EN 14792	A	At 65% MCR
	Carbon Monoxide	1500	628	±42	mg(N)m ⁻³				BS EN 15058	A	
	Volatile Organic Compounds (VOCs as carbon)	1750	1435	±51	mg(N)m ⁻³				BS EN 12619	A	
	Moisture	-	12.0	n/a	%	101.3kPa, 273K, dry gas		12:30-13:30	BS EN 14790	A	
	Oxygen	-	6.15	±0.37	%			12:30-13:30	BS EN 14789	A	

NOTE:

- A. EnviroDat Ltd MCerts/UKAS Accredited for sampling and analysis.
- B. EnviroDat Ltd MCerts/UKAS Accredited for sampling only, UKAS Accredited analysis conducted by sub-contract laboratory.
- C. EnviroDat Ltd UKAS Accredited for sampling only (further clarification is given in section 1.4). Analysis of this component is not UKAS Accredited.
- D. The method for sampling and analysis is not UKAS or MCerts Accredited, method follows documented in-house procedure (further clarification is given in section 1.4).

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Estimate of Uncertainty (2σ at 95% confidence)	Units	Reference Conditions	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method (see note below)	Operating Status
Flare	Oxides of Nitrogen (as NO ₂)	150	43.6	±3.1	mg(N)m ³	101.3kPa, 273K, dry gas, 3% Oxygen	17/03/2015	12:07-13:07	BS EN 14792	A	At 50% MCR
	Carbon Monoxide	50	49.7	±3.6	mg(N)m ³				BS EN 15058	A	
	Volatile Organic Compounds (VOCs as carbon)	10	0.01	±0.3	mg(N)m ³				BS EN 12619	A	
	Moisture	-	10.1	n/a	%	101.3kPa, 273K, dry gas		12:02-13:02	BS EN 14790	A	
	Oxygen	-	9.67	±0.49	%			12:07-13:07	BS EN 14789	A	

NOTE:

- A. EnviroDat Ltd MCerts/UKAS Accredited for sampling and analysis.
- B. EnviroDat Ltd MCerts/UKAS Accredited for sampling only, UKAS Accredited analysis conducted by sub-contract laboratory.
- C. EnviroDat Ltd UKAS Accredited for sampling only (further clarification is given in section 1.4). Analysis of this component is not UKAS Accredited.
- D. The method for sampling and analysis is not UKAS or MCerts Accredited, method follows documented in-house procedure (further clarification is given in section 1.4).

1.3 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results			
								Substance	CEMS Results	Periodic Monitoring Results	Units
Engine	17/03/2015	When required	N/A	Landfill Gas	N/A	None	650kWe Output @ 1000kWe unit	N/A	N/A	N/A	N/A
Flare Stack	17/03/2015	When required	N/A	Landfill Gas	N/A	None	250m ³ /hr Rated at 500m ³ /hr	N/A	N/A	N/A	N/A

1.4 Monitoring Deviations

Emission Point Reference	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Engine	None	None	None
Flare Stack	None	None	None

PART 2: SUPPORTING INFORMATION

2.1 Appendix I: General Information

2.1.1 Monitoring organisation staff details

Monitoring at Standard Landfill Site was conducted by the following EnviroDat Engineers:

Team Leader, Yu Shen – Mcerts Level II (TE1, 2, 3 & 4)	MM06 727
Team Leader, Bruce Kester – Mcerts Level II (TE1, 2, 3 & 4)	MM03 190
Assistant, Tom Bonham – Mcerts Level I	MM10 1076

2.1.2 Monitoring organisation method details

2.1.2.1 Standard Reference Conditions

All pollutant concentrations measured have been expressed at standard reference conditions of 273K, 101.3kPa, dry gas and 5% O₂ for the engine and 3% O₂ for the flare.

2.1.2.2 NO_x (as NO₂)

A sample of the duct gas was passed via a short high temperature, stainless steel probe and down a heated PTFE line to a gas conditioner used to remove moisture. The conditioned (dry) gas then passed to a Horiba PG250 analyser, which, following specific pre-treatment of the NO_x within the sample, measured the concentration of NO_x (as NO₂) by chemiluminescent detector, in accordance with EnviroDat Ltd. documented procedure SP14792, which implements the requirements of the standard reference method (SRM) BSEN14792. The detector and sampling system was checked prior to, and immediately following, testing to ensure operational conformity. This involved ensuring the absence of sample egress or air ingress, span and zero gas checks and system response times as necessary. All raw data was logged at 60-second intervals via a Grant Instruments Squirrel Datalogger and these are presented in Appendix II. An estimate of the uncertainty associated with the monitoring is also presented, as Appendix III.

2.1.2.3 CO

A sample of the duct gas was passed via a short high temperature, stainless steel probe and down a heated PTFE line to a gas conditioner used to remove moisture. The conditioned (dry) gas then passed to a Horiba PG250 analyser, which measured the concentration of CO by non-dispersive infrared (NDIR) detector, in accordance with EnviroDat Ltd. documented procedure SP15058 which implements the requirements of the SRM BSEN15058. The detector and sampling system was checked prior to, and immediately following, testing to ensure operational conformity. This involved ensuring the absence of sample egress or air ingress, span and zero gas checks and system response times as necessary. All raw data was logged at 60-second intervals via a Grant Instruments Squirrel Datalogger and these raw data are presented in Appendix II. An estimate of the uncertainty associated with the monitoring is also presented, as Appendix III.

2.1.2.4 Total VOCs

VOC sampling was performed using a Signal 3010HM analyser that measures by use of a heated flame ionisation detector (FID) in accordance with SP12619, which implements the requirements of the SRM BSEN12619:2013. The VOC analyser was positioned prior to the gas conditioner and measured the sample gas 'hot and wet.' The result was subsequently corrected to dry values. The detector and sampling system was checked prior to, and immediately following, testing to ensure operational conformity. This involved ensuring the absence of sample egress or air ingress, span and zero gas checks and system response times as necessary. All raw data was logged at 60-second intervals via a Grant Instruments Squirrel Datalogger and these raw data are presented in Appendix II. An estimate of the uncertainty associated with the monitoring is also presented, as Appendix III.

2.1.2.5 O₂

A sample of the duct gas was passed via a short high temperature, stainless steel probe and down a heated PTFE line to a gas conditioner used to remove moisture. The conditioned (dry) gas then passed to a Horiba PG250 analyser, which measured the concentration of O₂ by was measured by a zirconia cell, as detailed in documented procedure SP14789, which implements the requirements of the SRM BSEN14789. The detector and sampling system was checked prior to, and immediately following, testing to ensure operational conformity. This involved ensuring the absence of sample egress or air ingress, span and zero gas checks and system response times as necessary. All raw data was logged at 60-second intervals via a Grant Instruments Squirrel Datalogger and the raw data are presented in Appendix II. An estimate of the uncertainty associated with the monitoring is also presented, as Appendix III.

Determination of oxygen is essential for adjusting the prescribed pollutants to reference oxygen levels as detailed in the sites permit. This was performed in the following manner:

$$\text{Conc}_{\text{ref}} = \text{Conc}_{\text{meas}} \times \frac{(20.95 - \text{O}_{2\text{ref}})}{(20.95 - \text{O}_{2\text{meas}})}$$

Whereby, Conc_{ref} was the concentration at reference conditions and $\text{Conc}_{\text{meas}}$ was the measured concentration, $\text{O}_{2\text{ref}}$ is the oxygen reference conditions and $\text{O}_{2\text{meas}}$ is the measured oxygen value.

2.1.2.6 Moisture

Moisture levels in the stack were determined gravimetrically to the requirements of BSEN14790, which implements the requirements of the SRM BSEN14790. The equipment consisted of an Apex Instruments USEPA Method Five apparatus. This consisted of a heated probe, heated filter and impinger bucket, connected to the sampling console. The console contained a calibrated dry gas meter. The data obtained from this system combined with the gravimetric increases allowed water content to be calculated. The moisture correction factor was calculated in the following manner:

$$\frac{(100 - [\text{H}_2\text{O}]_{\text{reference}})}{(100 - [\text{H}_2\text{O}]_{\text{measured}})}$$

This correction factor is only applied to the VOC result and was not applied to the combustion gases as the sample train for combustion gases uses a gas conditioner to remove moisture and introduces dried gas to the analyser. The raw data relating to the moisture test is presented as Appendix IV.

2.1.3 Monitoring organisation equipment and gas check list references

EQUIPMENT			
Item	Reference	Calibration Due	PAT Due
Portable Gas Analyser	PGA#02	27-Jul-15	Oct-15
Flame Ionisation Detector Analyser	FID#01	24-Apr-15	Oct-15
Portable Gas Analyser	PGA#04	02-Nov-15	Oct-15
Flame Ionisation Detector Analyser	FID#02	24-Apr-15	Oct-15
Data Logger	DL#03	02-Nov-15	-
Data Logger	DL#04	24-Nov-15	-
Gas Conditioner	COND#02	06-Feb-16	Oct-15
Gas Conditioner	COND#03	23-Nov-15	Oct-15
NOx Converter	CONV#01	05-Feb-16	Oct-15
Digital Barometer	DB#07	29-Mar-15	-
Digital Barometer	DB#10	09-Jul-15	-
Balance	BAL#02	05-Apr-15	-
Heated Filter Head	HFH#02	14-Jan-16	
Heated Line	HL#18 & HL#11	14-Jan-16	-
Thermocouple (Stack Temperature Check)	TC#38	23-Nov-15	-
Thermocouple (HFH#02 Temperature Check)	TC#37	14-Jan-16	-
Timepiece	TP#10	29-Apr-15	-
Timepiece	TP#16	04-Jan-16	-
'Apex' Kit	APEX#02	Various	Oct-15
'Apex' Kit	APEX#04	Various	Oct-15

GAS CYLINDERS			
	Certificate No.	Level (ppm)	Validity
'Zero' Gas (%)	DV98PHI	99.9995%	N/A
Oxygen Span Gas (%)	VC80253	8.01%	22-Jan-16
VOC Span Gas	VC80253	801	22-Jan-16
Carbon Monoxide Span Gas	D666204	1154	11-Feb-16
Nitrogen Dioxide Span Gas	D666204	268.1	11-Feb-16
Oxygen Span Gas (%)	AC48FDG	7.97%	14-Dec-15
VOC Span Gas	AC48FDG	10.03	14-Dec-15
Carbon Monoxide Span Gas	D530838	160.5	29-Jul-15
Nitrogen Dioxide Span Gas	D530838	160.5	29-Jul-15

2.2 Appendix II: Emission Point Reference Data & Results

2.2.1 Photos of Sampling Location on Engine



Engine sampled from
10mm turbo port on
vertical section of approx.
0.25m diameter stack.



Engine Stack

2.2.2 Photo of Sampling Location on Flare

Flare sampled from a TOP EXIT on vertical section of approx. 1m diameter stack. Accessed via portable MAST.



2.2.3 Homogeneity testing

BS EN 15259 stipulates that the exhaust gases emitted from combustion processes are tested to ensure homogeneity and that a representative sample is obtained during the monitoring, subject to a number of caveats as elucidated in Environment Agency guidance MID15259. The details of the testing at each emission point are summarised below:

Stack	Result of Homogeneity Testing
Engine	N/A –homogeneity testing only required on stacks exceeding 1.13 m diameter, as specified in MID 15259. Homogeneity assumed and single point sampling acceptable
Flare Stack	N/A – Due to the health & safety implications of working on a live flare, homogeneity assumed and single point sampling acceptable.

2.2.4 Gas analyser site measurements and calibrations

The data in Charts 1 to 6 and Tables 1 to 2 are expressed in mgm^{-3} @ STP and is uncorrected for O_2 . In Addition VOC results are expressed as methane equivalent. This data was subsequently converted to reference oxygen concentrations (Section 1.2) with the addition of moisture correction for VOCs. Analyser calibration data is shown in Tables 3&4.

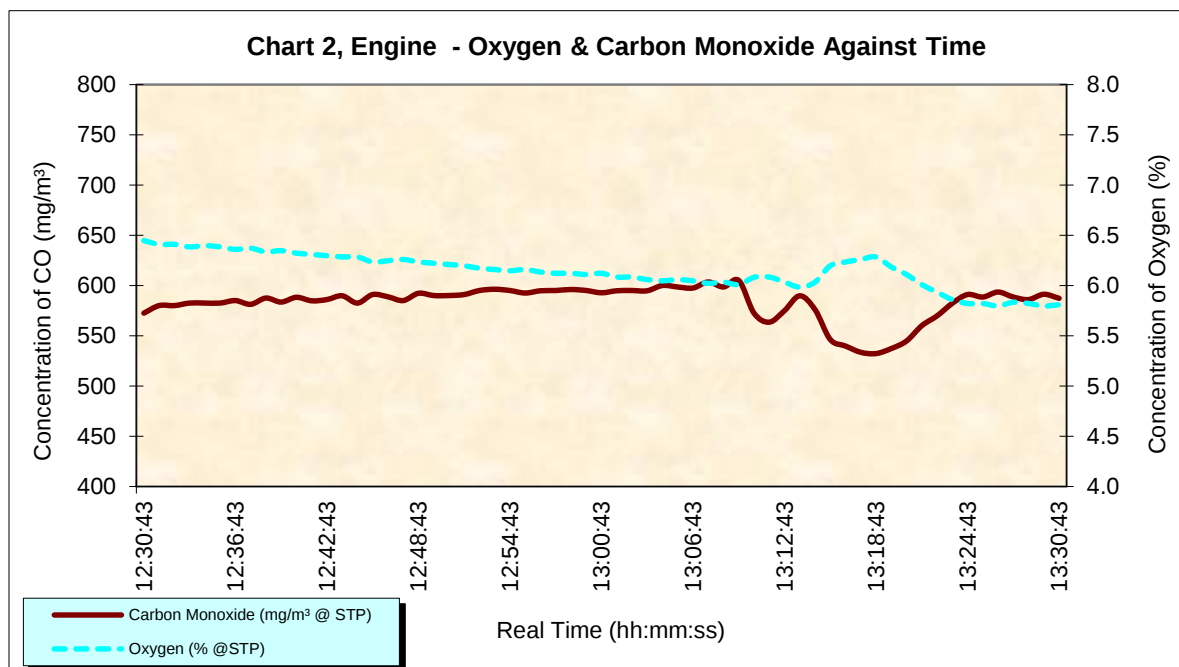
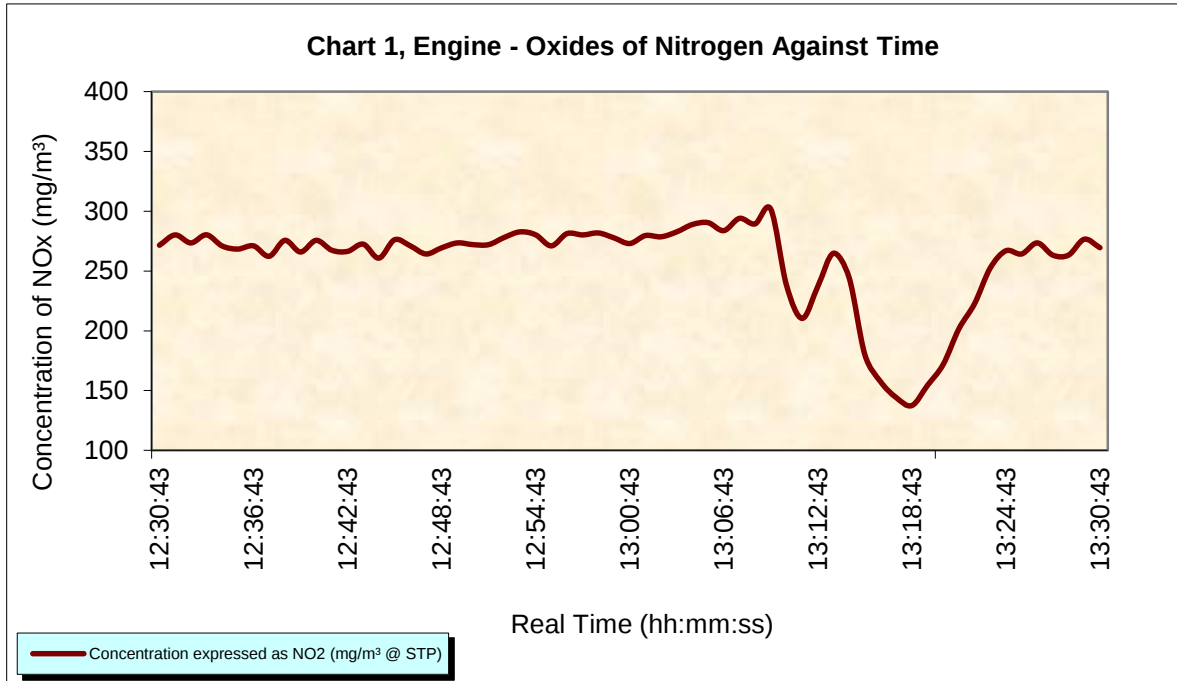


Chart 3, Engine - Volatile Organic Compounds Against Time

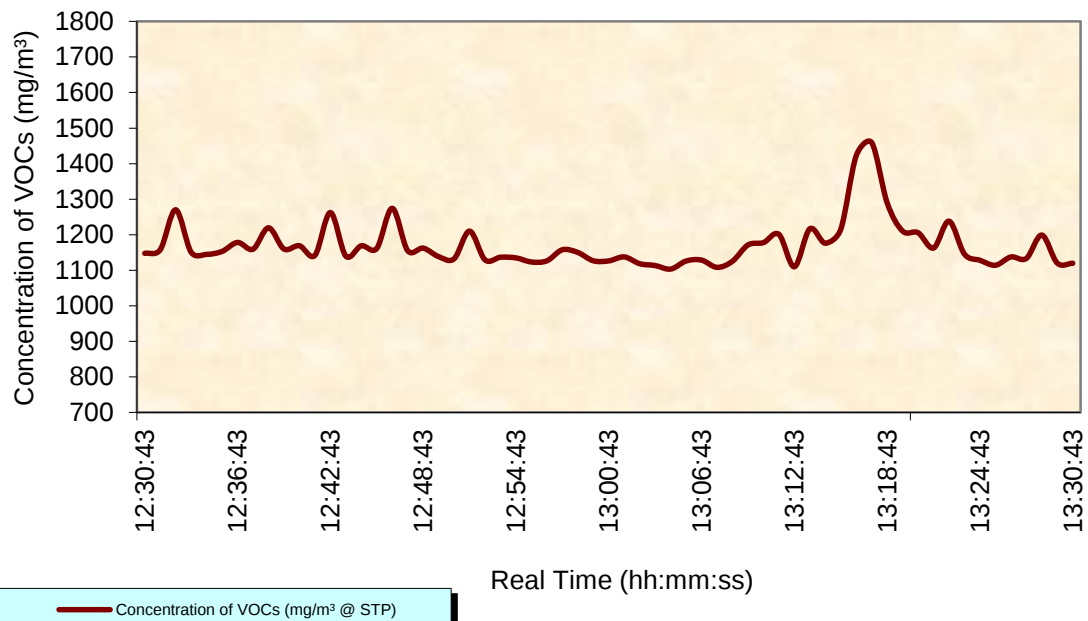
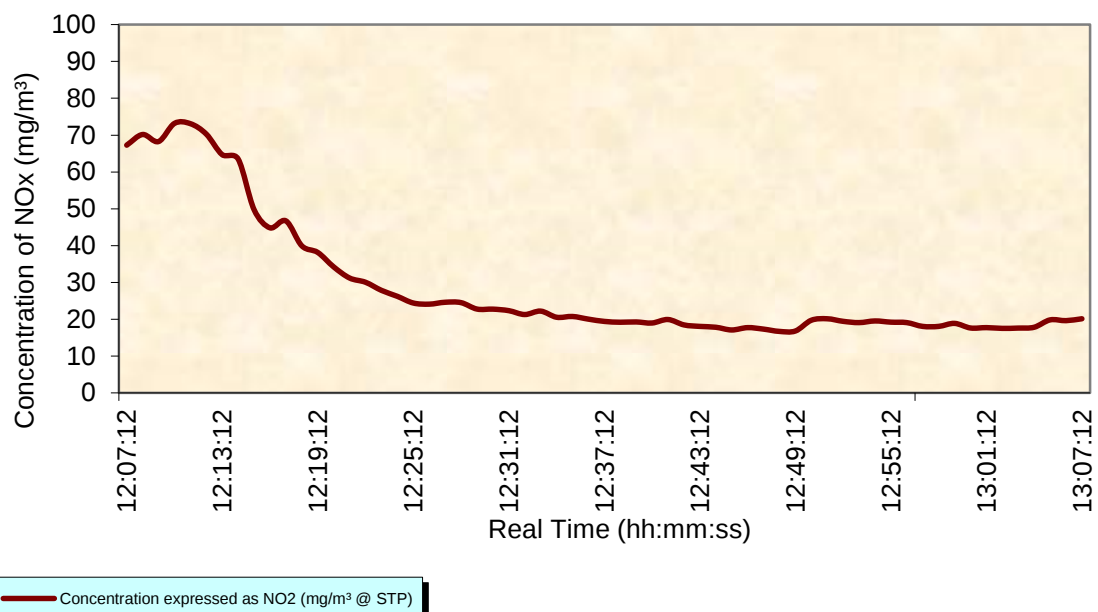


Chart 4, Flare - Oxides of Nitrogen Against Time



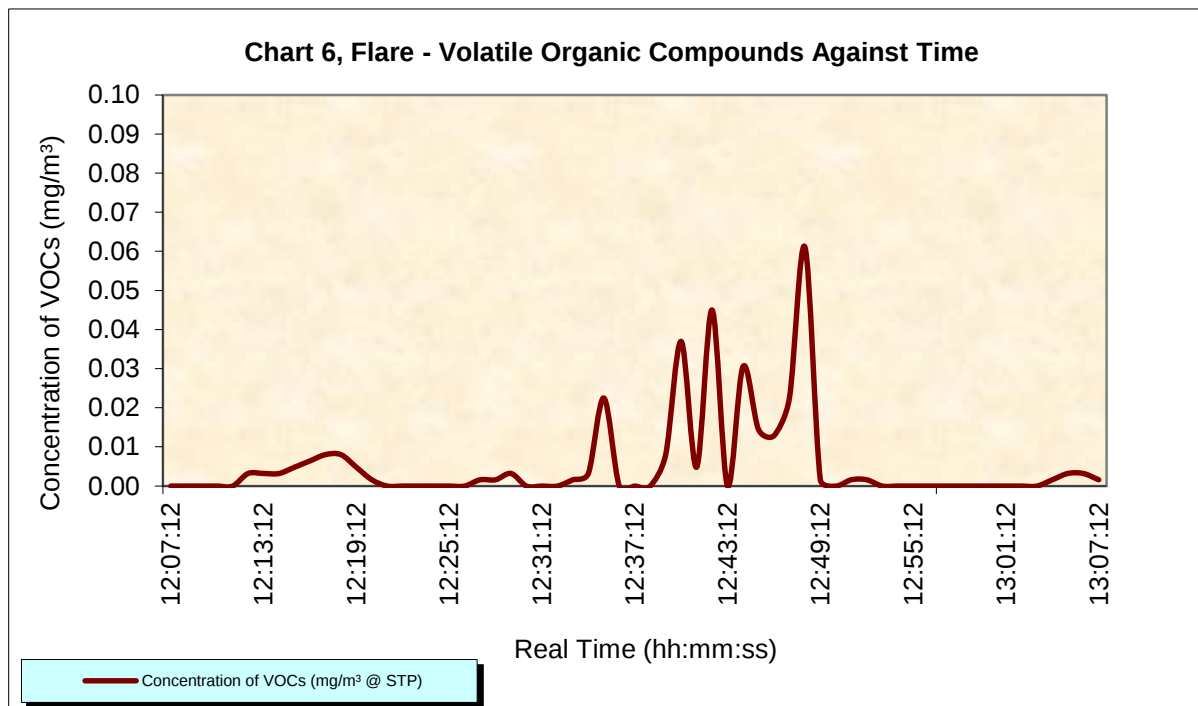
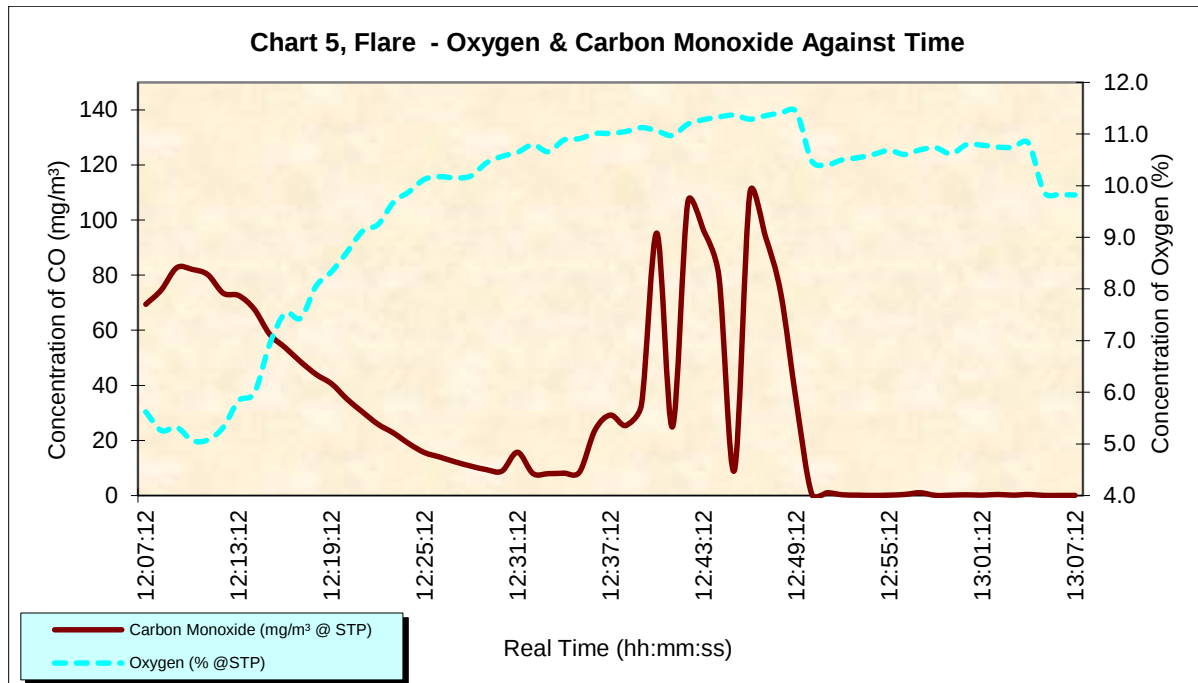


Table 1 – Engine, Raw Data

Time	Oxygen (%) (Dry Gas)	VOC (mgC/m ³) (Wet Gas)	CO (mg/m ³) (Dry Gas)	Nox (mg/m ³) (Dry Gas)	Comment
12:30:43	6.4	1147.98	572.5	271.6	Engine Sampling Starts
12:31:43	6.4	1158.11	580.0	280.2	
12:32:43	6.4	1270.45	580.0	273.5	
12:33:43	6.4	1151.04	582.5	280.3	
12:34:43	6.4	1145.09	582.5	271.0	
12:35:43	6.4	1153.45	582.5	268.4	
12:36:43	6.4	1178.68	585.0	271.1	
12:37:43	6.4	1159.71	581.3	262.3	
12:38:43	6.3	1219.82	587.5	275.7	
12:39:43	6.3	1160.20	583.5	265.9	
12:40:43	6.3	1169.52	588.3	275.7	
12:41:43	6.3	1142.20	584.8	267.4	
12:42:43	6.3	1262.73	586.0	266.5	
12:43:43	6.3	1140.27	589.8	272.5	
12:44:43	6.3	1169.36	582.5	260.8	
12:45:43	6.2	1161.80	591.0	276.2	
12:46:43	6.2	1274.63	588.8	271.1	
12:47:43	6.3	1155.38	585.0	264.3	
12:48:43	6.2	1162.77	592.3	269.4	
12:49:43	6.2	1138.82	590.0	273.5	
12:50:43	6.2	1132.71	590.0	272.1	
12:51:43	6.2	1210.50	591.0	272.1	
12:52:43	6.2	1129.66	595.0	278.2	
12:53:43	6.2	1137.05	596.3	282.8	
12:54:43	6.1	1135.29	595.0	280.3	
12:55:43	6.2	1123.71	592.5	271.1	
12:56:43	6.1	1126.93	594.8	281.3	
12:57:43	6.1	1158.11	595.0	280.2	
12:58:43	6.1	1150.55	596.0	281.9	
12:59:43	6.1	1127.09	595.0	277.7	
13:00:43	6.1	1126.77	592.8	273.0	
13:01:43	6.1	1138.02	594.8	279.7	
13:02:43	6.1	1118.89	595.0	278.7	
13:03:43	6.1	1113.75	594.8	282.8	
13:04:43	6.0	1103.79	600.0	288.9	
13:05:43	6.1	1126.45	598.5	290.5	
13:06:43	6.0	1129.02	597.5	283.8	
13:07:43	6.0	1108.61	603.5	294.1	

Time	Oxygen (%) (Dry Gas)	VOC (mgC/m ³) (Wet Gas)	CO (mg/m ³) (Dry Gas)	Nox (mg/m ³) (Dry Gas)	Comment
13:08:43	6.0	1125.80	598.5	289.5	
13:09:43	6.0	1171.61	605.0	301.8	
13:10:43	6.1	1178.20	572.5	238.2	
13:11:43	6.1	1201.50	563.5	210.4	
13:12:43	6.0	1110.21	575.0	237.2	
13:13:43	6.0	1216.93	589.8	264.9	
13:14:43	6.0	1176.43	576.0	244.4	
13:15:43	6.2	1215.48	546.3	180.1	
13:16:43	6.2	1422.48	539.8	157.5	
13:17:43	6.3	1459.45	533.5	144.2	
13:18:43	6.3	1290.05	532.3	137.5	
13:19:43	6.2	1210.50	537.3	154.4	
13:20:43	6.1	1206.00	544.8	171.9	
13:21:43	6.0	1162.93	560.0	201.7	
13:22:43	5.9	1238.46	569.8	222.7	
13:23:43	5.9	1145.73	582.3	252.5	
13:24:43	5.8	1128.54	591.0	267.0	
13:25:43	5.8	1114.55	588.5	264.3	
13:26:43	5.8	1137.86	593.5	273.5	
13:27:43	5.8	1133.68	588.5	263.3	
13:28:43	5.8	1199.41	586.0	263.4	
13:29:43	5.8	1120.50	591.3	276.6	
13:30:43	5.8	1120.18	587.3	269.5	Engine Sampling Ends

Table 2 – Flare, Raw Data

Time	Oxygen (%) (Dry Gas)	VOC (mgC/m ³) (Wet Gas)	CO (mg/m ³) (Dry Gas)	Nox (mg/m ³) (Dry Gas)	Comment
12:07:12	5.6	0.00	69.4	67.3	Flare Sampling Starts
12:08:12	5.3	0.00	74.6	70.2	
12:09:12	5.3	0.00	82.7	68.2	
12:10:12	5.1	0.00	82.1	73.2	
12:11:12	5.1	0.00	80.2	73.1	
12:12:12	5.3	0.00	73.5	70.3	
12:13:12	5.8	0.00	72.6	64.7	
12:14:12	6.0	0.00	67.7	63.5	
12:15:12	6.9	0.00	58.5	49.8	
12:16:12	7.5	0.01	53.7	44.8	
12:17:12	7.4	0.01	48.5	46.7	
12:18:12	8.1	0.01	44.0	39.9	
12:19:12	8.3	0.00	40.5	38.2	

Time	Oxygen (%) (Dry Gas)	VOC (mgC/m ³) (Wet Gas)	CO (mg/m ³) (Dry Gas)	Nox (mg/m ³) (Dry Gas)	Comment
12:20:12	8.7	0.00	35.0	34.2	
12:21:12	9.1	0.00	30.3	31.2	
12:22:12	9.2	0.00	25.8	30.1	
12:23:12	9.7	0.00	22.7	27.9	
12:24:12	9.9	0.00	18.8	26.2	
12:25:12	10.1	0.00	15.6	24.4	
12:26:12	10.2	0.00	13.9	24.1	
12:27:12	10.1	0.00	12.2	24.6	
12:28:12	10.2	0.00	10.6	24.5	
12:29:12	10.4	0.00	9.4	22.8	
12:30:12	10.6	0.00	8.9	22.8	
12:31:12	10.6	0.00	15.7	22.4	
12:32:12	10.8	0.00	8.0	21.3	
12:33:12	10.7	0.00	7.9	22.2	
12:34:12	10.9	0.00	8.1	20.6	
12:35:12	10.9	0.02	8.5	20.8	
12:36:12	11.0	0.00	23.7	20.1	
12:37:12	11.0	0.00	29.2	19.4	
12:38:12	11.0	0.00	25.4	19.2	
12:39:12	11.1	0.01	32.9	19.3	
12:40:12	11.1	0.04	95.3	19.0	
12:41:12	11.0	0.00	24.9	20.0	
12:42:12	11.2	0.05	106.7	18.5	
12:43:12	11.3	0.00	96.5	18.1	
12:44:12	11.3	0.03	79.7	17.9	
12:45:12	11.4	0.01	9.1	17.1	
12:46:12	11.3	0.01	109.7	17.8	
12:47:12	11.4	0.02	94.2	17.4	
12:48:12	11.4	0.06	73.4	16.7	
12:49:12	11.4	0.00	34.1	16.8	
12:50:12	10.5	0.00	0.5	19.8	
12:51:12	10.4	0.00	1.0	20.2	
12:52:12	10.5	0.00	0.2	19.5	
12:53:12	10.5	0.00	0.1	19.1	
12:54:12	10.6	0.00	0.0	19.6	
12:55:12	10.7	0.00	0.1	19.2	
12:56:12	10.6	0.00	0.4	19.1	
12:57:12	10.7	0.00	1.0	18.1	
12:58:12	10.7	0.00	0.0	18.1	
12:59:12	10.6	0.00	0.1	18.9	
13:00:12	10.8	0.00	0.2	17.7	
13:01:12	10.8	0.00	0.1	17.8	
13:02:12	10.7	0.00	0.4	17.6	
13:03:12	10.7	0.00	0.1	17.6	
13:04:12	10.8	0.00	0.4	17.9	
13:05:12	9.9	0.00	0.0	19.9	

Time	Oxygen (%) (Dry Gas)	VOC (mgC/m ³) (Wet Gas)	CO (mg/m ³) (Dry Gas)	Nox (mg/m ³) (Dry Gas)	Comment
13:06:12	9.8	0.00	0.0	19.7	
13:07:12	9.8	0.00	0.0	20.2	Flare Sampling Ends

Table 3 – Engine, Analyser Calibration Data

ANALYSER CALIBRATION DATA (Engine)					
Pre Sampling Check					
		NO (ppm)	CO (ppm)	O2 (%)	VOC's (ppm)
Range		500	2000	25	1000
Zero Gas	Cylinder No.	DV98PHI			
Span Gas	Cylinder No.	D666204	D666204	VC80253	VC80253
	Certified Value	268.1	1154	8.01	801
Zero Check	Value	0.5	3	0.03	0
<2 x repeatability (Yes/No)		YES	YES	YES	YES
Down Line Zero & Span Check					
Zero Gas	Value	0.2	1	0.14	-2
	<2% of span	YES	YES	YES	YES
Span Gas	Value	269.2	1156	7.97	794
	Within 2% of span	YES	YES	YES	YES
Post Sampling Drift Check					
Zero Gas	Value	4.4	5	0.13	6
	Drift (%)	1.6	0.3	0.1	1.0
	Validation	No Correction Required	No Correction Required	No Correction Required	No Correction Required
Span Gas	Value	269.3	1162	7.9	796
	Drift (%)	0.0	0.5	0.9	0.2
	Validation	No Correction Required	No Correction Required	No Correction Required	No Correction Required

Table 4 – Flare, Analyser Calibration Data

ANALYSER CALIBRATION DATA (Flare)					
Pre Sampling Check					
		NO (ppm)	CO (ppm)	O2 (%)	VOC's (ppm)
Range		100	200	25	10
Zero Gas	Cylinder No.	DV98PHI			
Span Gas	Cylinder No.	D530838	D530838	AC48FDG	AC48FDG
	Certified Value	89.9	160.5	7.97	10.03
Zero Check	Value	0.2	0.2	0.02	0.03
<2 x repeatability (Yes/No)		YES	YES	YES	YES
Down Line Zero & Span Check					
Zero Gas	Value	0.2	0.2	0.02	0.04
	<2% of span	YES	YES	YES	YES
Span Gas	Value	89	159.4	7.98	10.07
	Within 2% of span	YES	YES	YES	YES
Post Sampling Drift Check					
Zero Gas	Value	-0.2	-0.2	0.04	-0.02
	Drift (%)	0.4	0.2	0.3	0.6
	Validation	No Correction Required	No Correction Required	No Correction Required	No Correction Required
Span Gas	Value	89.1	157.4	7.98	9.99
	Drift (%)	0.1	1.2	0.0	0.8
	Validation	No Correction Required	No Correction Required	No Correction Required	No Correction Required

2.3 Appendix III: Uncertainty Calculation

2.3.1 Engine, Uncertainties

NOx - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{rit}	2.37
Drift			U _{odr}	7.41
volume or pressure flow dependence			U _{spres}	0.06
atmosphseric pressure dependence			U _{apres}	0.59
ambient temperature dependence			U _{temp}	0.35
NH3 (20 mg/m3)			U _{interf}	0.14
CO2 (15%)			-	0.02
H2O (30%)			-	0.01
Error in logger voltage			-	0.50
Dependence on voltage			U _{vdt}	0.03
Converter efficiency			U _{ceff}	1.19
losses in the line (leak)			U _{leak}	2.98
Uncertainty of calibration gas			U _{calib}	2.98
NOx Measurement uncertainty		Result	258.07	mg/m ³
Combined uncertainty			8.97	mg/m ³
Expanded uncertainty	k = 2		17.94	mg/m ³
Uncertainty corrected to std conds			17.94	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%	2.76 % ELV	
Expanded uncertainty		expressed with a level of confidence of 95%	17.94 mg.m ⁻³ of result	

CO - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{r fit}	5.77
Drift			U _{odr}	17.80
volume or pressure flow dependence			U _{spres}	0.00
atmospheric pressure dependence			U _{apres}	1.15
ambient temperature dependence			U _{temp}	0.00
CO2 (15%)			U _{interf}	0.00
N2O (40mgm3)			-	0.00
CH4 (57mgm3)			-	0.00
H2O (1%)			-	0.00
Dependence on voltage			U _{volt}	0.03
Error in Logger reading			-	2.00
losses in the line (leak)			U _{leak}	6.73
Uncertainty of calibration gas			U _{calib}	6.73
CO Measurement uncertainty			Result	582.99
				mg/m ³
Combined uncertainty				21.12
				mg/m ³
Expanded uncertainty		k = 2	42.24	mg/m ³
Uncertainty corrected to std conds			42.24	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%		2.82 % ELV
Expanded uncertainty		expressed with a level of confidence of 95%		42.24 mg.m ⁻³ of result

VOC - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{i0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{fit}	3.74
Drift			U _{odr}	16.12
volume or pressure flow dependence			U _{spres}	0.00
atmosphseric pressure dependence			U _{apres}	0.75
ambient temperature dependence			U _{temp}	0.00
NH3 (20 mg/m3)			U _{interf}	0.00
CO2 (15%)			-	0.00
H2O (30%)			-	0.00
Error on Logger voltage			-	1.00
Dependence on voltage			U _{volt}	0.03
losses in the line (leak)			U _{leak}	13.53
Uncertainty of calibration gas			U _{calib}	13.53
VOC Measurement uncertainty		Result	1171.78	mg/m ³
Combined uncertainty			25.33	mg/m ³
Expanded uncertainty	k =	2	50.66	mg/m ³
Uncertainty corrected to std conds			50.66	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%	2.89 % ELV	
Expanded uncertainty		expressed with a level of confidence of 95%	50.66 mg.m ⁻³ of result	

Oxygen - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U_{r0}	0.20
Standard deviation of repeatability at span level			U_{rs}	0.03
Lack of fit			U_{fit}	0.07
Drift			U_{odr}	0.10
volume or pressure flow dependence			U_{spres}	0.00
atmospheric pressure dependence			U_{apres}	0.01
ambient temperature dependence			U_{temp}	0.05
CO2 (15%)			-	0.00
NO(300)			-	0.06
NO2(30)			-	0.00
dependence on voltage			U_{volt}	0.02
losses in the line (leak)			U_{leak}	0.07
Error in Logger voltage			-	0.03
Uncertainty of calibration gas			U_{calib}	0.07
O2 Measurement uncertainty		Result	6.15	%vol
Combined uncertainty			0.18	%vol
% of value			2.99	%
Expanded uncertainty		expressed with a level of confidence of 95%	5.98 % of value	
Expanded uncertainty		expressed with a level of confidence of 95%	0.37 % vol	

2.3.2 Flare, Uncertainties

NOx - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{fit}	0.47
Drift			U _{odr}	1.34
volume or pressure flow dependence			U _{spres}	0.01
atmospheric pressure dependence			U _{apres}	0.12
ambient temperature dependence			U _{temp}	0.23
NH3 (20 mg/m3)			U _{interf}	0.14
CO2 (15%)			-	0.02
H2O (30%)			-	0.01
Error in logger voltage			-	0.10
Dependence on voltage			U _{vdt}	0.03
Converter efficiency			U _{ceff}	0.13
losses in the line (leak)			U _{leak}	0.32
Uncertainty of calibration gas			U _{calib}	0.32
NOx Measurement uncertainty		Result	27.42	mg/m ³
Combined uncertainty			1.54	mg/m ³
Expanded uncertainty	k = 2		3.07	mg/m ³
Uncertainty corrected to std conds			3.07	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%	2.05 % ELV	
Expanded uncertainty		expressed with a level of confidence of 95%	3.07 mg.m ⁻³ of result	

CO - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{fit}	0.58
Drift			U _{odr}	1.62
volume or pressure flow dependence			U _{spres}	0.00
atmospheric pressure dependence			U _{apres}	0.12
ambient temperature dependence			U _{temp}	0.00
CO2 (15%)			U _{interf}	0.00
N2O (40mgm3)			-	0.00
CH4 (57mgm3)			-	0.00
H2O (1%)			-	0.00
Dependence on voltage			U _{volt}	0.03
Error in Logger reading			-	0.20
losses in the line (leak)			U _{leak}	0.36
Uncertainty of calibration gas			U _{calib}	0.36
CO Measurement uncertainty		Result	31.24	mg/m ³
Combined uncertainty			1.82	mg/m ³
Expanded uncertainty	k = 2		3.63	mg/m ³
Uncertainty corrected to std conds			3.63	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%	7.26 % ELV	
Expanded uncertainty		expressed with a level of confidence of 95%	3.63 mg.m ⁻³ of result	

VOC - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.80
Standard deviation of repeatability at span level			U _{rs}	0.10
Lack of fit			U _{fit}	0.04
Drift			U _{odr}	0.09
volume or pressure flow dependence			U _{spres}	0.00
atmospheric pressure dependence			U _{apres}	0.01
ambient temperature dependence			U _{temp}	0.00
NH3 (20 mg/m3)			U _{interf}	0.00
CO2 (15%)			-	0.00
H2O (30%)			-	0.00
Error on Logger voltage			-	0.01
Dependence on voltage			U _{vdt}	0.03
losses in the line (leak)			U _{leak}	0.00
Uncertainty of calibration gas			U _{calib}	0.00
VOC Measurement uncertainty		Result	0.01	mg/m ³
Combined uncertainty			0.15	mg/m ³
Expanded uncertainty	k =	2	0.30	mg/m ³
Uncertainty corrected to std conds			0.30	mg.m-3 (corrected)
Expanded uncertainty		expressed with a level of confidence of 95%	2.97 % ELV	
Expanded uncertainty		expressed with a level of confidence of 95%	0.30 mg.m ⁻³ of result	

Oxygen - Measurement performance related to stationary conditions				
Performance characteristic			Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero			U _{r0}	0.20
Standard deviation of repeatability at span level			U _{rs}	0.03
Lack of fit			U _{fit}	0.11
Drift			U _{odr}	0.13
volume or pressure flow dependence			U _{spres}	0.00
atmospheric pressure dependence			U _{apres}	0.01
ambient temperature dependence			U _{temp}	0.03
CO2 (15%)			-	0.00
NO(300)			-	0.06
NO2(30)			-	0.00
dependence on voltage			U _{volt}	0.02
losses in the line (leak)			U _{leak}	0.11
Error in Logger voltage			-	0.03
Uncertainty of calibration gas			U _{calib}	0.11
O2 Measurement uncertainty		Result	9.67	%vol
Combined uncertainty			0.25	%vol
% of value			2.54	%
Expanded uncertainty		expressed with a level of confidence of 95%	5.09 % of value	
Expanded uncertainty		expressed with a level of confidence of 95%	0.49 % vol	

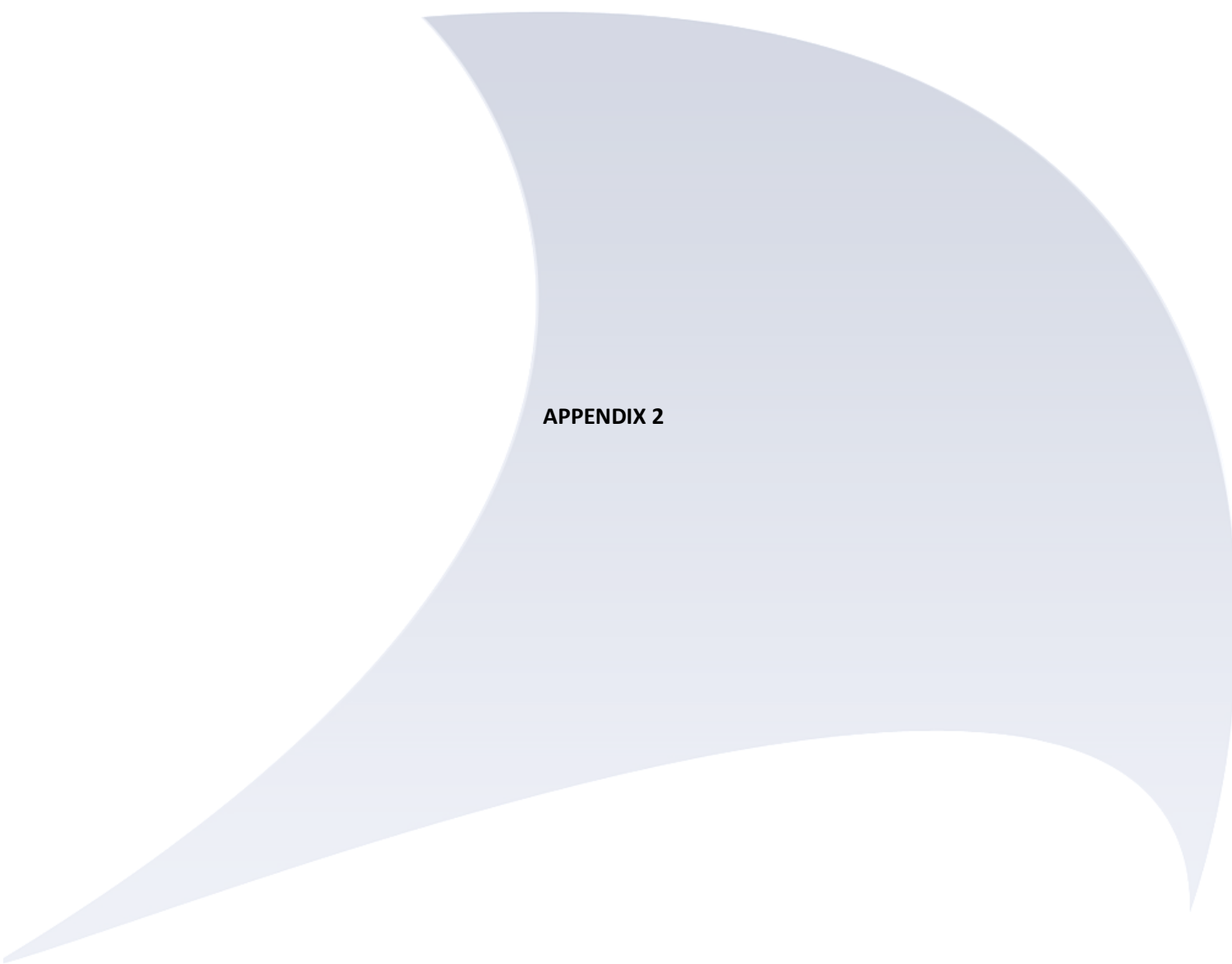
2.4 Appendix IV: Moisture Calculations

2.4.1 Engine, Uncertainties

Test No	T1			Site	Flintshire CC		
Date	17-3-15				Standard LFS		
pbar (mbar)	1001			Stack	Engine		
pbar (mmHg)	751			Job Number:	R15099		
Nozzle Diameter (mm)	n/a			Site Team:	BK, YS, TB		
Temp of Meter (in)/(out) deg. C	14			Data Entered By:	Yu Shen		
ΔH_{ave} (mmH ₂ O)	10.0						
DGM Cal Factor (Y)	0.9272						
				Enter Data into coloured cells only			
Start Volume Reading	748.6930	m ³		Start time	12:30	hr:min	
End Volume Reading	749.1290	m ³		End time	13:30	hr:min	
Volume Sampled	0.4043	m ³		Total time	01:00	hr:min	
IMPINGER	1	2	3	4	Initials of Analyst		
Absorber Solution (Type):	H2O	H2O	KO IMP	SILICA			
Sample No:	n/a	n/a	n/a	n/a			
Analysis Required:	n/a	n/a	n/a	n/a			
Initial Weight of Impingers plus absorber (g)	749.8	768.7	564.9	798.1	YS		
Final Weight of Impingers plus absorber (g)	777.2	774.5	565.9	805.6	YS		
Weight Gain (g)	27.4	5.8	1.0	7.5			
Total Weight Gain (1+2+3+4) (g)	41.7						
Gas Volume of water at 0 °C (l)	51.92						
Gas Meter volume at 0 °C (l)	380.36						
Moisture content of Gases (%)	12.0						

2.4.2 Flare, Uncertainties

Test No	T2		Site	Flintshire CC		
Date	17-3-15			Standard LFS		
pbar (mbar)	1001		Stack	Flare		
pbar (mmHg)	751		Job Number:	R15099		
Nozzle Diameter (mm)	n/a		Site Team:	BK, YS, TB		
Temp of Meter (in)/(out) deg. C	12		Data Entered By:	BK		
ΔH_{ave} (mmH ₂ O)	10.0		Enter Data into coloured cells only			
DGM Cal Factor (Y)	1.0103					
Start Volume Reading	658.8490	m ³	Start time	12:02	hr:min	
End Volume Reading	659.4202	m ³	End time	13:02	hr:min	
Volume Sampled	0.5771	m ³	Total time	01:00	hr:min	
IMPINGER	1	2	3	4	Initials of Analyst	
Absorber Solution (Type):	H2O	H2O	KO IMP	SILICA		
Sample No:	n/a	n/a	n/a	n/a		
Analysis Required:	n/a	n/a	n/a	n/a		
Initial Weight of Impingers plus absorber (g)	777.2	774.5	565.9	805.6	BK	
Final Weight of Impingers plus absorber (g)	818.2	778.5	566.1	809.6	BK	
Weight Gain (g)	41.0	4.0	0.2	4.0		
Total Weight Gain (1+2+3+4) (g)	49.2					
Gas Volume of water at 0 °C (l)	61.25					
Gas Meter volume at 0 °C (l)	546.77					
Moisture content of Gases (%)	10.1					

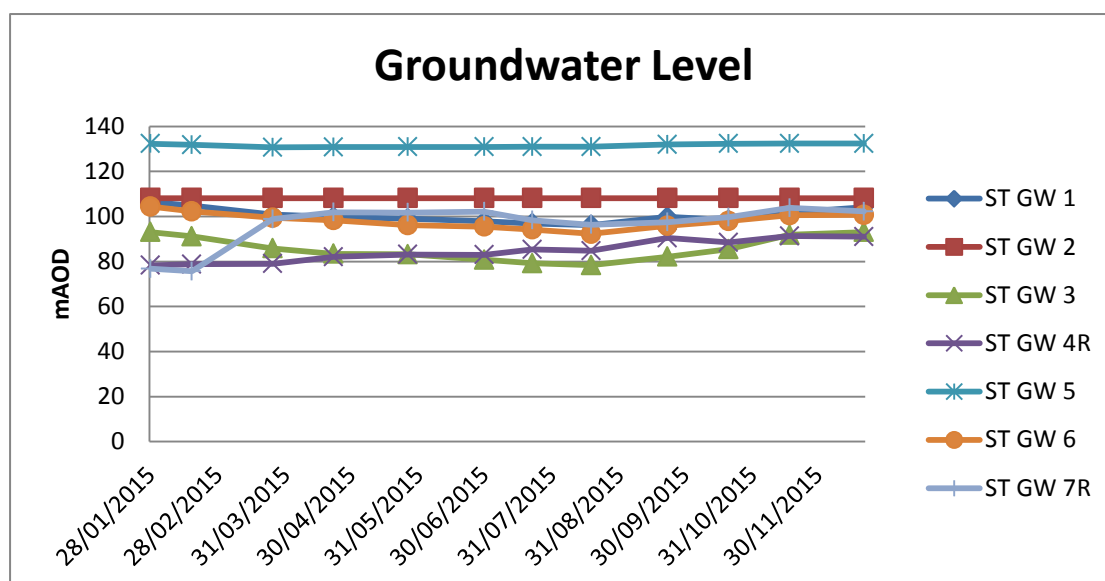
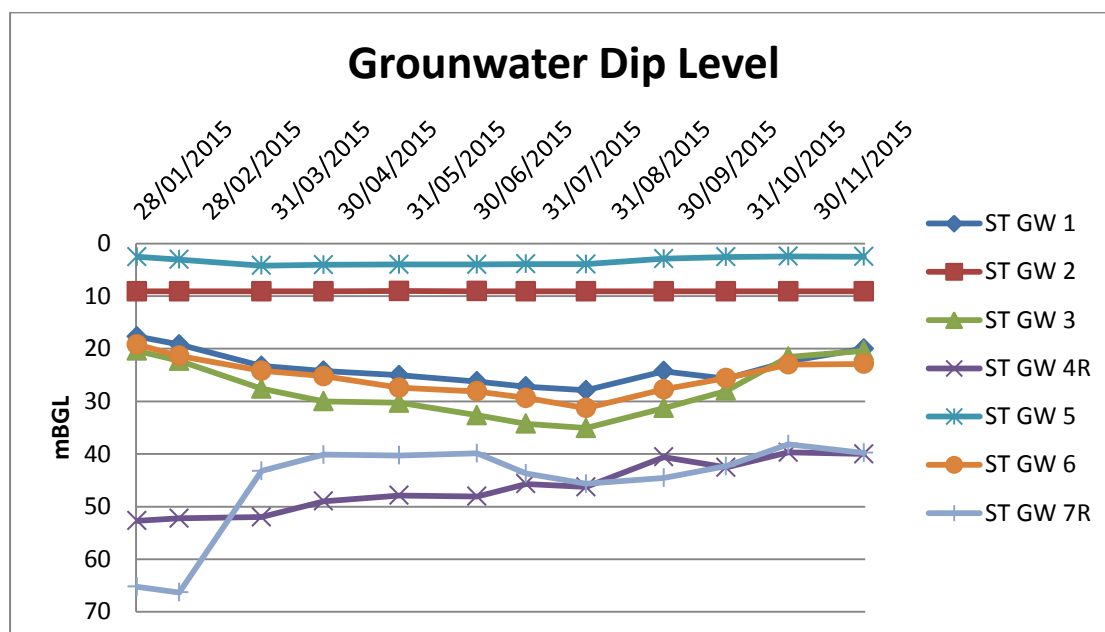


APPENDIX 2

APPENDIX 2 - GROUNDWATER**Table 1: Groundwater Levels**

Location	Data	Dip Level (mBGL)	GW Level (mAOD)
GW 1	Minimum	17.69	96.19
	Maximum	27.89	106.39
	Average	23.59	100.49
GW 2	Minimum	9.05	108.11
	Maximum	9.10	108.16
	Average	9.09	108.12
GW 3	Minimum	20.39	78.35
	Maximum	35.07	93.03
	Average	27.81	85.61
GW 4R	Minimum	39.69	78.31
	Maximum	52.69	91.31
	Average	46.39	84.62
GW 5	Minimum	2.45	130.65
	Maximum	4.21	132.41
	Average	3.34	131.52
GW 6	Minimum	19.21	92.29
	Maximum	31.28	104.36
	Average	25.44	98.13
GW 7R	Minimum	38.19	75.68
	Maximum	66.32	103.81
	Average	45.76	96.24

APPENDIX 2 - GROUNDWATER



APPENDIX 2 - GROUNDWATER**Table 2 – Quarterly monitoring data, Q1**

Parameter	Units	GW1	GW3	GW5	GW6
Carbon					
Organic Carbon, Total	mg/l	<3	3.33	7.72	29.4
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	130	200	220	90
Ammoniacal Nitrogen as N	mg/l	1.12	0.795	2.98	75.5
Chloride	mg/l	56.9	70.7	14.1	519
COD, unfiltered	mg/l	280	28.5	225	225
Conductivity @ 20 deg.C	mS/cm	0.587	0.823	0.373	2.82
Oxygen, dissolved	mg/l	3.12	3.73	<0.3	3.39
pH	pH	6.25	6.94	7.31	6.43
Sulphate	mg/l	276	294	48.7	426
Total Oxidised Nitrogen as N	mg/l	0.758	0.942	3.25	>106
Filtered (Dissolved) Metals					
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	<0.0001	0.00281
Calcium (diss.filt)	mg/l	60.2	95.1	74.8	79.9
Chromium (diss.filt)	mg/l	0.00158	0.00401	0.00247	0.00419
Copper (diss.filt)	mg/l	<0.00085	<0.00085	<0.00085	0.0069
Iron (diss.filt)	mg/l	<0.019	<0.019	10.8	0.0613
Lead (diss.filt)	mg/l	<0.00002	<0.00002	0.000036	0.000229
Magnesium (diss.filt)	mg/l	29	42.2	9.7	42.5
Manganese (diss.filt)	mg/l	1.09	0.0964	2.77	8.3
Nickel (diss.filt)	mg/l	0.00149	0.00241	0.00313	0.104
Potassium (diss.filt)	mg/l	10.9	10.6	7.27	64.3
Sodium (diss.filt)	mg/l	29.6	51.1	12.1	365
Zinc (diss.filt)	mg/l	0.0126	0.00528	0.00662	0.0975
TPH Criteria Working Group (TPH CWG)					
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011
Toluene	mg/l	<0.004	<0.004	<0.004	<0.004

APPENDIX 2 - GROUNDWATER**Table 3 - Quarterly monitoring data, Q2**

Parameter	Units	GW1	GW3	GW4	GW5	GW6	GW7
Carbon							
Organic Carbon, Total	mg/l	<3	6.05	3.09	15.4	37	<3
Inorganics							
Alkalinity, Total as CaCO ₃	mg/l	44.2	230	80	395	130	320
Ammoniacal Nitrogen as N	mg/l	<0.2	2.01	0.412	5.61	75	1.06
Chloride	mg/l	50.1	34.1	72.5	15.7	500	47.5
COD, unfiltered	mg/l	37.7	90.5	303	294	157	13.4
Conductivity @ 20 deg.C	mS/cm	0.588	0.711	0.687	0.674	2.91	0.9
Oxygen, dissolved	mg/l	5.34	3.49	3.86	<0.3	5.15	4.92
pH	pH	6.14	7.75	6.45	6.85	5.88	7.55
Sulphate	mg/l	222	182	228	282	355	160
Total Oxidised Nitrogen as N	mg/l	0.553	0.338	0.172	0.115	102	0.01
Filtered (Dissolved) Metals							
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	0.000451	<0.0001	0.00238	<0.0001
Calcium (diss.filt)	mg/l	50.6	80.6	69.7	111	70.2	71.8
Chromium (diss.filt)	mg/l	0.000653	0.00266	0.00113	0.00357	0.00176	0.000567
Copper (diss.filt)	mg/l	<0.00085	<0.00085	0.000925	<0.00085	0.00811	<0.00085
Iron (diss.filt)	mg/l	<0.019	<0.019	0.0352	33.8	0.0563	1.61
Lead (diss.filt)	mg/l	<0.00002	<0.00002	<0.00002	0.000021	0.000286	<0.00002
Magnesium (diss.filt)	mg/l	23.6	29.4	22.3	16.8	32.9	30.1
Manganese (diss.filt)	mg/l	0.44	0.139	4.56	6.14	8.8	0.558
Nickel (diss.filt)	mg/l	0.00127	0.00161	0.0759	0.00307	0.0791	0.0129
Potassium (diss.filt)	mg/l	9.36	13.2	8.1	10.9	56.2	12.5
Sodium (diss.filt)	mg/l	26.4	22.7	36	22.7	326	70.6
Zinc (diss.filt)	mg/l	0.0134	0.00469	0.102	0.000597	0.0662	0.0104
TPH Criteria Working Group (TPH CWG)							
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Toluene	mg/l	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004

APPENDIX 2 - GROUNDWATER**Table 4 - Quarterly monitoring data, Q3**

Parameter	Units	GW1	GW3	GW4	GW5	GW6	GW7
Carbon							
Organic Carbon, Total	mg/l	<3	3.53	<3	10.7	32.5	<3
Inorganics							
Alkalinity, Total as CaCO ₃	mg/l	125	120	115	530	140	320
Ammoniacal Nitrogen as N	mg/l	<0.2	0.33	<0.2	5.55	65.8	1.09
Chloride	mg/l	50.7	72.8	77.6	11.5	471	54.9
COD, unfiltered	mg/l	128	30.7	67.5	368	137	11.4
Conductivity @ 20 deg.C	mS/cm	0.605	0.687	0.709	0.679	2.78	0.876
Oxygen, dissolved	mg/l	6.3	5.43	6.31	<0.3	5.09	4.18
pH	pH	6.16	6.33	6.01	6.74	5.72	7.4
Sulphate	mg/l	226	197	209	151	349	145
Total Oxidised Nitrogen as N	mg/l	0.564	0.135	0.17	0.68	82.8	0.0478
Filtered (Dissolved) Metals							
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	0.000303	<0.0001	0.00247	<0.0001
Calcium (diss.filt)	mg/l	53.6	75.3	75.4	95.6	81.1	72.5
Chromium (diss.filt)	mg/l	0.00175	0.00276	0.0023	0.00305	0.00557	0.00422
Copper (diss.filt)	mg/l	0.00087	0.0015	<0.00085	<0.00085	0.00738	<0.00085
Iron (diss.filt)	mg/l	0.0464	<0.019	0.025	51.3	0.0769	1.08
Lead (diss.filt)	mg/l	<0.00002	<0.00002	<0.00002	0.00004	0.000106	<0.00002
Magnesium (diss.filt)	mg/l	26	31.8	25.8	14.1	40.5	31.2
Manganese (diss.filt)	mg/l	0.394	0.715	0.263	6.88	8.44	1.38
Nickel (diss.filt)	mg/l	0.00149	0.0143	0.0671	0.00372	0.0773	0.0184
Potassium (diss.filt)	mg/l	10.9	8.97	9.49	10.2	58.3	13.7
Sodium (diss.filt)	mg/l	28.2	37.7	38.7	17.2	319	80.8
Zinc (diss.filt)	mg/l	0.00649	0.0165	0.112	0.00671	0.0633	0.0273
TPH Criteria Working Group (TPH CWG)							
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011

APPENDIX 2 - GROUNDWATER**Table 5 – Annual monitoring data, Q4 (detected hazardous substances highlighted)**

Parameter	Units	GW1	GW3	GW4R	GW5	GW6	GW7
Carbon							
Organic Carbon, Total	mg/l	<3	6.71	4.69	7.41	27.2	<3
Inorganics							
Alkalinity, Total as CaCO ₃	mg/l	44.7	104	106	228	35.7	311
Ammoniacal Nitrogen as N	mg/l	<0.2	0.215	<0.2	1.13	64.2	1.12
Chloride	mg/l	45.4	67.6	53.5	10.6	373	51.1
COD, unfiltered	mg/l	83.3	24	20.1	101	152	17.2
Conductivity @ 20 deg.C	mS/cm	20	0.73	0.873	0.467	2.83	0.902
Cyanide, Free	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Oxygen, dissolved	mg/l	7.33	2.41	5.01	0.3	4.39	3.78
pH	pH	7.11	6.12	6.74	6.65	5.65	7.16
Sulphate	mg/l	200	192	346	21.5	324	157
Total Oxidised Nitrogen as N	mg/l	0.639	<0.01	0.326	0.116	176	<0.01
Filtered (Dissolved) Metals							
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	0.000163	0.000197	0.00325	<0.0001
Calcium (diss.filt)	mg/l	48.2	68.7	101	67.2	74.9	71.7
Chromium (diss.filt)	mg/l	0.00203	0.00458	0.00231	0.0325	0.00521	0.00487
Copper (diss.filt)	mg/l	0.00165	0.00133	0.00238	0.0047	0.00693	0.000914
Iron (diss.filt)	mg/l	<0.019	1.26	0.0286	27.6	0.057	3.76
Lead (diss.filt)	mg/l	<0.00002	<0.00002	0.000047	0.000585	0.000517	<0.00002
Magnesium (diss.filt)	mg/l	23.7	25.1	34.9	7.98	36.1	29
Manganese (diss.filt)	mg/l	0.241	0.912	0.781	28	8.26	0.982
Mercury (diss.filt)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.00156	0.0153	0.0396	0.0513	0.129	0.0144
Potassium (diss.filt)	mg/l	9.02	7.86	8.46	6.12	58.5	12.4
Sodium (diss.filt)	mg/l	24.4	34.1	30.6	12.3	325	74.1
Zinc (diss.filt)	mg/l	0.0301	0.0325	0.0471	0.216	0.147	0.00773
Mineral Oil / Oils & Greases							
Mineral oil >C10 C40	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Criteria Working Group (TPH CWG)							
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Toluene	mg/l	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004

APPENDIX 2 - GROUNDWATER

Parameter	Units	GW1	GW3	GW4R	GW5	GW6	GW7
Semi-Volatile Organic Compounds (SVOCs)							
1,2,4-Trichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,4,5-Trichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,4-Dichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,4-Dimethylphenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,4-Dinitrotoluene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2,6-Dinitrotoluene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chloronaphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Methylnaphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Methylphenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
2-Nitrophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
3-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Bromophenylphenylether (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chloro-3-methylphenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chloroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorophenylphenylether (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Methylphenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
4-Nitrophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthylene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Azobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(a)pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(b)fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
bis(2-Chloroethyl)ether (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.008	<0.002	<0.002	<0.002	<0.002	<0.002
Butylbenzyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Carbazole (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzofuran (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Diethyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Dimethyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Fluorene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorocyclopentadiene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachloroethane (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Isophorone (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Naphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
n-Dibutyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
n-Dioctyl phthalate (aq)	mg/l	<0.02	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Pentachlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Phenanthrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Phenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001

APPENDIX 2 - GROUNDWATER

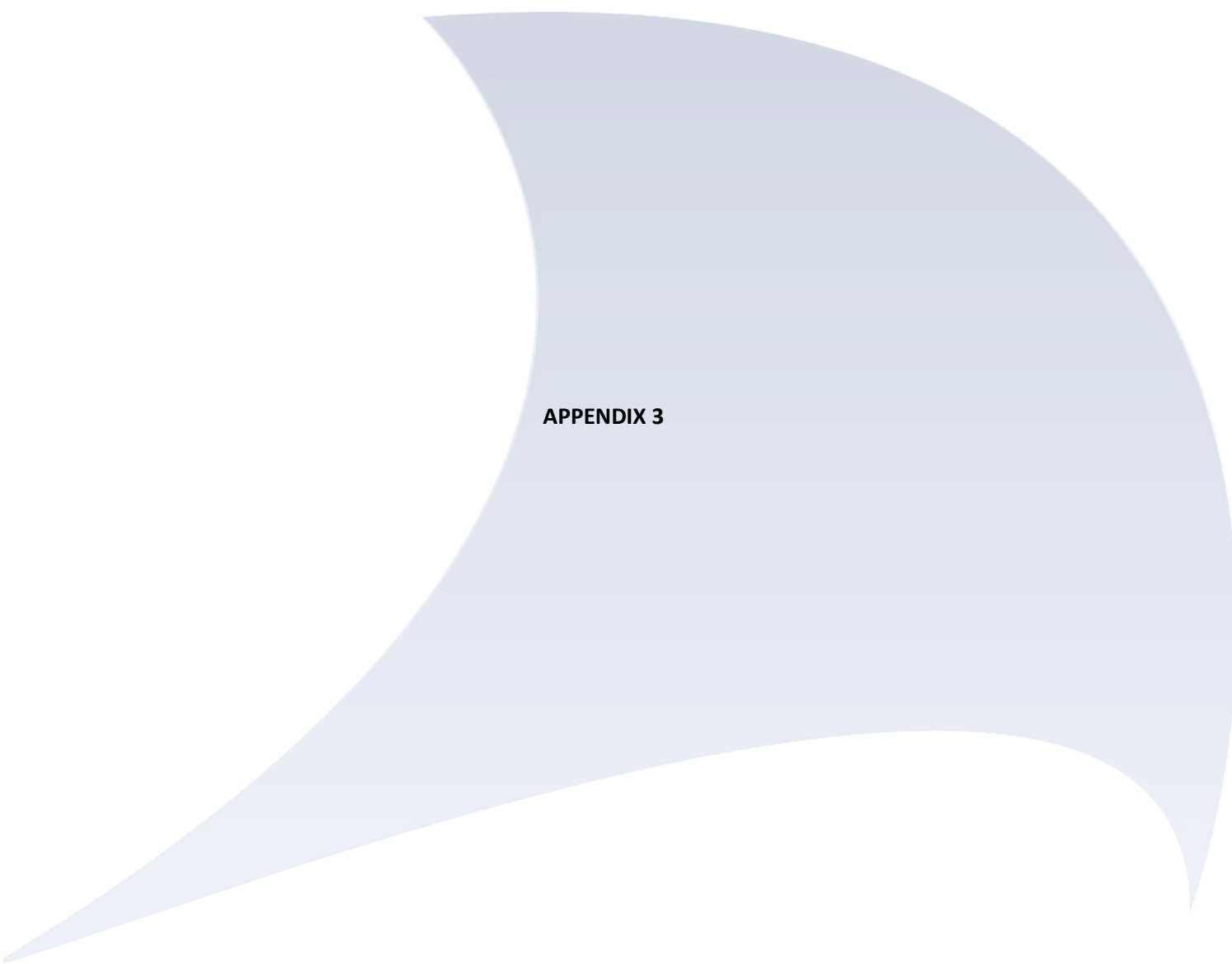
Parameter	Units	GW1	GW3	GW4R	GW5	GW6	GW7
Volatile Organic Compounds (VOCs)							
1,1,1,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001	0.00105	<0.001
1,2,3-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-iso-Propyltoluene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromoform	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon disulphide	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbontetrachloride	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroform	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dichloromethane	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Ethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
m,p-Xylene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methyl tertiary butyl ether (MTBE)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Naphthalene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Propylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Amyl methyl ether (TAME)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
trans-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

APPENDIX 2 - GROUNDWATER

Parameter	Units	GW1	GW3	GW4R	GW5	GW6	GW7
Combined Pesticides / Herbicides							
Aldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Atrazine	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbophenothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Diazinon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dimethoate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Ethion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Etrimphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Fenitrothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Fenthion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Isodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Malathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Methyl parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Mevinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pendimethalin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Phosalone	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Propetamphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Quintozone (PCNB)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Simazine	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tecnazene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Telodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Triadimefon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Triallate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Triazophos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Trifluralin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

APPENDIX 2 - GROUNDWATER

Parameter	Units	GW1	GW3	GW4R	GW5	GW6	GW7
Miscellaneous Organics							
Dibutyl tin	mg/l	<0.000005	<0.000005	<0.000005	<0.00001	<0.000005	<0.000005
Tetrabutyl tin	mg/l	<0.000002	<0.000002	<0.000002	<0.000004	<0.000002	<0.000002
Tributyl tin	mg/l	<0.000001	<0.000001	<0.000001	<0.000002	<0.000001	<0.000001
Triphenyl tin	mg/l	<0.000001	<0.000001	<0.000001	<0.000002	<0.000001	<0.000001
Subcontracted: Organics							
2,4,5-T*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-D*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-DB*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bentazone*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bromoxynil*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dicamba*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dichloroprop*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.0004	<0.00005
Fenoprop*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Ioxynil*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
MCPA*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Mecoprop*	mg/l	<0.00008	<0.00004	<0.00004	<0.00004	0.00267	<0.00004
Triclopyr*	mg/l	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

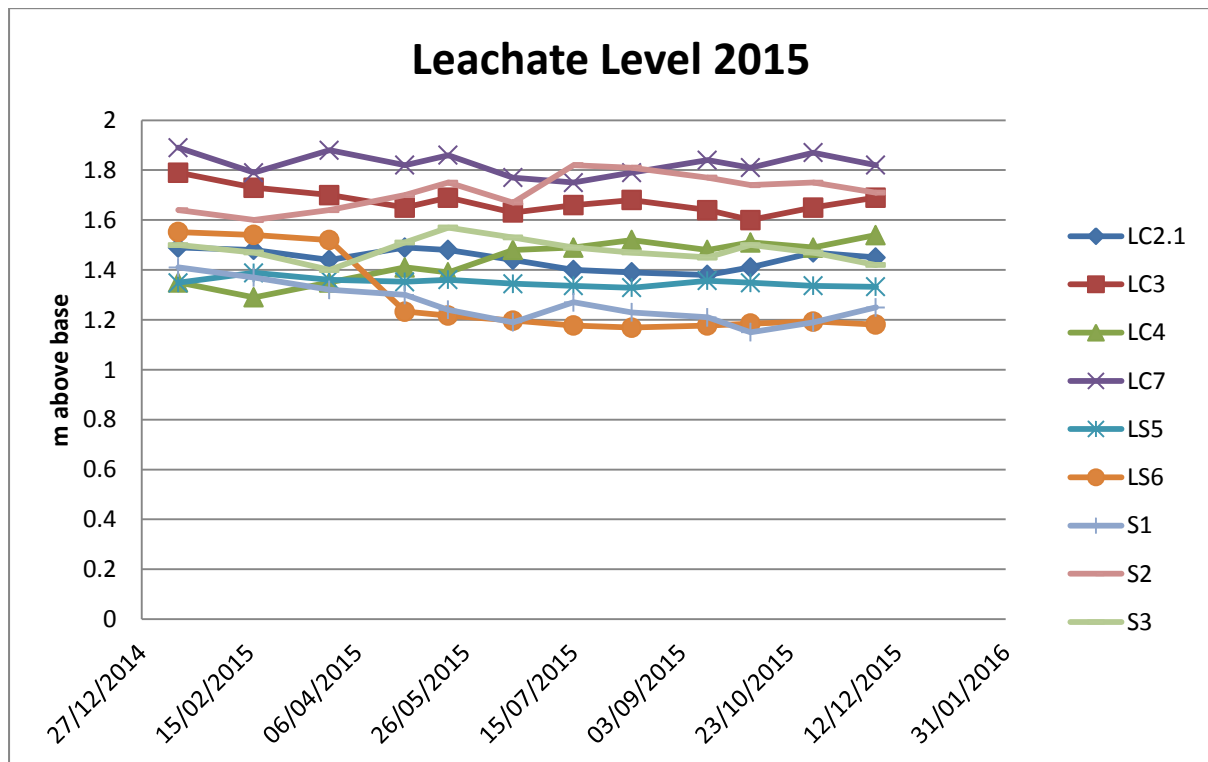


APPENDIX 3

APPENDIX 3 - LEACHATE

Table 1: Leachate Levels

Location	Leachate head (m above cell base)		
	Min	Max	Average
LC2.1	1.38	1.49	1.44
LC3	1.60	1.79	1.68
LC4	1.29	1.54	1.44
LC7	1.75	1.89	1.82
LS5	1.33	1.39	1.35
LS6	1.17	1.55	1.28
S1	1.15	1.41	1.26
S2	1.60	1.82	1.72
S3	1.40	1.57	1.48



APPENDIX 3 - LEACHATE**Table 2 –Leachate monitoring Data, Quarter 1**

Parameter	Units	LC2	LC3	LC4	LC7
Carbon					
Organic Carbon, Total	mg/l	770	533	264	373
Inorganics					
Alkalinity, Total as CaCO₃	mg/l	7680	5700	3930	4530
Ammoniacal Nitrogen as N	mg/l	372	1180	734	734
BOD, unfiltered	mg/l	114	117	36.4	55.9
Chloride	mg/l	2400	1780	1330	1260
COD, unfiltered	mg/l	2280	1780	840	870
pH	pH Units	7.98	7.88	7.96	7.88
Sulphate	mg/l	1.52	29.8	0.874	4.08
Total Oxidised Nitrogen as N	mg/l	0.293	0.0129	0.621	0.455
Filtered (Dissolved) Metals					
Calcium (diss.filt)	mg/l	58.4	74.6	111	78.2
Magnesium (diss.filt)	mg/l	95.4	84.2	92.4	98.2
Potassium (diss.filt)	mg/l	733	591	381	399
Sodium (diss.filt)	mg/l	1840	1380	960	1070

Table 3 – Leachate monitoring data, Quarter 2

Parameter	Units	LC2	LC3	LC4	LC7
Carbon					
Organic Carbon, Total	mg/l	746	519	261	428
Inorganics					
Alkalinity, Total as CaCO₃	mg/l	7820	6360	4160	5080
Ammoniacal Nitrogen as N	mg/l	1530	1050	727	866
BOD, unfiltered	mg/l	117	141	56.7	85
Chloride	mg/l	2150	1740	1160	1330
COD, unfiltered	mg/l	2360	1690	986	1290
pH	pH Units	7.75	7.6	7.78	7.94
Sulphate	mg/l	3.37	10.5	2.76	1.65
Total Oxidised Nitrogen as N	mg/l	<0.01	0.0598	2.59	<0.01
Filtered (Dissolved) Metals					
Calcium (diss.filt)	mg/l	25	52.1	84.8	69.2
Magnesium (diss.filt)	mg/l	41.9	55.2	67.9	87.3
Potassium (diss.filt)	mg/l	242	255	315	489
Sodium (diss.filt)	mg/l	1800	1350	1020	1240

APPENDIX 3 - LEACHATE

Table 4 – Leachate monitoring data, Quarter 3

Parameter	Units	LC2	LC3	LC4	LC7
Carbon					
Organic Carbon, Total	mg/l	915	680	323	396
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	8360	6140	4060	4700
Ammoniacal Nitrogen as N	mg/l	1460	1090	761	759
BOD, unfiltered	mg/l	148	186	92.2	109
Chloride	mg/l	2200	1740	1170	1180
COD, unfiltered	mg/l	2400	1770	998	977
pH	pH Units	7.99	8.05	7.55	7.53
Sulphate	mg/l	1.15	9.02	1.1	1.22
Total Oxidised Nitrogen as N	mg/l	<0.01	<0.01	2.13	<0.01
Filtered (Dissolved) Metals					
Calcium (diss.filt)	mg/l	55.4	86.1	95.6	52.8
Magnesium (diss.filt)	mg/l	102	90.5	78.8	67.4
Potassium (diss.filt)	mg/l	802	659	350	329
Sodium (diss.filt)	mg/l	1940	1470	1030	1140

Table 5 – Leachate monitoring data, Quarter 4 (detected hazardous substances highlighted)

Parameter	Unit	LC2	LC3	LC4	LC7
Carbon					
Organic Carbon, Total	mg/l	892	19.9	345	421
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	8060	5140	4300	4880
Ammoniacal Nitrogen as N	mg/l	1560	-	172	801
BOD, unfiltered	mg/l	102	>81.6	160	87.4
Chloride	mg/l	2140	1330	1180	1190
COD, unfiltered	mg/l	2490	1060	1670	1110
Cyanide, Free	mg/l	<0.05	<0.05	<0.05	<0.05
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05
pH	pH Units	7.81	7.8	8.01	8.23
Sulphate	mg/l	5.21	75.2	1.71	2
Total Oxidised Nitrogen as N	mg/l	<0.25	<0.2	0.333	<0.1
Filtered (Dissolved) Metals					
Cadmium (diss.filt)	mg/l	0.0001	0.000185	<0.0001	<0.0001
Calcium (diss.filt)	mg/l	30.1	56.6	71.2	41.3
Chromium (diss.filt)	mg/l	0.0499	0.036	0.0149	0.0162
Copper (diss.filt)	mg/l	0.00351	0.363	0.00706	<0.00085
Iron (diss.filt)	mg/l	3.04	2.27	0.809	1.67
Lead (diss.filt)	mg/l	0.00223	0.00625	0.000171	0.00025
Magnesium (diss.filt)	mg/l	50.9	41.6	60.4	57.5
Manganese (diss.filt)	mg/l	0.147	0.209	0.175	0.0564
Mercury (diss.filt)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.297	0.191	0.108	0.0489
Potassium (diss.filt)	mg/l	324	251	248	269
Sodium (diss.filt)	mg/l	1550	1030	881	1050
Zinc (diss.filt)	mg/l	0.0232	0.154	0.0182	0.00309
Mineral Oil / Oils & Greases					
Mineral oil >C10 C40 (aq)	mg/l	<0.01	<0.01	<0.01	<0.01

APPENDIX 3 - LEACHATE

Parameter	Unit	LC2	LC3	LC4	LC7
Semi-Volatile Organic Compounds (SVOCs)					
1,2,4-Trichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
1,2-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
1,3-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
1,4-Dichlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2,4,5-Trichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2,4,6-Trichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2,4-Dichlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2,4-Dimethylphenol (aq)	mg/l	<0.004	0.00106	<0.001	<0.002
2,4-Dinitrotoluene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2,6-Dinitrotoluene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2-Chloronaphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2-Chlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2-Methylnaphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2-Methylphenol (aq)	mg/l	<0.004	0.00122	<0.001	<0.002
2-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
2-Nitrophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
3-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Bromophenylphenylether (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Chloro-3-methylphenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Chloroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Chlorophenylphenylether (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Methylphenol (aq)	mg/l	<0.004	0.00123	<0.001	<0.002
4-Nitroaniline (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
4-Nitrophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Acenaphthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Acenaphthylene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Azobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Benzo(a)anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Benzo(a)pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Benzo(b)fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Benzo(g,h,i)perylene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Benzo(k)fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
bis(2-Chloroethyl)ether (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.008	<0.002	<0.002	<0.004
Butylbenzyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Carbazole (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Chrysene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Dibenzo(a,h)anthracene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Dibenzofuran (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Diethyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Dimethyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Fluoranthene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Fluorene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Hexachlorobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Hexachlorobutadiene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Hexachlorocyclopentadiene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Hexachloroethane (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Isophorone (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Naphthalene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
n-Dibutyl phthalate (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
n-Dioctyl phthalate (aq)	mg/l	<0.02	<0.005	<0.005	<0.01
Nitrobenzene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Pentachlorophenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Phenanthrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Phenol (aq)	mg/l	<0.004	<0.001	<0.001	<0.002
Pyrene (aq)	mg/l	<0.004	<0.001	<0.001	<0.002

APPENDIX 3 - LEACHATE

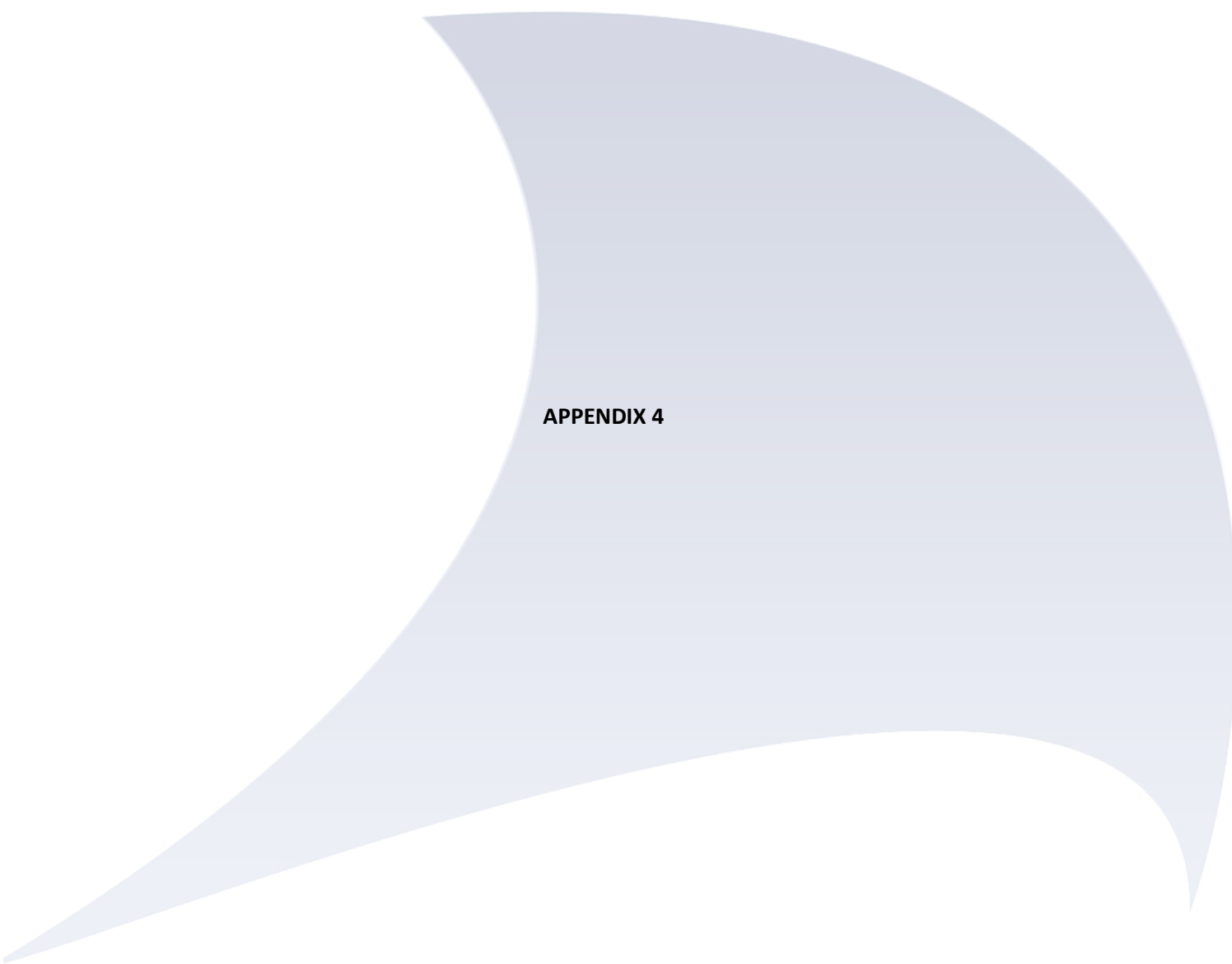
Parameter	Unit	LC2	LC3	LC4	LC7
Volatile Organic Compounds (VOCs)					
1,1,1,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	mg/l	0.00219	<0.001	<0.001	0.00585
1,2-Dibromo-3-chloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,3,5-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	0.00271	0.00118	<0.001	0.00181
1,3-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001
4-iso-Propyltoluene	mg/l	0.00522	<0.001	<0.001	<0.001
Benzene	mg/l	0.00398	0.00281	0.00354	0.00345
Bromobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Bromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Bromoform	mg/l	<0.001	<0.001	<0.001	<0.001
Bromomethane	mg/l	<0.001	<0.001	<0.001	<0.001
Carbon disulphide	mg/l	<0.001	<0.001	<0.001	<0.001
Carbontetrachloride	mg/l	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
Chloroform	mg/l	<0.001	<0.001	<0.001	<0.001
Chloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
cis-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dibromomethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dichloromethane	mg/l	<0.003	<0.003	<0.003	<0.003
Ethylbenzene	mg/l	<0.001	<0.001	<0.001	0.00371
Hexachlorobutadiene	mg/l	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
m,p-Xylene	mg/l	0.00656	<0.001	0.00115	0.0145
Methyl tertiary butyl ether (MTBE)	mg/l	<0.001	<0.001	<0.001	<0.001
Naphthalene	mg/l	0.0129	0.00422	0.0166	0.00605
n-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	0.00915	0.00537	0.00169	0.00557
Propylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	<0.001	<0.001	<0.001	<0.001
tert-Amyl methyl ether (TAME)	mg/l	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.00519	0.00214	<0.001	0.00241
trans-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	mg/l	<0.001	<0.001	<0.001	<0.001

APPENDIX 3 - LEACHATE

Parameter	Unit	LC2	LC3	LC4	LC7
Combined Pesticides / Herbicides					
Aldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Atrazine	mg/l	<0.001	<0.001	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Carbophenothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Diazinon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dimethoate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Ethion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Etrimphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Fenitrothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Fenthion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Isodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Malathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Methyl parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Mevinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Pendimethalin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Phosalone	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Propetamphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Quintozene (PCNB)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Simazine	mg/l	<0.001	<0.001	<0.001	<0.001
Tecnazene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Telodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triadimefon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triallate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triazophos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Trifluralin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001

APPENDIX 3 - LEACHATE

Parameter	Unit	LC2	LC3	LC4	LC7
Miscellaneous Organics					
Dibutyl tin	mg/l	<0.00015	<0.000005	<0.00003	0.000054
Tetrabutyl tin	mg/l	<0.00006	<0.000002	<0.000012	<0.00002
Tributyl tin	mg/l	<0.00003	<0.000001	<0.000006	<0.00001
Triphenyl tin	mg/l	<0.00003	<0.000001	<0.000006	<0.00001
Subcontracted: Organics					
2,4,5-T*	mg/l	<0.002	<0.002	-	<0.0005
2,4-D*	mg/l	<0.002	<0.002	<0.0005	<0.0005
2,4-DB*	mg/l	<0.002	<0.002	<0.0005	<0.0005
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Bentazone*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Bromoxynil*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Dicamba*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Dichloroprop*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Fenoprop*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Ioxynil*	mg/l	<0.002	<0.002	<0.0005	<0.0005
MCPA*	mg/l	<0.002	<0.002	<0.0005	<0.0005
Mecoprop*	mg/l	0.0725	0.0545	0.0295	0.0355
Triclopyr*	mg/l	<0.002	<0.002	<0.0005	<0.0005



APPENDIX 4

APPENDIX 4 – SURFACE WATER

Table 1: Weekly Surface Water Quality

Location	Data	Ammoniacal Nitrogen (mg/l)	Chloride (mg/l)	COD (mg/l)	Conductivity (mS/cm)	pH (pH Units)
SW1	20/02/2015	1.2	209	142	1.2	7.8
	30/06/2015	2.3	-	7000	-	7.2
SW2	20/02/2015	0.2	323	26	1.4	7.8
	30/06/2015	0.4	-	48	-	7.9
SW4	20/02/2015	<0.2	306	20	1.4	8.0
	30/06/2015	19.0	-	2860	-	6.9
SW5	20/02/2015	<0.2	66	31	0.6	7.5
	30/06/2015	<0.2	-	108	-	8.2

APPENDIX 4 – SURFACE WATER**Table 2 – Quarterly monitoring data, Q1**

Parameter	Units	SW1	SW2	SW4	SW5
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	205	155	165	125
Ammoniacal Nitrogen as N	mg/l	0.763	<0.2	<0.2	<0.2
BOD, unfiltered	mg/l	63.9	2.19	<1	<1
COD, unfiltered	mg/l	1010	23.8	17.4	45.3
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05
Nitrate as NO ₃	mg/l	20.1	2.22	9.6	3.74
Nitrite as NO ₂	mg/l	<0.03	0.703	0.417	0.742
pH	pH Units	7.64	7.96	8.02	8.05
Total Oxidised Nitrogen as N	mg/l	4.53	0.716	2.29	1.07
Filtered (Dissolved) Metals					
Arsenic (diss.filt)	mg/l	0.00114	0.000532	0.00079	0.0012
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	<0.0001	<0.0001
Copper (diss.filt)	mg/l	<0.00085	0.00289	0.00422	0.00374
Iron (diss.filt)	mg/l	0.637	0.0641	0.0677	0.0701
Lead (diss.filt)	mg/l	0.000406	0.000163	0.000284	0.00027
Magnesium (diss.filt)	mg/l	19.5	15.1	12.8	25.3
Mercury (diss.filt)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.00345	0.00615	0.0055	0.00464
Potassium (diss.filt)	mg/l	7.05	8.36	8.21	8.24
Sodium (diss.filt)	mg/l	44.5	97.8	50.4	29
Zinc (diss.filt)	mg/l	0.00478	0.00336	0.0103	0.00216
Phenols					
Phenols, Total Detected 5 speciated	mg/l	<0.025	<0.025	<0.025	<0.025

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Combined Pesticides / Herbicides					
Aldrin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Atrazine	mg/l	<0.02	<0.001	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Carbophenothion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Diazinon	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Dimethoate	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Disulfoton	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Endosulphan I	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Endosulphan II	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Endrin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Ethion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Etrimphos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Fenitrothion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Fenthion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Heptachlor	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Isodrin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Malathion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Methyl parathion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Mevinphos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
o,p-DDE	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
o,p-DDT	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
p,p-DDE	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
p,p-DDT	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Parathion	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Pendimethalin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Permethrin I	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Permethrin II	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Phosalone	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Propetamphos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Quintozone (PCNB)	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Simazine	mg/l	<0.02	<0.001	<0.001	<0.001
Tecnazene	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Telodrin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Triadimefon	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Triallate	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Triazophos	mg/l	<0.0002	<0.00001	<0.00001	<0.00001
Trifluralin	mg/l	<0.0002	<0.00001	<0.00001	<0.00001

APPENDIX 4 – SURFACE WATER**Table 3 - Quarterly monitoring data, Q2**

Parameter	Units	SW1	SW2	SW4	SW5
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	520	250	570	185
Ammoniacal Nitrogen as N	mg/l	2.32	0.396	19	<0.2
BOD, unfiltered	mg/l	57.7	4.61	1290	2.41
COD, unfiltered	mg/l	7000	48.1	2860	108
Cyanide, Total	mg/l	<0.05	<0.05	0.07	<0.05
Nitrate as NO ₃	mg/l	7.47	<0.04	<0.2	<0.04
Nitrite as NO ₂	mg/l	1.14	0.484	<0.15	<0.03
pH	pH Units	7.2	7.91	6.88	8.18
Total Oxidised Nitrogen as N	mg/l	2.03	0.153	<0.01	<0.01
Filtered (Dissolved) Metals					
Arsenic (diss.filt)	mg/l	0.00287	0.00152	0.00325	0.0009
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	<0.0001	<0.0001
Copper (diss.filt)	mg/l	<0.00085	0.00107	0.00166	0.00285
Iron (diss.filt)	mg/l	0.143	0.227	10.3	<0.019
Lead (diss.filt)	mg/l	0.000028	0.00014	0.00102	<0.00002
Magnesium (diss.filt)	mg/l	21.2	14.7	5.98	35.1
Mercury (diss.filt)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.00337	0.00567	0.0198	0.00375
Potassium (diss.filt)	mg/l	9.77	7.75	15.8	7.84
Sodium (diss.filt)	mg/l	47.5	74.9	418	29.3
Zinc (diss.filt)	mg/l	<0.00041	0.00254	0.00726	0.000861
Phenols					
Phenols, Total Detected 5 speciated	mg/l	<0.025	<0.025	2.48	<0.025

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Combined Pesticides / Herbicides					
Aldrin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Atrazine	mg/l	<0.2	<0.001	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.002	<0.00001	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Carbophenothion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.002	<0.00001	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Diazinon	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Dimethoate	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Disulfoton	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Endosulphan I	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Endosulphan II	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Endrin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Ethion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Etrimphos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Fenitrothion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Fenthion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Heptachlor	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Isodrin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Malathion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Methyl parathion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Mevinphos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
o,p-DDE	mg/l	<0.002	<0.00001	<0.00001	<0.00001
o,p-DDT	mg/l	<0.002	<0.00001	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.002	<0.00001	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
p,p-DDE	mg/l	<0.002	<0.00001	<0.00001	<0.00001
p,p-DDT	mg/l	<0.002	<0.00001	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.002	<0.00001	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Parathion	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Pendimethalin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Permethrin I	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Permethrin II	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Phosalone	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Propetamphos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Quintozene (PCNB)	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Simazine	mg/l	<0.2	<0.001	<0.001	<0.001
Tecnazene	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Telodrin	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Triadimefon	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Triallate	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Triazophos	mg/l	<0.002	<0.00001	<0.00001	<0.00001
Trifluralin	mg/l	<0.002	<0.00001	<0.00001	<0.00001

APPENDIX 4 – SURFACE WATER**Table 4 - Quarterly monitoring data, Q3**

Parameter	Units	SW4	SW5
Inorganics			
Alkalinity, Total as CaCO ₃	mg/l	50	140
Ammoniacal Nitrogen as N	mg/l	0.267	<0.2
BOD, unfiltered	mg/l	4.43	6.69
COD, unfiltered	mg/l	68.7	31.2
Cyanide, Total	mg/l	<0.05	<0.05
Nitrate as NO ₃	mg/l	1.72	<0.04
Nitrite as NO ₂	mg/l	0.296	<0.03
pH	pH Units	7.5	8.0
Total Oxidised Nitrogen as N	mg/l	0.479	<0.01
Filtered (Dissolved) Metals			
Arsenic (diss.filt)	mg/l	0.000924	0.000485
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001
Copper (diss.filt)	mg/l	<0.00085	<0.00085
Iron (diss.filt)	mg/l	0.0292	<0.019
Lead (diss.filt)	mg/l	<0.00002	<0.00002
Magnesium (diss.filt)	mg/l	2.76	31.5
Mercury (diss.filt)	mg/l	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.00116	0.00177
Potassium (diss.filt)	mg/l	2.29	<1
Sodium (diss.filt)	mg/l	17.6	25.5
Zinc (diss.filt)	mg/l	0.00604	<0.00041
Phenols			
Phenols, Total Detected 5 speciated	mg/l	<0.025	<0.025

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW4	SW5
Combined Pesticides / Herbicides			
Aldrin	mg/l	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001
Atrazine	mg/l	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001
Carbophenothion	mg/l	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.00001	<0.00001
Diazinon	mg/l	<0.00001	<0.00001
Dichlorvos	mg/l	<0.00001	<0.00001
Dieldrin	mg/l	<0.00001	<0.00001
Dimethoate	mg/l	<0.00001	<0.00001
Disulfoton	mg/l	<0.00001	<0.00001
Endosulphan I	mg/l	<0.00001	<0.00001
Endosulphan II	mg/l	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.00001	<0.00001
Endrin	mg/l	<0.00001	<0.00001
Ethion	mg/l	<0.00001	<0.00001
Etrimphos	mg/l	<0.00001	<0.00001
Fenitrothion	mg/l	<0.00001	<0.00001
Fenthion	mg/l	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001
Heptachlor	mg/l	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.00001	<0.00001
Isodrin	mg/l	<0.00001	<0.00001
Malathion	mg/l	<0.00001	<0.00001
Methyl parathion	mg/l	<0.00001	<0.00001
Mevinphos	mg/l	<0.00001	<0.00001
o,p-DDE	mg/l	<0.00001	<0.00001
o,p-DDT	mg/l	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.00001	<0.00001
p,p-DDE	mg/l	<0.00001	<0.00001
p,p-DDT	mg/l	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.00001	<0.00001
Parathion	mg/l	<0.00001	<0.00001
Pendimethalin	mg/l	<0.00001	<0.00001
Permethrin I	mg/l	<0.00001	<0.00001
Permethrin II	mg/l	<0.00001	<0.00001
Phosalone	mg/l	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.00001	<0.00001
Propetamphos	mg/l	<0.00001	<0.00001
Quintozene (PCNB)	mg/l	<0.00001	<0.00001
Simazine	mg/l	<0.001	<0.001
Tecnazene	mg/l	<0.00001	<0.00001
Telodrin	mg/l	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.00001	<0.00001
Triadimefon	mg/l	<0.00001	<0.00001
Triallate	mg/l	<0.00001	<0.00001
Triazophos	mg/l	<0.00001	<0.00001
Trifluralin	mg/l	<0.00001	<0.00001

APPENDIX 4 – SURFACE WATER**Table 5 - Annual monitoring data, Q4**

Parameter	Units	SW1	SW2	SW4	SW5
Carbon					
Organic Carbon, Total	mg/l	12.9	7.87	8.97	12.8
Inorganics					
Alkalinity, Total as CaCO ₃	mg/l	875	135	160	42.5
Ammoniacal Nitrogen as N	mg/l	0.664	<0.2	0.378	<0.2
Chloride	mg/l	54.3	34.7	36.4	21.4
COD, unfiltered	mg/l	679	24.7	39.5	35.8
Conductivity @ 20 deg.C	mS/cm	0.78	0.542	0.604	0.232
Cyanide, Free	mg/l	<0.05	<0.05	<0.05	<0.05
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05
Oxygen, dissolved	mg/l	<0.3	7.07	7.13	9.52
pH	pH Units	7.21	7.9	7.74	7.46
Sulphate	mg/l	364	105	120	40
Total Oxidised Nitrogen as N	mg/l	<0.05	0.873	1.63	0.763
Filtered (Dissolved) Metals					
Cadmium (diss.filt)	mg/l	<0.0001	<0.0001	<0.0001	<0.0001
Calcium (diss.filt)	mg/l	101	68	86	21.6
Chromium (diss.filt)	mg/l	0.00137	0.00191	0.0128	0.00799
Copper (diss.filt)	mg/l	0.00142	0.00436	0.00449	0.00524
Iron (diss.filt)	mg/l	0.219	0.05	0.107	0.115
Lead (diss.filt)	mg/l	0.00011	0.000212	0.000279	0.000448
Magnesium (diss.filt)	mg/l	17.2	11.5	11	4.3
Manganese (diss.filt)	mg/l	1.11	0.0515	0.0256	0.0102
Mercury (diss.filt)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Nickel (diss.filt)	mg/l	0.00415	0.00546	0.0514	0.0378
Potassium (diss.filt)	mg/l	7.87	7.44	8.16	4.21
Sodium (diss.filt)	mg/l	39.1	26.2	25.2	17.6
Zinc (diss.filt)	mg/l	0.000905	0.00383	0.00848	0.012
Mineral Oil / Oils & Greases					
Mineral oil >C10 C40 (aq)	mg/l	0.916	<0.01	<0.01	<0.01
TPH Criteria Working Group (TPH CWG)					
Sum of detected Xylenes	mg/l	<0.011	<0.011	<0.011	<0.011
Toluene	mg/l	<0.004	<0.004	<0.004	<0.004

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Semi-Volatile Organic Compounds (SVOCs)					
1,2,4-Trichlorobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
1,2-Dichlorobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
1,3-Dichlorobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
1,4-Dichlorobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,4,5-Trichlorophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,4-Dichlorophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,4-Dimethylphenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,4-Dinitrotoluene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2,6-Dinitrotoluene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Chloronaphthalene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Chlorophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Methylnaphthalene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Methylphenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Nitroaniline (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
2-Nitrophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
3-Nitroaniline (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Bromophenylphenylether (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Chloro-3-methylphenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Chloroaniline (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Chlorophenylphenylether (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Methylphenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Nitroaniline (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
4-Nitrophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Acenaphthene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Acenaphthylene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Anthracene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Azobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Benzo(a)anthracene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Benzo(a)pyrene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Benzo(b)fluoranthene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Benzo(k)fluoranthene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
bis(2-Chloroethyl)ether (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.04	<0.002	<0.002	<0.002
Butylbenzyl phthalate (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Carbazole (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Chrysene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Dibenzofuran (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Diethyl phthalate (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Dimethyl phthalate (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Fluoranthene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Fluorene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Hexachlorobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Hexachlorobutadiene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Hexachlorocyclopentadiene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Hexachloroethane (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Isophorone (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Naphthalene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
n-Dibutyl phthalate (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
n-Dioctyl phthalate (aq)	mg/l	<0.1	<0.005	<0.005	<0.005
Nitrobenzene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Pentachlorophenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Phenanthrene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Phenol (aq)	mg/l	<0.02	<0.001	<0.001	<0.001
Pyrene (aq)	mg/l	<0.02	<0.001	<0.001	<0.001

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Volatile Organic Compounds (VOCs)					
1,1,1,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,3,5-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001
4-iso-Propyltoluene	mg/l	<0.001	<0.001	<0.001	<0.001
Benzene	mg/l	<0.001	<0.001	<0.001	<0.001
Bromobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Bromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Bromoform	mg/l	<0.001	<0.001	<0.001	<0.001
Bromomethane	mg/l	<0.001	<0.001	<0.001	<0.001
Carbon disulphide	mg/l	0.00335	<0.001	<0.001	<0.001
Carbontetrachloride	mg/l	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/l	<0.001	<0.001	<0.001	<0.001
Chloroform	mg/l	<0.001	<0.001	<0.001	<0.001
Chloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
cis-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dibromomethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Dichloromethane	mg/l	<0.003	<0.003	<0.003	<0.003
Ethylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	mg/l	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
m,p-Xylene	mg/l	<0.001	<0.001	<0.001	<0.001
Methyl tertiary butyl ether (MTBE)	mg/l	<0.001	<0.001	<0.001	<0.001
Naphthalene	mg/l	<0.001	<0.001	<0.001	<0.001
n-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	<0.001	<0.001	<0.001	<0.001
Propylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	<0.001	<0.001	<0.001	<0.001
tert-Amyl methyl ether (TAME)	mg/l	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	<0.001	<0.001	<0.001	<0.001
trans-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	mg/l	<0.001	<0.001	<0.001	<0.001

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Combined Pesticides / Herbicides					
Aldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
alpha-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Atrazine	mg/l	<0.001	<0.001	<0.001	<0.001
Azinphos-ethyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
beta-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Carbophenothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorfenvinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorothalonil	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Chlorpyrifos methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
cis-Chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Diazinon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Dimethoate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan sulphate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Endrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Ethion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Etrimphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Fenitrothion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Fenthion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
gamma-Hexachlorocyclohexane (HCH / Lindane)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Heptachlor epoxide	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Isodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Malathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Methyl parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Mevinphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
o,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDE	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-DDT	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-Methoxychlor	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
p,p-TDE (DDD)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Parathion	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Pendimethalin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin I	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Permethrin II	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Phosalone	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Pirimiphos-methyl	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Propetamphos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Quintozone (PCNB)	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Simazine	mg/l	<0.001	<0.001	<0.001	<0.001
Tecnazene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Telodrin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Trans-chlordane	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triadimefon	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triallate	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Triazophos	mg/l	<0.00001	<0.00001	<0.00001	<0.00001
Trifluralin	mg/l	<0.00001	<0.00001	<0.00001	<0.00001

APPENDIX 4 – SURFACE WATER

Parameter	Units	SW1	SW2	SW4	SW5
Miscellaneous Organics					
Dibutyl tin	mg/l	<0.00005	<0.000005	<0.000005	<0.000005
Tetrabutyl tin	mg/l	<0.00002	<0.000002	<0.000002	<0.000002
Tributyl tin	mg/l	<0.00001	<0.000001	<0.000001	<0.000001
Triphenyl tin	mg/l	<0.00001	<0.000001	<0.000001	<0.000001
Subcontracted: Organics					
2,4,5-T*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
2,4-D*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
2,4-DB*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Bentazone*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Bromoxynil*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Dicamba*	mg/l	<0.00005	<0.00005	<0.00005	0.00005
Dichloroprop*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Fenoprop*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Ioxynil*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
MCPA*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005
Mecoprop*	mg/l	<0.00004	<0.00004	<0.00004	<0.00004
Triclopyr*	mg/l	<0.00005	<0.00005	<0.00005	<0.00005



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