

Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Standard Landfill Site

Flintshire County Council Waste Management Services

Environmental Management

Annual Review 2022

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Annual Review 2022**TABLE OF CONTENTS**

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Site Location and Surrounding Land Use	1
1.3	Site History and Development	1
2.0	ENVIRONMENTAL CONTEXT	2
2.1	Geology	2
2.2	Hydrogeology	2
2.3	Hydrology	2
3.0	LANDFILL GAS	3
3.1	Introduction	3
3.2	Perimeter Boreholes	3
4.0	LEACHATE	5
4.1	Introduction	5
4.2	Leachate Levels	5
4.3	Leachate Quality	5
5.0	GROUNDWATER	7
5.1	Introduction	7
5.2	Groundwater Levels	7
5.3	Groundwater Quality	7
6.0	SURFACE WATER.....	9
6.1	Introduction	9
6.2	Surface Water Quality	9
7.0	CONCLUSIONS	10
7.1	Landfill Gas	10
7.2	Leachate	10
7.3	Groundwater	10
7.4	Surface Water	10

DRAWINGS

10439a Standard 22-05-2019 Environmental Monitoring Locations

APPENDICES

Appendix 1	Perimeter Landfill Gas Monitoring Summary Table
Appendix 2	Leachate Level and Quality Summary Tables
Appendix 3	Groundwater Level and Quality Summary Tables
Appendix 4	Surface Water Quality Summary Table
Appendix 5	Surface Emissions Survey

1.0 INTRODUCTION

1.1 Background

- 1.1.1 This report has been compiled in accordance with the Environmental Permit (EPR), ref. EPR/BP3390VA (previously EAWML 37073) for Standard Landfill Site, Buckley, which requires an annual review of the monitoring data collected at the site. Standard Landfill is a Closed Landfill, confirmed by Natural Resources Letter ref. 37073/ML1/05, dated 17th May 2018, in approval of the Closure Plan ref. 3031-CAU-XX-XX-RP-V-0304.A0-C3.
- 1.1.2 The data reviewed by this report was collected between the 1st of January and the 31st of December 2022. 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 northeast 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 is 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. Official closure was granted by NRW on the 17th May 2018.

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 500 m 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, except for the last quarter where monitoring was done monthly, at 29 perimeter boreholes during the review period. Methane, carbon dioxide, oxygen, carbon monoxide, hydrogen sulphide, relative pressure and atmospheric pressure were all recorded during each monitoring visit. In waste gas is monitored annually via trace gas analysis and engine and flare emissions testing.
- 3.1.2 Borehole locations are shown on the attached Environmental Monitoring Locations drawing ref. 10439a.
- 3.1.3 A summary and time series graphs displaying methane and carbon dioxide concentrations and can be found in Appendix 1.

3.2 Perimeter Boreholes

Methane

- 3.2.1 Methane was only detected at BH22 during 2022 but remained below the compliance limit (1.0 %). Concentrations ranged from 0.1 % to 0.2 % within BH22. All other locations remained below 0.0 % throughout the review period.

Carbon Dioxide

- 3.2.2 Carbon dioxide was detected at all locations throughout the review period but did not exceed compliance limits during 2022. Average carbon dioxide concentrations ranged from 0.88 % (BH5.1) and 1.72 % (BH3.0).

Carbon Monoxide and Hydrogen Sulphide

- 3.2.3 No carbon monoxide or hydrogen sulphide was detected at any of the monitoring locations during 2022.

Surface Emissions Monitoring

- 3.2.4 A surface emissions survey was undertaken on the 16th September 2022 by Caulmert Ltd, in accordance with the Permit and methodology defined in LFTGN07 'Guidance on monitoring landfill gas surface emissions'. A Flame Ionisation Detector (FID) was used to complete a walkover survey of the entire site following a 50m square grid, to include all landfill gas and leachate extraction installations, monitoring points, pipework, manifolds, interfaces between capped zones and the landfill perimeter to identify any point source landfill gas emissions. The full report is included in Appendix 5.

- 3.2.5 There were 8 Point Source Emissions (PSEs) identified during the survey, and of these, only 1 location was above the upper limit of detection (>10,000 ppm). This is a decrease from last year (2021) when 5 PSEs were detected above the upper detection limit, out of a total of 12.
- 3.2.6 Lower ambient emissions (50 – 1500 ppm) were detected at the seven remaining locations in 2022. These concentrations were inside the locked concrete chambers that the wells are located in. The specific point of these emissions could not be identified at the well itself.
- 3.2.7 No emissions were detected on the ground surface away from wells or pipework. There were no signs of vegetation die-back on the site.

Engine and Flare Emissions Monitoring

- 3.2.8 Trace gas and emissions surveys for the landfill gas utilisation plant and landfill gas flare are due to be conducted on the 7th February 2023 and will be submitted separately.

4.0 LEACHATE

4.1 Introduction

- 4.1.1 Leachate levels at nine leachate monitoring locations were recorded monthly. Samples from all chambers were collected and analysed quarterly. Samples were tested for a suite of metals and hazardous substances in the fourth quarter.
- 4.1.2 Previously monitored leachate collection point, LC2 could not be accessed, so a nearby well was utilised during 2021. This has been referred to as LC2.1 for the purpose of the Review.
- 4.1.3 Well locations are shown on the Environmental Monitoring Locations drawing ref. 10439a.

4.2 Leachate Levels

- 4.2.1 Leachate levels were recorded on a monthly basis. Time series graphs displaying leachate levels, in metres above cell base and mAOD, can be found in Appendix 2.
- 4.2.2 All leachate levels remained very stable throughout the 2022 review period. On average, the highest leachate levels were recorded in LC7 at 1.71 meters above the base, comparable to previous reviews. All locations remained below the compliance limit of 2 meters above base throughout the review. It should be noted that the base levels are unconfirmed, and the accuracy of these leachate 'head' figures cannot be verified.
- 4.2.3 The leachate levels in meters above ordnance datum (mAOD) calculations for all locations, based on recent top of well surveys, show that all leachate levels were comparable to those detected previously. Average levels ranged from 104.50 mAOD at LS5 to 132.69 mAOD at LC7. Levels were comparable to those seen in the previous annual reviews.
- 4.2.4 The locations LS5 and LS6 are side slope risers which are alternatively referred to as SSR5 and SSR6 or SUMPR5 and SUMPR6. These locations cannot provide accurate representations of the leachate height above base in these chambers due to the sloping nature of the installations, however, the leachate levels are provided to assist in monitoring of the leachate levels in these phases.
- 4.2.5 Leachate is pumped from Standard Landfill to a holding tank (HT). Leachate is then tankered to the leachate treatment plant at the nearby Brookhill Landfill Site. The quality of the final discharge from this plant is discussed in the environmental monitoring data reviews for Brookhill Landfill Site.

4.3 Leachate Quality

- 4.3.1 Concentrations of ammoniacal nitrogen (as N) fluctuated throughout the review period. The highest concentration occurred in LC2.1 at 1500 mg/l in September 2022, which is similar to the previous annual review's maximum of 1390 mg/l in September 2021, also in LC2.1. Average concentrations of ammoniacal nitrogen were from 355.1 mg/l in S1 to 1375 mg/l in LC2.1. The average ammoniacal nitrogen concentrations were slightly elevated in 2022 when

compared to the previous annual review's average which ranged from 75.44 mg/l in S1 to 910 mg/l in LC2.1 during 2021.

- 4.3.2 Chloride concentrations in leachate ranged between 68.1 mg/l in S2 to 2280 mg/l in LC2.1 during 2022. LC2.1 had the highest average chloride concentration during 2022 of 2015 mg/l.
- 4.3.3 The highest COD concentration was observed in LC7 where a concentration of 2300 mg/l was recorded in June 2022. The lowest COD concentration was 7.26 mg/l detected in LC2 in March 2022.
- 4.3.4 The pH remained relatively stable at all locations during 2022, ranging between 7.26 at S1 and 8.29 in SSR6, comparable to the previous review period.
- 4.3.5 In total, 18 substances were detected of the 191 parameters tested for in the annual suite. These concentrations are highlighted below in Table 1:

Table 1 – Hazardous Substances detected within the Leachate

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
Cyanide, Total	mg/l	0.56	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.58	0.57
Mineral Oil / Oils & Greases											
Mineral oil >C10 C40 (aq)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.107	<0.1	<0.1
Semi-Volatile Organic Compounds (SVOCs)											
2,4-Dimethylphenol (aq)	mg/l	<0.02	0.0217	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Volatile Organic Compounds (VOCs)											
1,2,4-Trimethylbenzene	mg/l	0.00526	0.021	<0.001	<0.001	0.0088	0.00162	<0.001	0.00156	0.00581	0.00546
1,3,5-Trimethylbenzene	mg/l	0.0025	0.00422	<0.001	<0.001	0.00424	0.00479	<0.001	0.00182	0.0026	0.00224
1,4-Dichlorobenzene	mg/l	0.00181	0.00271	<0.001	0.00123	0.0026	0.00147	<0.001	<0.001	0.00184	0.00175
4-iso-Propyltoluene	mg/l	0.00149	0.0101	<0.001	<0.001	0.00799	0.02	<0.001	0.00732	0.00183	0.00194
Benzene	mg/l	0.00322	0.00451	<0.001	0.00152	0.00429	0.00173	<0.001	0.00126	0.00308	0.00292
Bromoform	mg/l	<0.001	<0.001	<0.001	<0.001	0.00126	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	0.00284	0.00789	0.00103	0.0026	0.00678	<0.001	<0.001	<0.001	0.00287	0.0032
Chloroethane	mg/l	<0.001	<0.001	0.00182	0.00481	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/l	0.00362	0.0171	<0.001	<0.001	0.00554	<0.001	<0.001	<0.001	0.00448	0.00441
Isopropylbenzene	mg/l	<0.001	0.00461	<0.001	<0.001	0.00149	<0.001	<0.001	<0.001	<0.001	<0.001
m,p-Xylene	mg/l	0.00844	0.0362	<0.001	<0.001	0.021	0.00647	<0.001	0.00288	0.00891	0.0077
Naphthalene	mg/l	0.00343	0.0113	<0.001	<0.001	0.0088	<0.001	<0.001	0.00274	0.00403	0.00337
o-Xylene	mg/l	0.0109	0.016	<0.001	<0.001	0.014	0.014	<0.001	0.00668	0.0111	0.0101
Propylbenzene	mg/l	<0.001	0.00112	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.00204	0.00831	<0.001	<0.001	0.00678	0.00574	<0.001	0.0045	0.002	0.00191

5.0 GROUNDWATER

5.1 Introduction

5.1.1 Groundwater levels were recorded on a monthly basis at groundwater monitoring boreholes GW1, GW2R, GW3, GW4R, GW5, GW6 and GW7R. Location GW2R was installed in October 2016 to replace GW2.

5.1.2 GW3, GW4R, GW6 and GW7R are considered downgradient of the site and are subject to a Permit Compliance Limit of 6.4 mg/l for ammoniacal nitrogen.

5.1.3 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.

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

5.2 Groundwater Levels

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

5.2.2 Groundwater levels follow the same trend at the majority of the boreholes with a gradual decrease from January through to August, followed by a more pronounced increase towards the end of the monitoring period in December. This is consistent with seasonal trends.

5.2.3 GW5 remains relatively stable throughout the year and does not fluctuate as much as other boreholes. The average level in GW5 is 131.59 mAOD, similar to previous reviews.

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

5.3 Groundwater Quality

5.1.1 Ammoniacal nitrogen concentrations were highest in GW5, with a maximum of 3.61 mg/l and an average of 1.3 mg/l. The lowest ammoniacal concentrations were detected in GW1, GW2R, GW4R, GW6 and GW7 where on average concentrations were below the limit of detection (<0.2 mg/l). Concentrations remained below the compliance limit of 6.4 mg/l throughout the review period at all wells. This represents a vast improvement over previous reviews where concentrations were decreasing but remained above the compliance limit.

- 5.1.2 Average chloride concentrations were lowest in GW5 at 10.0 mg/l and highest in GW1 at 54.0 mg/l. The peak concentration at GW7 at 64.5 mg/l detected in June 2022, following which concentrations reduced to 7.3 mg/l in September.
- 5.1.3 The highest chemical oxygen demand (COD) concentrations were detected at GW5 3230 mg/l in June 2022. This is an increase from the previous annual review maximum concentrations of 2270 mg/l in March 2021, also in GW5. Concentrations in the remaining locations varied from 7.69 mg/l at GW3 to 228 mg/l in GW2R.
- 5.1.4 Concentrations of lead were below the detection limit (<0.2 µg/l) at all locations throughout 2022.
- 5.1.5 Iron concentrations ranged from less than the limit of detection (<0.019 mg/l) in all wells to a maximum of 6.19 mg/l in GW3 during June 2022.
- 5.1.6 On average, potassium concentrations were highest in GW3 at 10.79 mg/l, with a maximum of 12.6 mg/l in June 2022. Concentrations at the remaining locations were between 1.7 mg/l (GW5) and 11.3 mg/l (GW2R), comparable to the previous review period.
- 5.1.7 Sodium concentrations were highest in GW3, with a maximum of 52.5 mg/l in March 2022, which is comparable to the maximum of 63.8 mg/l in June 2021.
- 5.1.8 Magnesium concentrations were relatively stable throughout the review period. As in the previous review the highest magnesium concentrations were detected within GW3 at a maximum of 44 mg/l in March 2022, and an average of 36.4 mg/l, which is comparable to the average of 35.9 mg/l in 2021. As noted in the previous review, magnesium concentrations continued to decrease in GW6, which are now comparable to the background concentrations observed at the other monitoring points.
- 3.1.1 Nickel concentrations were relatively low at all locations. The highest concentrations were detected in GW6, with a maximum of 0.518 mg/l in November 2022.
- 3.1.2 No phenols or free cyanide were detected at any of the monitoring locations across the site in 2022. No mineral oils were detected in 2022, except in GW5 in November 2022, with a concentration of 1.51 mg/l.
- 3.1.3 No volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), herbicides or pesticides were detected within the annual suite for groundwater in November 2022.

6.0 SURFACE WATER

6.1 Introduction

6.1.1 Surface water samples were routinely collected from three locations during 2022: SW4, SW5 and SW6 which are shown on the Environmental Monitoring Locations drawing ref. 10439a.

6.1.2 SW5 is the first pond in a series of 3 surface water collection lagoons for runoff from the landfill. This sample point is subject to Permit Compliance Limits of 1.0 mg/l ammoniacal nitrogen and 105 mg/l of chloride.

6.1.3 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 and total phenols.

6.1.4 A summary of the laboratory analysis of the surface water samples is presented in Appendix 4.

6.2 Surface Water Quality

6.2.1 Ammoniacal nitrogen concentrations remained below the detection limit (<0.02 mg/l) at SW4 and SW6 throughout 2022, and ammoniacal concentrations in SW5 ranged from <0.3 mg/l to 0.707 mg/l, with an average of 0.4 mg/l.

6.2.2 Average COD concentrations ranged between 37.6 mg/l (SW4) and 580.4 mg/l (SW6). The highest COD concentration was detected in SW6 in June 2022 at 2160 mg/l, a significant increase on last year's highest COD at SW6 of 81.6 mg/l.

6.2.3 Chloride concentrations at SW5 remained below the compliance limit throughout 2022, with a maximum concentration of 30.7 mg/l in November 2022. This is an increase on the previous annual review's maximum of 21.3 mg/l in 2021. Chloride concentrations within SW4 showed a slight decrease towards the end of the review period, from 64.2 mg/l in March, down to 35.3 mg/l in November 2022.

6.2.4 The pH in the surface water was higher in the first quarter of 2022 in all locations, ranging from 7.78 in SW4 to 7.84 in SW6. The pH then decreased in September 2022 in all locations, ranging from 6.97 in SW6 to 7.62 in SW4. The pH at all locations for the year were on average near neutral.

6.2.5 Sulphate concentrations ranged from 47.4 mg/l in SW5 to 194 mg/l in SW6 during 2022.

7.0 CONCLUSIONS

7.1 Landfill Gas

- 7.1.1 Methane was only detected at BH22 during 2022 but remained below the compliance limit of 1.0 %.
- 7.1.2 Carbon dioxide was detected at all locations throughout the review period but did not exceed compliance limits during 2022.

7.2 Leachate

- 7.2.1 All leachate levels remained relatively stable throughout the review period with no significant fluctuations at all locations.
- 7.2.2 Leachate quality results indicate that a medium to strong leachate is present. This is to be expected given the age of the waste mass and the closed and capped nature of the site.
- 7.2.3 There were 18 hazardous substances detected above the limit of detection within the leachate as part of the annual suite.

7.3 Groundwater

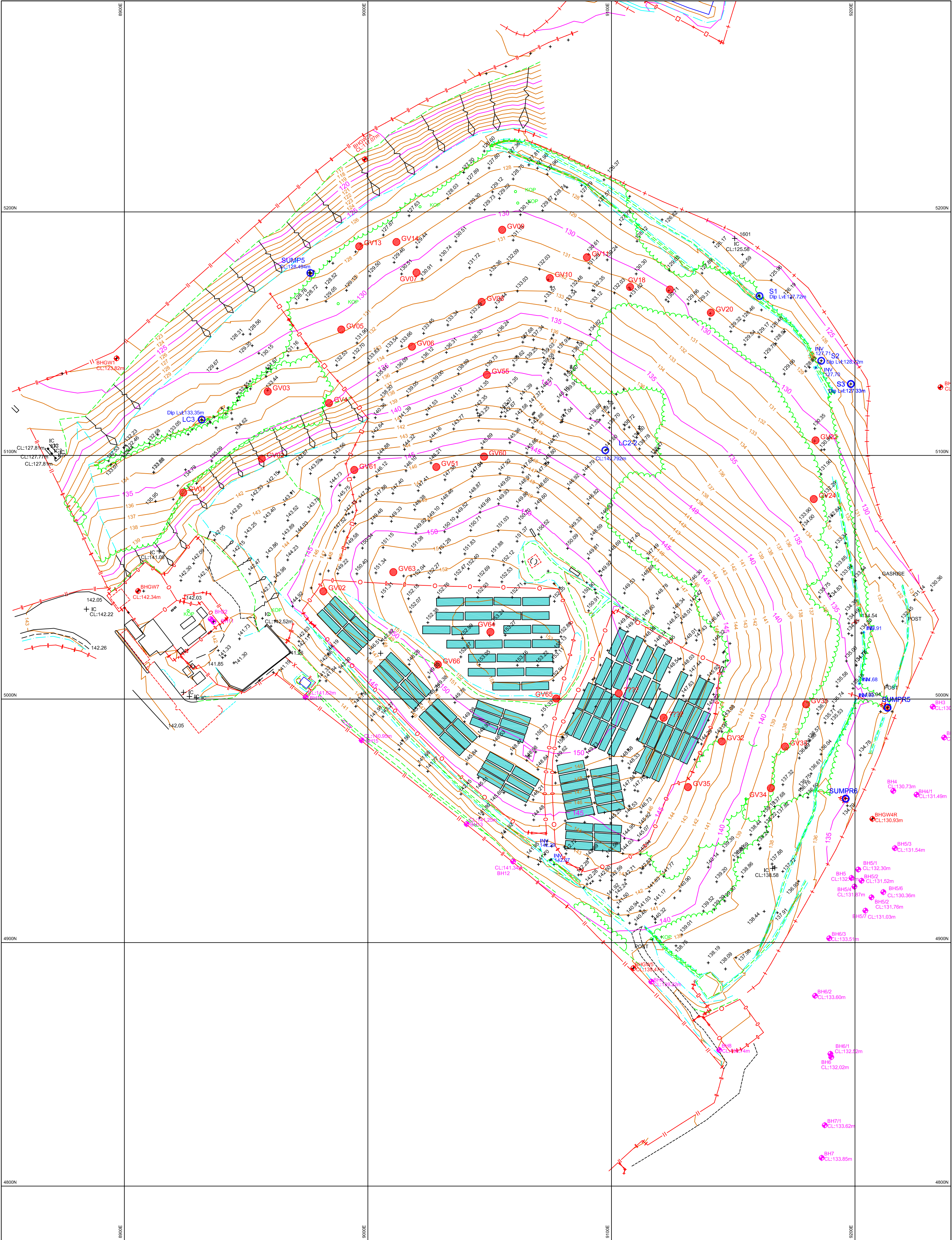
- 7.3.1 Groundwater levels follow the same trend at the majority of the boreholes with a gradual decrease from January through to August, followed by a more pronounced increase towards the end of the monitoring period in December. This is consistent with seasonal trends.
- 7.3.2 Key leachate indicator parameters have continued to decrease in concentration over 2022 in GW6, as per previous annual review periods, namely magnesium and ammoniacal nitrogen.
- 7.3.3 No phenols or free cyanide were detected at any of the monitoring locations across the site in 2022, with only one location detecting very low concentrations of mineral oil. Similarly, no volatile organic compounds, semi-volatile organic compounds, herbicides or pesticides were detected within the annual suite for groundwater.

7.4 Surface Water

- 7.4.1 No ammoniacal nitrogen was detected at SW4 or SW6 throughout the review period, with only low concentrations detected in SW5 during 2022.
- 7.4.2 The chloride compliance limit for SW5 was not exceeded during 2022.
- 7.4.3 The pH of surface water at all locations fluctuated slightly during 2022 but remained on average near neutral.
- 7.4.4 Overall, surface water quality at the Site was of good quality, indicating that there is little discernible impact from the landfill on the surrounding water course.

DRAWINGS

12439a Standard 22-07-2022 Environmental Monitoring
Locations



SITE

Standard
Landfill

PROJECT

Site
Survey

SCALE

1:1000 @ A2

DATE

22/07/2022

DRAWING No.

12439a

CLIENT



CYNFOR
Sir y Fflint
Flintshire
COUNTY COUNCIL
English Cymraeg

NOTES

Site Grid Shown
Levels Relate to Site Datum

 Groundwater Borehole

 Borehole

 Solar Panel

 LC5

 GV31

Leachate Well

Gas Vent Switched On



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Vernon Courtyard, Main Road, Sudbury, Derbyshire, DE6 5HS
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APPENDIX 1

Perimeter Landfill Gas Monitoring Summary Table

APPENDIX 1 – LANDFILL GAS

Table 1: Perimeter Landfill Gas

ID	Methane					Carbon Dioxide				
	Min	Max	Average	Count	Trigger	Min	Max	Average	Count	Trigger
STBH 1.0	0	0	0	12	1	1.1	1.4	1.22	12	5.4
STBH 1.1	0	0	0	12	1	1.2	1.9	1.55	12	5.4
STBH 2.0	0	0	0	12	1	0.9	1.6	1.22	12	7
STBH 2.1	0	0	0	12	1	1.1	1.6	1.36	12	7.6
STBH 2.2	0	0	0	12	1	1.1	1.4	1.28	12	5.8
STBH 3.0	0	0	0	12	1	1.4	2	1.72	12	6.7
STBH 3.1	0	0	0	12	1	1	1.5	1.28	12	7.8
STBH 4.0	0	0	0	12	10	1	1.7	1.29	12	10.6
STBH 4.1	0	0	0	12	1	1.1	1.6	1.37	12	7.1
STBH 4.2	0	0	0	12	1	1.1	2.3	1.52	12	8.6
STBH 5.0	0	0	0	12	15	1.2	1.8	1.44	12	19.4
STBH 5.1	0	0	0	12	1	0.5	1.4	0.88	12	5.8
STBH 5.2	0	0	0	12	1	1.1	1.6	1.28	12	9.6
STBH 5.3	0	0	0	12	1	1.2	1.9	1.62	12	6
STBH 5.4	0	0	0	12	1	0.4	1.8	1.13	12	8.3
STBH 5.5	0	0	0	12	1	1.1	1.6	1.36	12	3
STBH 5.7	0	0	0	12	1.6	1.1	1.4	1.27	12	3.1
STBH 6.0	0	0	0	12	1	1.2	1.9	1.42	12	16
STBH 6.1	0	0	0	12	1	1.2	1.6	1.41	12	17.1
STBH 6.2	0	0	0	12	1	1.1	2	1.47	12	7.1
STBH 6.3	0	0	0	12	1	1.4	2	1.58	12	5.4
STBH 7.0	0	0	0	12	1	1.2	2.1	1.60	12	5.4
STBH 7.1	0	0	0	12	1	1	2	1.38	12	5.4
STBH 12	0	0	0	12	1	0.6	1.9	1.22	12	8.2
STBH 13	0	0	0	12	1	1	1.7	1.33	12	6.2
STBH 15	0	0	0	12	1	1.2	1.6	1.38	12	5.5
STBH 16	0	0	0	12	10	0.6	1.6	1.14	12	6.5
STBH 22	0.1	0.2	0.11	12	10	1	1.8	1.20	12	5.2

APPENDIX 2

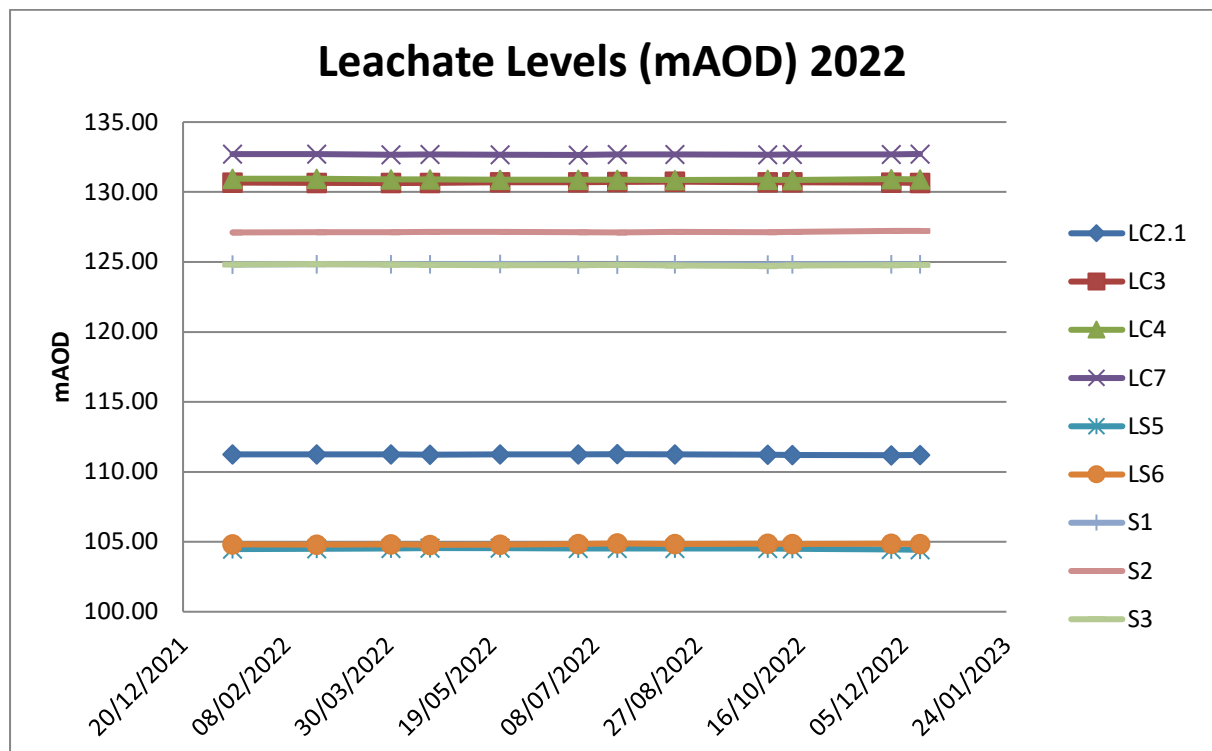
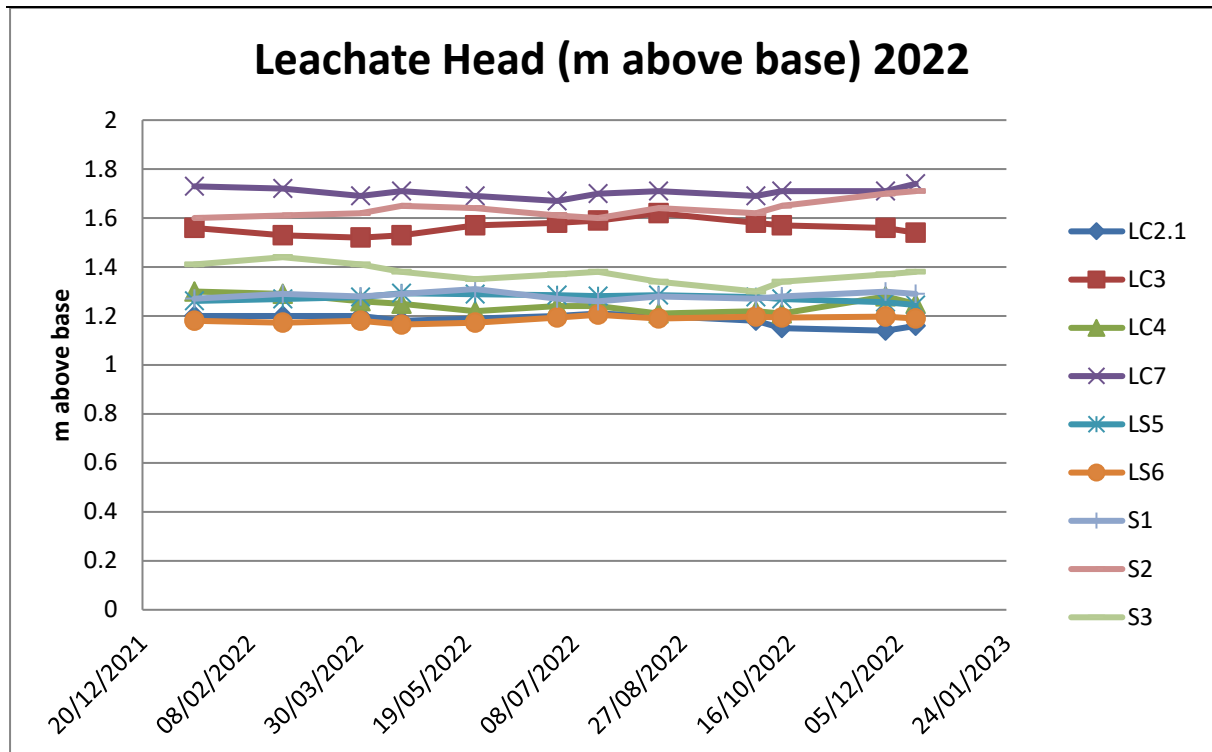
Leachate Level and Quality Summary Tables

APPENDIX 2 - LEACHATE**Table 1: Leachate Levels**

Location	Leachate head (m above cell base)		
	Min	Max	Average
LC2.1	1.14	1.21	1.18
LC3	1.52	1.62	1.56
LC4	1.21	1.30	1.25
LC7	1.67	1.74	1.71
LS5	1.24	1.29	1.27
LS6	1.17	1.20	1.19
S1	1.26	1.31	1.28
S2	1.60	1.71	1.64
S3	1.30	1.44	1.37

Location	Leachate level (mAOD)		
	Min	Max	Average
LC2.1	111.19	111.26	111.23
LC3	130.64	130.74	130.68
LC4	130.86	130.95	130.90
LC7	132.65	132.72	132.69
LS5	104.43	104.55	104.50
LS6	104.78	104.88	104.83
S1	124.81	124.86	124.83
S2	127.11	127.22	127.15
S3	124.71	124.85	124.78

APPENDIX 2 - LEACHATE



APPENDIX 2 - LEACHATE

Table 2 – Quarterly Leachate monitoring data

ID		Alkalinity, Total as CaCO ₃ (mg/L)	Ammoniacal Nitrogen as N (mg/L)	BOD, unfiltered (mg/L)	Chloride (mg/L)	Chlorine, Total (Residual) (mg/L)	COD, unfiltered (mg/L)
HT	Min	5380	996	<50	1430	0.15	1320
	Max	6000	1190	116	1660	1.45	1620
	Average	5655	1052.0	80	1532.0	0.77	1492.0
LC2.1	Min	6540	1230	<50	1760	0.19	7.26
	Max	7290	1500	135	2280	2.5	2130
	Average	6905	1375	95	2015	1.15	1579.320
LC3	Min	1370	102	<8.57	219	0.11	141
	Max	5410	676		1520	1.45	1490
	Average	3505	456.0		910	0.780	815
LC4	Min	1160	102	<8.35	213	0.16	143
	Max	7020	1330	136	1910	1.8	1650
	Average	4345	606	57.39	1166	0.79	801
LC7	Min	3200	504	<28.7	736	0.15	591
	Max	6570	1090	202	1860	1.6	2300
	Average	4542.0	694.0	94.9	1222.0	0.74	1404
S1	Min	1120	21.5	<3.83	207	0.06	77.5
	Max	4320	904	106	1180	1.1	1420
	Average	2408.0	355.1	<45.61	584	0.55	574.6
S2	Min	455	15	<4.03	68.1	0.08	59.9
	Max	3630	593	91.9	1060	0.7	1050
	Average	2539	409	59.08	706.8	0.25	724.2
S3	Min	2610	441	<50	671	0.1	794
	Max	4980	1120	87.6	1390	1.36	1460
	Average	3992.0	768	68	1105	0.7	1112
SSR5	Min	5050	946	<50	1420	0.15	1460
	Max	6080	1180	112	1640	1.35	1770
	Average	5518.0	1038	80	1520	0.72	1560
SSR6	Min	5400	957	<25	1460	0.15	1410
	Max	5980	1180	130	1660	1.35	1540
	Average	5625	1045	81	1542.0	0.960	1478.0

APPENDIX 2 - LEACHATE

ID		Conductivity @ 20 deg.C (mS/cm)	pH	Total Oxidised Nitrogen as N (mg/L)	Magnesium (Dis.Filt) (mg/L)	Potassium (Dis.Filt) (mg/L)	Sodium (Dis.Filt) (mg/L)
HT	Min	9.53	7.76	<0.741	73	491	1200
	Max	14	8.09	5.21	-	-	-
	Average	12.01	7.94	2.845	-	-	-
LC2.1	Min	11.1	7.65	<0.211	64.8	598	1450
	Max	17.4	7.74	<2	-	-	-
	Average	15.00	7.68	<0.928	-	-	-
LC3	Min	2.58	7.54	<0.107	57.5	76.7	180
	Max	12.9	7.85	4.47	-	-	-
	Average	7.8	7.73	<1.237	-	-	-
LC4	Min	2.7	7.35	<0.106	44.2	92.4	186
	Max	10.9	7.94	2.02	-	-	-
	Average	8.7	7.65	<0.8320	-	-	-
LC7	Min	6.37	7.34	<0.1	84.4	392	829
	Max	14.3	8	<1.21	-	-	-
	Average	9.46	7.76	<0.5	-	-	-
S1	Min	2.49	7.26	<0.11	45.7	70.6	179
	Max	9.51	7.95	<0.538	63.3	404	984
	Average	5.400	7.62	<0.26	52.4	201	503
S2	Min	1.94	7.45	<0.1	57.4	17.7	55.4
	Max	9.04	8.04	<1	-	-	-
	Average	6.040	7.700	<0.3	-	-	-
S3	Min	6.2	7.64	<0.105	64.5	250	575
	Max	10.5	7.94	<0.5	-	-	-
	Average	8.4	7.800	<0.213	-	-	-
SSR5	Min	10.8	7.77	<0.967	52.9	493	1170
	Max	14.1	8.01	25.4	-	-	-
	Average	12	7.91	9.414	-	-	-
SSR6	Min	11.4	7.78	<0.865	71.1	513	1230
	Max	14	8.29	48.1	-	-	-
	Average	12.20	8.01	13.439	-	-	-

APPENDIX 3 – LEACHATE

Table 4 – Quarter 4 Annual Hazardous Substances Leachate monitoring data (detected substances highlighted)

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
Date sampled: 29/11/2022											
Inorganics											
Cyanide, Free	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide, Total	mg/l	0.56	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.58	0.57
Filtered (Dissolved) Metals											
Cadmium (diss.filt)	mg/l	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.000186	<0.00008	<0.00008	<0.00008
Mercury (diss.filt)	mg/l	<0.0001	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.0001
Mineral Oil / Oils & Greases											
Mineral oil >C10 C40 (aq)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.107	<0.1	<0.1
Semi-Volatile Organic Compounds (SVOCs)											
1,2,4-Trichlorobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
1,2-Dichlorobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
1,3-Dichlorobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
1,4-Dichlorobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,4,5-Trichlorophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,4,6-Trichlorophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,4-Dichlorophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,4-Dimethylphenol (aq)	mg/l	<0.02	0.0217	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,4-Dinitrotoluene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2,6-Dinitrotoluene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Chloronaphthalene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Chlorophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Methylnaphthalene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Methylphenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Nitroaniline (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
2-Nitrophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
3-Nitroaniline (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
4-Bromophenylphenylether (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Chloro-3-methylphenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Chloroaniline (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Chlorophenylphenylether (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Methylphenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Nitroaniline (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
4-Nitrophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Acenaphthene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Acenaphthylene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Anthracene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Azobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Benzo(a)anthracene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Benzo(a)pyrene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Benzo(b)fluoranthene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Benzo(g,h,i)perylene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Benzo(k)fluoranthene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
bis(2-Chloroethyl)ether (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.04	<0.04	<0.016	<0.02	<0.04	<0.04	<0.002	<0.2	<0.04	<0.04
Butylbenzyl phthalate (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Carbazole (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Chrysene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Dibenzo(a,h)anthracene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Dibenzofuran (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Diethyl phthalate (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Dimethyl phthalate (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Fluoranthene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
Fluorene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Hexachlorobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Hexachlorobutadiene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Hexachlorocyclopentadiene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Hexachloroethane (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Isophorone (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Naphthalene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
n-Dibutyl phthalate (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
n-Dioctyl phthalate (aq)	mg/l	<0.1	<0.1	<0.04	<0.05	<0.1	<0.1	<0.005	<0.5	<0.1	<0.1
Nitrobenzene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Pentachlorophenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Phenanthrene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Phenol (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Pyrene (aq)	mg/l	<0.02	<0.02	<0.008	<0.01	<0.02	<0.02	<0.001	<0.1	<0.02	<0.02
Volatile Organic Compounds (VOCs)											
1,1,1,2-Tetrachloroethane	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<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	<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	<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	<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	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.001	<0.001	<0.001	<0.001

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
1,2,4-Trimethylbenzene	mg/l	0.00526	0.021	<0.001	<0.001	0.0088	0.00162	<0.001	0.00156	0.00581	0.00546
1,2-Dibromo-3-chloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<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	<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	<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	<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	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	0.0025	0.00422	<0.001	<0.001	0.00424	0.00479	<0.001	0.00182	0.0026	0.00224
1,3-Dichlorobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	0.00181	0.00271	<0.001	0.00123	0.0026	0.00147	<0.001	<0.001	0.00184	0.00175
2,2-Dichloropropane	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-iso-Propyltoluene	mg/l	0.00149	0.0101	<0.001	<0.001	0.00799	0.02	<0.001	0.00732	0.00183	0.00194
Benzene	mg/l	0.00322	0.00451	<0.001	0.00152	0.00429	0.00173	<0.001	0.00126	0.00308	0.00292
Bromobenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromoform	mg/l	<0.001	<0.001	<0.001	<0.001	0.00126	<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	<0.001	<0.001	<0.001	<0.001
Carbon disulphide	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	0.00284	0.00789	0.00103	0.0026	0.00678	<0.001	<0.001	<0.001	0.00287	0.0032
Chloroethane	mg/l	<0.001	<0.001	0.00182	0.00481	<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	<0.001	<0.001	<0.001	<0.001
Chloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
cis-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.003	<0.003	<0.003	<0.003
Ethylbenzene	mg/l	0.00362	0.0171	<0.001	<0.001	0.00554	<0.001	<0.001	<0.001	0.00448	0.00441
Hexachlorobutadiene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	<0.001	0.00461	<0.001	<0.001	0.00149	<0.001	<0.001	<0.001	<0.001	<0.001
m,p-Xylene	mg/l	0.00844	0.0362	<0.001	<0.001	0.021	0.00647	<0.001	0.00288	0.00891	0.0077
Methyl tertiary butyl ether (MTBE)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Naphthalene	mg/l	0.00343	0.0113	<0.001	<0.001	0.0088	<0.001	<0.001	0.00274	0.00403	0.00337
n-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	0.0109	0.016	<0.001	<0.001	0.014	0.014	<0.001	0.00668	0.0111	0.0101
Propylbenzene	mg/l	<0.001	0.00112	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.00204	0.00831	<0.001	<0.001	0.00678	0.00574	<0.001	0.0045	0.002	0.00191
trans-1,2-Dichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	<0.001	<0.001	<0.001	<0.001	<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	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Pesticides / Herbicides											

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
Aldrin	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
alpha-HCH	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Atrazine	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Azinphos ethyl	mg/l	<0.0006	<0.0012	<0.00012	<0.00012	<0.0012	<0.00024	<0.00012	<0.0012	<0.0006	<0.0006
Azinphos methyl	mg/l	<0.0006	<0.0012	<0.00012	<0.00012	<0.0012	<0.00024	<0.00012	<0.0012	<0.0006	<0.0006
beta-HCH	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Carbophenothion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Chlorfenvinphos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Chlorothalonil	mg/l	<0.0005	<0.0001	<0.00005	<0.00005	<0.0005	<0.00005	<0.00005	<0.0005	<0.0005	<0.00005
Chlorpyrifos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Chlorpyrifos-methyl	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
cis-Chlordane	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Diazinon	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Dichlorvos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Dieldrin	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Dimethoate	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Disulfoton	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Endosulphan I	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Endosulphan II	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.0002	<0.0001	<0.00002	<0.0002	<0.0002	<0.0002
Endosulphan Sulphate	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.0002	<0.0001	<0.00002	<0.0002	<0.0002	<0.0002
Endrin	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Ethion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Etrimpfos	mg/l	<0.0001	<0.0001	<0.00002	<0.00002	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.00005
Fenitrothion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Fenthion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
gamma-HCH (Lindane)	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Heptachlor	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
Heptachlor epoxide	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Hexachlorobenzene	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Isodrin	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Malathion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Methyl Parathion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Mevinphos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
o,p'-DDD (TDE)	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
o,p'-DDE	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
o,p'-DDT	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
p,p'-DDD (TDE)	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
p,p'-DDE	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
p,p'-DDT	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
p,p'-Methoxychlor	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Parathion	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Pendimethalin	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Permethrin I	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Permethrin II	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Phosalone	mg/l	<0.0001	<0.0002	<0.00002	<0.00002	<0.0002	<0.00004	<0.00002	<0.0002	<0.0001	<0.0001
Pirimiphos-methyl	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Propetamphos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Quintozene (PCNB)	mg/l	<0.0001	<0.0001	<0.00002	<0.00002	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.00005
Simazine	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Tecnazene	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Telodrin	mg/l	<0.0001	<0.0001	<0.00002	<0.00002	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.00005
trans-Chlordane	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Triadimefon	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Triallate	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005

APPENDIX 3 – LEACHATE

Parameter	Unit	HT	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
		Date sampled: 29/11/2022									
Triazophos	mg/l	<0.00005	<0.0001	<0.00001	<0.00001	<0.0001	<0.00002	<0.00001	<0.0001	<0.00005	<0.00005
Trifluralin	mg/l	<0.0001	<0.0001	<0.00001	<0.00001	<0.0001	<0.00005	<0.00001	<0.0001	<0.0001	<0.0001
Miscellaneous Organics											
Dibutyl tin	mg/l	<0.00015	<0.00015	<0.00003	<0.00003	<0.00015	<0.00015	<0.00003	<0.00015	<0.00015	<0.00015
Tetrabutyl tin	mg/l	<0.00006	<0.00006	<0.000012	<0.000012	<0.00006	<0.00006	<0.000012	<0.00006	<0.00006	<0.00006
Tributyl tin	mg/l	<0.00003	<0.00003	<0.000006	<0.000006	<0.00003	<0.00003	<0.000006	<0.00003	<0.00003	<0.00003
Triphenyl tin	mg/l	<0.00003	<0.00003	<0.000006	<0.000006	<0.00003	<0.00003	<0.000006	<0.00003	<0.00003	<0.00003

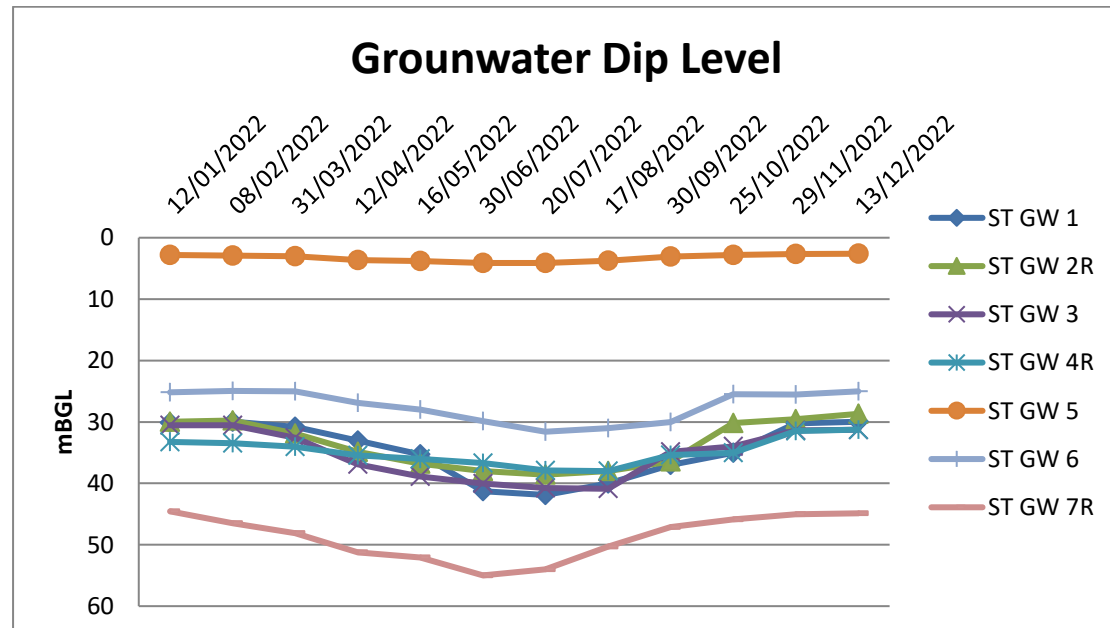
APPENDIX 3

Groundwater Level and Quality Summary Tables

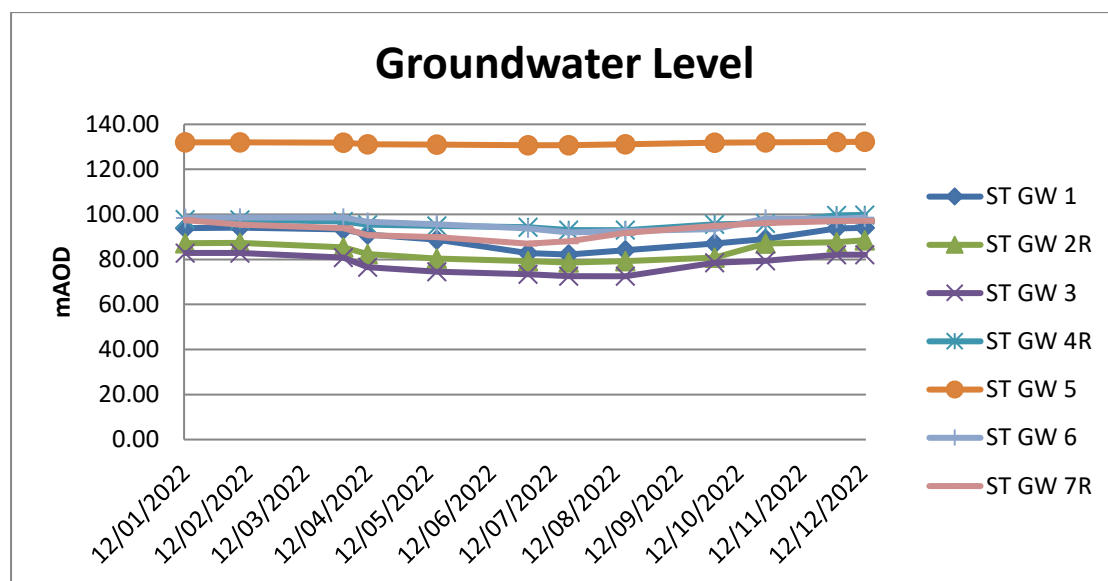
APPENDIX 3 - GROUNDWATER

Table 1: Groundwater Levels

Location	Data	Dip Level (mBGL)	GW Level (mAOD)
GW 1	Min	29.95	82.19
	Max	41.89	94.13
	Average	34.55	89.53
GW 2R	Min	28.68	78.62
	Max	38.59	88.53
	Average	33.56	83.65
GW 3	Min	30.54	72.53
	Max	40.89	82.88
	Average	35.22	78.20
GW 4R	Min	31.25	92.99
	Max	38.01	99.75
	Average	34.83	96.17
GW 5	Min	2.61	130.75
	Max	4.11	132.25
	Average	3.27	131.59
GW 6	Min	24.95	91.98
	Max	31.59	98.62
	Average	27.38	96.20
GW 7R	Min	44.56	87.01
	Max	54.99	97.44
	Average	48.72	93.28



APPENDIX 3 - GROUNDWATER



APPENDIX 3 - GROUNDWATER

Table 2 – Quarterly monitoring data summary

ID	Date Sampled	Alkalinity, Total as CaCO ₃ (mg/L)	Ammoniacal Nitrogen as N (mg/L)	Arsenic (tot.unfilt) (mg/L)	BOD, unfiltered (mg/L)	Cadmium (tot.unfilt) (mg/L)	Calcium (Tot. Unfilt.) (mg/L)	Chloride (mg/L)	Chlorine, Total (Residual) (mg/L)	COD, unfiltered (mg/L)
GW1	Min	35.6	<0.2	<0.0005	<1	<8E-05	53.4	52.5	0.02	99
	Max	66.1	<0.2	<0.0005	<3.33	<8E-05	53.4	56.2	1.15	206
	Average	55.5	<0.2	<0.0005	<2	<0	53.4	54	0.32	134
GW2R	Min	50	<0.2	<0.0005	<1	<8E-05	53.8	51.8	<0.01	56.8
	Max	67.7	<0.2	<0.0005	<3.81	<8E-05	53.8	57.4	1.33	228
	Average	59	<0.2	<0.0005	<2	<0	53.8	53.6	0.340	136.2
Compliance Limit		-	6.4	-	-	-	-	-	-	-
GW3	Min	149	0.387	<0.0005	<1	<8E-05	92.3	34.2	0.05	7.69
	Max	217	1.18	<0.0005	<2.06	<8E-05	92.3	56.9	0.96	29.6
	Average	186	0.85	<0.0005	<2	<0	92.3	48.3	0.28	16.980
Compliance Limit		-	6.4	-	-	-	-	-	-	-
GW4R	Min	99	<0.2	<0.0005	<1	<8E-05	97.7	38.8	<0.01	14.8
	Max	135	<0.2	<0.0005	<2.69	0.000236	97.7	61.8	0.83	92
	Average	115	<0.2	<0.0005	<2	<0	97.7	46.6	0.24	48.8
GW5	Min	90.4	<0.2	<0.0005	<1.9	<8E-05	48.2	7.2	0.02	126
	Max	564	3.61	<0.0005	44.7	<8E-05	48.2	13.9	0.48	3230
	Average	221	1.3	<0.0005	12.9	<0	48.2	10.4	0.15	1013
Compliance Limit		-	6.4	-	-	-	-	-	-	-
GW6	Min	99.6	<0.2	<0.0005	<1	<8E-05	98.7	28.8	0.02	30.9
	Max	182	<0.2	<0.0005	5.89	0.000179	98.7	53.4	0.06	91.7
	Average	135.60	<0.2	<0.0005	<4	<0	98.7	41.2	0.04	71.20
Compliance Limit		-	6.4	-	-	-	-	-	-	-
GW7	Min	95	<0.2	<0.0005	<2.45	<8E-05	63.9	7.3	<0.01	48.4
	Max	176	<0.2	<0.0005	5.58	<8E-05	63.9	64.5	0.08	218
	Average	120	<0.2	<0.0005	<4.06	<0	63.9	41.20	0.03	106.8

APPENDIX 3 - GROUNDWATER

ID	Date Sampled	Copper (tot.unfilt) (mg/L)	Cresols (mg/L)	Cyanide, Total (mg/L)	Iron (Dis.Filt) (mg/L)	Lead (tot.unfilt) (mg/L)	Magnesium (Dis.Filt) (mg/L)	Mercury (tot.unfilt) (mg/L)	Nickel (tot.unfilt) (µg/L)	Nitrate as NO3 (mg/L)	Nitrite as NO2 (mg/L)
GW1	Min	<0.0003	<0.006	<0.05	<0.019	<0.0002	22.4	<1E-05	0.000795	3.1	<0.05
	Max	<0.0003	<0.006	<0.05	0.0652	<0.0002	27.1	<1E-05	0.000795	4.17	<0.05
	Average	<0.0003	<0.006	<0.05	0.031	<0.0002	24.9	<0	0.000795	3.6	<0.05
GW2R	Min	0.000336	<0.006	<0.05	<0.019	<0.0002	22.4	<1E-05	0.000736	3.26	<0.05
	Max	0.000336	<0.006	<0.05	0.0193	<0.0002	27.3	<1E-05	0.000736	4.03	<0.05
	Average	0.000336	<0.006	<0.05	<0.019	<0.0002	25.1	<0	0.000736	3.58	<0.05
GW3	Min	<0.0003	<0.006	<0.05	<0.019	<0.0002	30.6	<1E-05	0.00127	<0.3	<0.05
	Max	<0.0003	<0.006	<0.05	6.19	<0.0002	44	<1E-05	0.00127	1.71	<0.05
	Average	<0.0003	<0.006	<0.05	1.562	<0.0002	36.4	<0	0.00127	0.7	<0.05
GW4R	Min	0.000908	<0.006	<0.05	<0.019	<0.0002	14.9	<1E-05	0.0239	0.625	<0.05
	Max	0.000908	<0.006	<0.05	0.0737	<0.0002	35.4	<1E-05	0.0239	2.52	<0.05
	Average	0.000908	<0.006	<0.05	0.033	<0.0002	29.8	<0	0.0239	1.776	<0.05
GW5	Min	0.00111	<0.006	<0.05	<0.019	<0.0002	3.71	<1E-05	0.00172	<0.3	<0.05
	Max	0.00111	<0.006	<0.05	-	<0.0002	8.62	<1E-05	0.00172	4.34	<0.05
	Average	0.00111	<0.006	<0.05	-	<0.0002	5.68	<0	0.00172	1.4	<0.05
GW6	Min	0.000995	<0.006	<0.05	<0.019	<0.0002	27.7	<1E-05	0.0207	0.95	<0.05
	Max	0.000995	<0.006	<0.05	0.0762	<0.0002	36.2	<1E-05	0.0207	2.92	<0.05
	Average	0.000995	<0.006	<0.05	0.043	<0.0002	33.60	<0	0.0207	1.94	<0.05
GW7	Min	0.000314	<0.006	<0.05	<0.019	<0.0002	4.21	<1E-05	0.00299	<0.3	<0.05
	Max	0.000314	<0.006	<0.05	0.0719	<0.0002	28.2	<1E-05	0.00299	1.3	<0.05
	Average	0.000314	<0.006	<0.05	0.032	<0.0002	16.83	<0	0.00299	0.8	<0.05

APPENDIX 3 - GROUNDWATER

ID	Date Sampled	Organic Carbon, Total (mg/L)	pH (pH Units)	Phenol (mg/L)	Phenols, Total Detected monohydric (mg/L)	Potassium (Dis.Filt) (mg/L)	Sodium (Dis.Filt) (mg/L)	Sulphate (mg/L)	Total Oxidised Nitrogen as NO3 (mg/L)	Xylenols (mg/L)	Zinc (tot.unfilt) (mg/L)
GW1	Min	14.9	5.91	<0.002	<0.016	9.57	27.6	190	0.765	<0.008	0.0183
	Max	50.4	6.66	<0.002	<0.016	11.2	29.9	214	0.765	<0.008	0.0183
	Average	27.2	6.300	<0.002	<0.016	10.59	28.5	201	0.765	<0.008	0.0183
GW2R	Min	12.2	5.96	<0.002	<0.016	9.56	27.8	190	0.737	<0.008	0.00702
	Max	41	6.86	<0.002	<0.016	11.3	30.6	205	0.737	<0.008	0.00702
	Average	27.5	6.26	<0.002	<0.016	10.660	28.9	198.0	0.737	<0.008	0.00702
GW3	Min	<3	6.59	<0.002	<0.016	9.16	20.3	161	0.391	<0.008	0.0099
	Max	6.35	7.76	<0.002	<0.016	12.6	52.5	241	0.391	<0.008	0.0099
	Average	5	6.97	<0.002	<0.016	10.79	37.6	207	0.391	<0.008	0.0099
GW4R	Min	3.24	6.33	<0.002	<0.016	6.34	22.9	135	0.468	<0.008	0.0367
	Max	16.4	7.57	<0.002	<0.016	8.46	27.5	276	0.468	<0.008	0.0367
	Average	8.92	6.9	<0.002	<0.016	7.46	24.9	222	0.468	<0.008	0.0367
GW5	Min	8.14	6.46	<0.002	<0.016	1.7	3.75	16.3	0.986	<0.008	0.0549
	Max	21.3	6.98	<0.002	<0.016	7.63	9.47	32	0.986	<0.008	0.0549
	Average	17.040	6.65	<0.002	<0.016	4	6.49	21.8	0.986	<0.008	0.0549
GW6	Min	3.37	6.3	<0.002	<0.016	5.71	18.9	221	0.664	<0.008	0.0294
	Max	11.3	6.82	<0.002	<0.016	8.51	24.9	278	0.664	<0.008	0.0294
	Average	7.63	6.5	<0.002	<0.016	7.52	22.6	251	0.664	<0.008	0.0294
GW7	Min	12.9	6.56	<0.002	<0.016	2.09	4.86	19.6	<0.1	<0.008	0.0038
	Max	23.7	7.77	<0.002	<0.016	8.52	37.2	247	<0.1	<0.008	0.0038
	Average	18.7	6.98	<0.002	<0.016	6.660	23.74	128.9	<0.1	<0.008	0.0038

APPENDIX 3 - GROUNDWATER

Table 3 – Q1 Annual hazardous substances data (substances above limit of detection highlighted) – sampled 31st March 2022

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Inorganics								
Cyanide, Free		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Filtered (Dissolved) Metals								
Chromium (diss.filt)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss.filt)	mg/l	0.15	0.346	0.171	0.443	1.44	0.207	0.147
Mineral Oil / Oils & Greases								
Mineral oil >C10 C40 (aq)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Semi-Volatile Organic Compounds (SVOCs)								
1,2,4-Trichlorobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
1,2-Dichlorobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
1,3-Dichlorobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
1,4-Dichlorobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,4,5-Trichlorophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,4,6-Trichlorophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,4-Dichlorophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,4-Dimethylphenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,4-Dinitrotoluene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2,6-Dinitrotoluene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Chloronaphthalene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Chlorophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Methylnaphthalene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Methylphenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Nitroaniline (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
2-Nitrophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
3-Nitroaniline (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008

APPENDIX 3 - GROUNDWATER

4-Bromophenylphenylether (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Chloro-3-methylphenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Chloroaniline (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Chlorophenylphenylether (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Methylphenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Nitroaniline (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
4-Nitrophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Acenaphthene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Acenaphthylene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Anthracene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Azobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Benzo(a)anthracene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Benzo(a)pyrene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Benzo(b)fluoranthene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Benzo(k)fluoranthene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
bis(2-Chloroethyl)ether (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.02	<0.02	<0.008	<0.016	<0.016	<0.016	<0.016
Butylbenzyl phthalate (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Carbazole (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Chrysene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Dibenzo(a,h)anthracene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Dibenzofuran (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Diethyl phthalate (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Dimethyl phthalate (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Fluoranthene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008

APPENDIX 3 - GROUNDWATER

Fluorene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Hexachlorobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Hexachlorobutadiene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Hexachlorocyclopentadiene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Hexachloroethane (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Isophorone (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Naphthalene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
n-Dibutyl phthalate (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
n-Dioctyl phthalate (aq)	mg/l	<0.05	<0.05	<0.02	<0.04	<0.04	<0.04	<0.04
Nitrobenzene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Pentachlorophenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Phenanthrene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Phenol (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Pyrene (aq)	mg/l	<0.01	<0.01	<0.004	<0.008	<0.008	<0.008	<0.008
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	mg/l	-	<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
1,1,2,2-Tetrachloroethane	mg/l	-	<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
1,1-Dichloroethane	mg/l	-	<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
1,1-Dichloropropene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	-	<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
1,2,4-Trichlorobenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001

APPENDIX 3 - GROUNDWATER

1,2,4-Trimethylbenzene	mg/l	-	<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
1,2-Dibromoethane	mg/l	-	<0.001	<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	<0.001
1,2-Dichloropropane	mg/l	-	<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
1,3,5-Trimethylbenzene	mg/l	-	<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
1,3-Dichloropropane	mg/l	-	<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
2,2-Dichloropropane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
4-Bromofluorobenzene**	%	-	97.7	95.4	-	96.7	99.1	99.5
4-Chlorotoluene	mg/l	-	<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
Benzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Bromobenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Bromochloromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Bromoform	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Bromomethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Carbon disulphide	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Carbontetrachloride	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Chloroethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Chloroform	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Chloromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001

APPENDIX 3 - GROUNDWATER

cis-1,2-Dichloroethene	mg/l	-	<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
Dibromochloromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Dibromofluoromethane**	%	-	131	109	-	128	128	124
Dibromomethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Dichlorodifluoromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Dichloromethane	mg/l	-	<0.003	<0.003	-	<0.003	<0.003	<0.003
Ethylbenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Hexachlorobutadiene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	-	<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
Methyl tertiary butyl ether (MTBE)	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Naphthalene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
n-Butylbenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
o-Xylene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Propylbenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
sec-Butylbenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Styrene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Sum of BTEX	mg/l	-	<0.005	<0.005	-	<0.005	<0.005	<0.005
Sum of detected Xylenes	mg/l	-	<0.002	<0.002	-	<0.002	<0.002	<0.002
tert-Amyl methyl ether (TAME)	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Toluene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Toluene-d8**	%	-	102	97.7	-	102	101	102
trans-1,2-Dichloroethene	mg/l	-	<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

APPENDIX 3 - GROUNDWATER

Trichloroethene	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Vinyl chloride	mg/l	-	<0.001	<0.001	-	<0.001	<0.001	<0.001
Combined Pesticides / Herbicides								
Aldrin	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
alpha-HCH	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Atrazine	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Azinphos ethyl	mg/l	<0.0004	<0.0004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
Azinphos methyl	mg/l	<0.0004	<0.0004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
beta-HCH	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Carbophenothion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Chlorfenvinphos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Chlorothalonil	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.0001	<0.00002
Chlorpyrifos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Chlorpyrifos-methyl	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
cis-Chlordane	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Diazinon	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Dichlorvos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Dieldrin	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Dimethoate	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Disulfoton	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Endosulphan I	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Endosulphan II	mg/l	<0.0004	<0.0004	<0.00002	<0.00004	<0.00002	<0.00004	<0.00002
Endosulphan Sulphate	mg/l	<0.0004	<0.0004	<0.00002	<0.00004	<0.00002	<0.00004	<0.00002
Endrin	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Ethion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Etrimphos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.0001	<0.00002
Fenitrothion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002

APPENDIX 3 - GROUNDWATER

Fenthion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
gamma-HCH (Lindane)	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Heptachlor	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Heptachlor epoxide	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Hexachlorobenzene	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Isodrin	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Malathion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Methyl Parathion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Mevinphos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
o,p'-DDD (TDE)	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
o,p'-DDE	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
o,p'-DDT	mg/l	<0.0004	<0.0004	<0.00002	<0.00004	<0.00002	<0.00004	<0.00002
p,p'-DDD (TDE)	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
p,p'-DDE	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
p,p'-DDT	mg/l	<0.0006	<0.0006	<0.00003	<0.00006	<0.00003	<0.00006	<0.00003
p,p'-Methoxychlor	mg/l	<0.0006	<0.0006	<0.00003	<0.00006	<0.00003	<0.00006	<0.00003
Parathion	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Pendimethalin	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Permethrin I	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Permethrin II	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Phosalone	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Pirimiphos-methyl	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Propetamphos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Quintozene (PCNB)	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00002
Simazine	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Tecnazene	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Telodrin	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00001	<0.00002
trans-Chlordane	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001

APPENDIX 3 - GROUNDWATER

Triadimefon	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Triallate	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Triazophos	mg/l	<0.0002	<0.0002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Trifluralin	mg/l	<0.0002	<0.0002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001
Miscellaneous Organics								
Dibutyl tin	mg/l	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Surrogate**	%	102	98.9	105	99.4	109	95.5	99.4
Tetrabutyl tin	mg/l	<0.000012	<0.000012	<0.000012	<0.000012	<0.000012	<0.000012	<0.000012
Tributyl tin	mg/l	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006
Triphenyl tin	mg/l	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006	<0.000006

APPENDIX 3 - GROUNDWATER

Table 4 - Q4 Annual hazardous substances data (substances above limit of detection highlighted) – sampled 29th November 2022

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Inorganics								
Cyanide, Free	mg/l	<0.05	<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	<0.05
Filtered (Dissolved) Metals								
Chromium (diss.filt)	mg/l	-	-	-	-	-	-	-
Manganese (diss.filt)	mg/l	-	-	-	-	-	-	-
Mineral Oil / Oils & Greases								
Mineral oil >C10 C40 (aq)	mg/l	<0.1	<0.1	<0.1	<0.1	1.51	<0.1	<0.1
Semi-Volatile Organic Compounds (SVOCs)								
1,2,4-Trichlorobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
1,2-Dichlorobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
1,3-Dichlorobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
1,4-Dichlorobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,4,5-Trichlorophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,4,6-Trichlorophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,4-Dichlorophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,4-Dimethylphenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,4-Dinitrotoluene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2,6-Dinitrotoluene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Chloronaphthalene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Chlorophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Methylnaphthalene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Methylphenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Nitroaniline (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
2-Nitrophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
3-Nitroaniline (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
4-Bromophenylphenylether (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Chloro-3-methylphenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Chloroaniline (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Chlorophenylphenylether (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Methylphenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Nitroaniline (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
4-Nitrophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Acenaphthene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Acenaphthylene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Anthracene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Azobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Benzo(a)anthracene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Benzo(a)pyrene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Benzo(b)fluoranthene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Benzo(g,h,i)perylene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Benzo(k)fluoranthene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
bis(2-Chloroethoxy)methane (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
bis(2-Chloroethyl)ether (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
bis(2-Ethylhexyl) phthalate (aq)	mg/l	<0.008	<0.02	<0.002	<0.008	<0.008	<0.04	<0.016
Butylbenzyl phthalate (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Carbazole (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Chrysene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Dibenzo(a,h)anthracene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Dibenzofuran (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Diethyl phthalate (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Dimethyl phthalate (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Fluoranthene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Fluorene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Hexachlorobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Hexachlorobutadiene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Hexachlorocyclopentadiene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Hexachloroethane (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Indeno(1,2,3-cd)pyrene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Isophorone (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Naphthalene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
n-Dibutyl phthalate (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
n-Dioctyl phthalate (aq)	mg/l	<0.02	<0.05	<0.005	<0.02	<0.02	<0.1	<0.04
Nitrobenzene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
n-Nitroso-n-dipropylamine (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Pentachlorophenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Phenanthrene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Phenol (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Pyrene (aq)	mg/l	<0.004	<0.01	<0.001	<0.004	<0.004	<0.02	<0.008
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	mg/l	<0.001	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/l	<0.001	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/l	<0.001	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/l	<0.001	-	-	-	-	-	-
1,1-Dichloroethane	mg/l	<0.001	-	-	-	-	-	-
1,1-Dichloroethene	mg/l	<0.001	-	-	-	-	-	-
1,1-Dichloropropene	mg/l	<0.001	-	-	-	-	-	-
1,2,3-Trichlorobenzene	mg/l	<0.001	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/l	<0.001	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/l	<0.001	-	-	-	-	-	-

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
1,2,4-Trimethylbenzene	mg/l	<0.001	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/l	<0.001	-	-	-	-	-	-
1,2-Dibromoethane	mg/l	<0.001	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/l	<0.001	-	-	-	-	-	-
1,2-Dichloroethane	mg/l	<0.001	-	-	-	-	-	-
1,2-Dichloropropane	mg/l	<0.001	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/l	<0.001	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/l	<0.001	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/l	<0.001	-	-	-	-	-	-
1,3-Dichloropropane	mg/l	<0.001	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/l	<0.001	-	-	-	-	-	-
2,2-Dichloropropane	mg/l	<0.001	-	-	-	-	-	-
2-Chlorotoluene	mg/l	<0.001	-	-	-	-	-	-
4-Chlorotoluene	mg/l	<0.001	-	-	-	-	-	-
4-iso-Propyltoluene	mg/l	<0.001	-	-	-	-	-	-
Benzene	mg/l	<0.001	-	-	-	-	-	-
Bromobenzene	mg/l	<0.001	-	-	-	-	-	-
Bromochloromethane	mg/l	<0.001	-	-	-	-	-	-
Bromodichloromethane	mg/l	<0.001	-	-	-	-	-	-
Bromoform	mg/l	<0.001	-	-	-	-	-	-
Bromomethane	mg/l	<0.001	-	-	-	-	-	-
Carbon disulphide	mg/l	<0.001	-	-	-	-	-	-
Carbontetrachloride	mg/l	<0.001	-	-	-	-	-	-
Chlorobenzene	mg/l	<0.001	-	-	-	-	-	-
Chloroethane	mg/l	<0.001	-	-	-	-	-	-
Chloroform	mg/l	<0.001	-	-	-	-	-	-
Chloromethane	mg/l	<0.001	-	-	-	-	-	-

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
cis-1,2-Dichloroethene	mg/l	<0.001	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/l	<0.001	-	-	-	-	-	-
Dibromochloromethane	mg/l	<0.001	-	-	-	-	-	-
Dibromomethane	mg/l	<0.001	-	-	-	-	-	-
Dichlorodifluoromethane	mg/l	<0.001	-	-	-	-	-	-
Dichloromethane	mg/l	<0.003	-	-	-	-	-	-
Ethylbenzene	mg/l	<0.001	-	-	-	-	-	-
Hexachlorobutadiene	mg/l	<0.001	-	-	-	-	-	-
Isopropylbenzene	mg/l	<0.001	-	-	-	-	-	-
m,p-Xylene	mg/l	<0.001	-	-	-	-	-	-
Methyl tertiary butyl ether (MTBE)	mg/l	<0.001	-	-	-	-	-	-
Naphthalene	mg/l	<0.001	-	-	-	-	-	-
n-Butylbenzene	mg/l	<0.001	-	-	-	-	-	-
o-Xylene	mg/l	<0.001	-	-	-	-	-	-
Propylbenzene	mg/l	<0.001	-	-	-	-	-	-
sec-Butylbenzene	mg/l	<0.001	-	-	-	-	-	-
Styrene	mg/l	<0.001	-	-	-	-	-	-
tert-Amyl methyl ether (TAME)	mg/l	<0.001	-	-	-	-	-	-
tert-Butylbenzene	mg/l	<0.001	-	-	-	-	-	-
Tetrachloroethene	mg/l	<0.001	-	-	-	-	-	-
Toluene	mg/l	<0.001	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/l	<0.001	-	-	-	-	-	-
trans-1,3-Dichloropropene	%	<0.001	-	-	-	-	-	-
Trichloroethene	mg/l	<0.001	-	-	-	-	-	-
Trichlorofluoromethane	mg/l	<0.001	-	-	-	-	-	-
Vinyl chloride	mg/l	<0.001	-	-	-	-	-	-
Combined Pesticides / Herbicides								

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Aldrin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
alpha-HCH	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Atrazine	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Azinphos ethyl	mg/l	<0.0012	<0.0012	<0.00012	<0.0012	<0.0012	<0.0012	<0.0012
Azinphos methyl	mg/l	<0.0012	<0.0012	<0.00012	<0.0012	<0.00012	<0.0012	<0.0012
beta-HCH	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Carbophenothion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Chlorfenvinphos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Chlorothalonil	mg/l	<0.0005	<0.0005	<0.00005	<0.0005	<0.0005	<0.001	<0.0005
Chlorpyrifos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Chlorpyrifos-methyl	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
cis-Chlordane	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Diazinon	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Dichlorvos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Dieldrin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Dimethoate	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Disulfoton	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Endosulphan I	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Endosulphan II	mg/l	<0.0002	<0.0002	<0.00002	<0.0002	<0.0002	<0.0004	<0.0002
Endosulphan Sulphate	mg/l	<0.0002	<0.0002	<0.00002	<0.0002	<0.0002	<0.0004	<0.0002
Endrin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Ethion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Etrimphos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Fenitrothion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Fenthion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
gamma-HCH (Lindane)	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Heptachlor	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Heptachlor epoxide	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Hexachlorobenzene	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Isodrin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Malathion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Methyl Parathion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Mevinphos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
o,p'-DDD (TDE)	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
o,p'-DDE	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
o,p'-DDT	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
p,p'-DDD (TDE)	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
p,p'-DDE	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
p,p'-DDT	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
p,p'-Methoxychlor	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Parathion	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Pendimethalin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Permethrin I	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Permethrin II	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Phosalone	mg/l	<0.0002	<0.0002	<0.00002	<0.0002	<0.0002	<0.0002	<0.0002
Pirimiphos-methyl	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Propetamphos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Quintozone (PCNB)	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Simazine	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Tecnazene	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Telodrin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
trans-Chlordane	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Triadimefon	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Triallate	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001

APPENDIX 3 - GROUNDWATER

Parameter	Units	GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Triazophos	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0001	<0.0001
Trifluralin	mg/l	<0.0001	<0.0001	<0.00001	<0.0001	<0.0001	<0.0002	<0.0001
Miscellaneous Organics								
Dibutyl tin	mg/l	<0.00003	<0.00003	<0.00003	<0.00003	<0.00015	<0.00003	<0.00003
Tetrabutyl tin	mg/l	<0.000012	<0.000012	<0.000012	<0.000012	<0.00006	<0.000012	<0.000012
Tributyl tin	mg/l	<0.000006	<0.000006	<0.000006	<0.000006	<0.00003	<0.000006	<0.000006
Triphenyl tin	mg/l	<0.000006	<0.000006	<0.000006	<0.000006	<0.00003	<0.000006	<0.000006

APPENDIX 4

Surface Water Quality Summary Table

APPENDIX 4 – SURFACE WATER

Table 1 – Quarterly monitoring data summary

Sample Point		Alkalinity, Total as CaCO ₃ (mg/l)	Ammoniacal Nitrogen as N (mg/l)	Ammoniacal Nitrogen as NH ₄ (mg/l)	BOD, unfiltered (mg/l)	COD, unfiltered (mg/l)	Calcium (Tot. Unfilt.) (mg/l)	Chloride (mg/l)	Chlorine, Total (Residual) (mg/l)
SW4	Min	120	<0.2	<0.3	<1	15.3	68.1	35.3	0.03
	Max	165	<0.2	<0.3	9.22	66.7	75.8	68.6	0.08
	Ave	140	<0.2	<0.3	5	37.6	72.80	54.7	0.060
Compliance Limit (SW5)		-	1.0 mg/l	1.0 mg/l	-	-	-	105 mg/l	-
SW5	Min	120	<0.2	<0.3	3.22	35.1	38.9	20.8	<0.01
	Max	320	0.55	0.707	70.6	974	120	20.8	0.11
	Ave	201	0.3	0.4	21.25	281.80	81.80	20.8	0.04
SW6	Min	75	<0.2	<0.3	<1	34.8	40.6	20.8	<0.01
	Max	256	<0.2	<0.3	3.53	2160	97.8	20.8	0.12
	Ave	167	<0.2	<0.3	2	580.4	76.7	20.8	0.04

Sample Point		Conductivity @ 20 deg.C (mS/cm)	Iron (Dis.Filt) (mg/l)	Magnesium (Dis.Filt) (mg/l)	Nitrate as NO ₃ (mg/l)	Potassium (Dis.Filt) (mg/l)	Sodium (Dis.Filt) (mg/l)	Sulphate (mg/l)	Total Oxidised Nitrogen as N (mg/l)	pH
SW4	Min	0.491	0.0199	12.1	<0.3	6.96	20.7	78	<0.1	7.42
	Max	0.624	0.034	17	1.11	8.04	42.2	112	0.274	7.78
	Ave	0.57	0.02720	15.4	0.5	7.48	32.6	101	<0.1	7.58
SW5	Min	0.347	0.0278	15.4	<0.3	6.24	12.7	47.4	<0.1	6.97
	Max	0.662	1.54	39.2	4.49	8.55	19.3	187	1.04	7.8
	Ave	0.5660	0.5281	30.6	1.3	7.22	16.9	120.40	0.3	7.36
SW6	Min	0.346	0.025	15.8	<0.3	5.76	13.1	48.5	<0.1	6.98
	Max	0.661	1.46	40	4.91	8.41	19.6	194	1.14	7.84
	Ave	0.564	0.4640	30.60	1.5	7	17	121.8	0.4	7.38

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