

Blaenau Gwent County Borough Council

Silent Valley Landfill

2024 Third Quarter Monitoring Report

Reference: 4-50

Issue 01 | 20 December 2024



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1. Introduction

This 2024 Third Quarter Monitoring Report is a consolidated report detailing the findings of this quarter's results from the surface water, groundwater, landfill gas and leachate results for the monitoring undertaken in the period July to September 2024 in accordance with the Silent Valley Environmental Permit ^[1] (Permit no. MP3835SV) and the Aftercare Phase Environmental and Infrastructure Monitoring Program ^[5].

The data has been collected as referenced in Schedule 3 of the Consolidated Permit ^[1]. This report refers to the 2024 Second Quarter Monitoring Report ^[3].

1.1 Monitoring Regime

The monitoring regime is undertaken in accordance with the Aftercare Phase Environmental and Infrastructure Monitoring Program ^[5] and in line with the Consolidated Permit ^[1], which is fully detailed within the 2019 Annual Report ^[2].

2. Discussion of Monitoring Results

2.1 Rainfall

Measured rainfall data is illustrated in **Appendix A, Figures A1 and A2**.

Based on the available data, the following summary has been provided:

- September recorded the most rainfall with 159mm in total and the wettest since recording began in 2008. September also recorded the highest daily rainfall total 33.2mm on the 26th.
- August was the driest month of the quarter, recording 56mm, around average for this time of year in comparison to 2008-2023 records. July recorded 16 non-consecutive days without rainfall.

2.2 Leachate

2.2.1 Leachate Quality Monitoring

Leachate quality monitoring results from within the waste body and from leachate standpipes are presented in **Appendix B, Table B1**.

To assess compliance, the Allowable Maximum Concentrations (AMC) are compared with the overall average concentrations from all combined wells.

No average leachate concentrations have exceeded the AMC this quarter and therefore this is compliant with the Permit.

2.2.2 Leachate Level Monitoring

Leachate head level monitoring results are presented in **Appendix B, Table B2**. The monthly average level for all the wells remains below the required 3.0m, as per the Permit ^[1].

2.2.3 BSC Pipe

Leachate head measurements were undertaken in BH1 to BH4 which are located along the alignment of the BSC pipe. Leachate levels have remained relatively consistent indicating no rise in leachate levels therefore the pipe is working as required. Results are included in **Appendix A, Figure A7** and **Appendix B, Table B6**.

2.3 Surface Water

The surface water quality monitoring results are presented in **Appendix B, Table B3**, and graphically in **Appendix A, Figure A3**.

Commentaries are provided for upstream and downstream monitoring points in the Nant Merddog as discussed below.

2.3.1 Upstream Surface Water

Surface water monitoring locations, SWU, SW2A1, SWW4, SWW1 and SWW2 are located downstream of the landfill and monitored on a six-monthly basis in accordance with the Permit requirements.

These locations were not required to be monitored this quarter.

2.3.2 Downstream Surface Water

SWD and SWD1

Results show both SWD and SWD1 are compliant this quarter.

2.4 Groundwater

2.4.1 Groundwater Quality Monitoring

Groundwater quality monitoring results are presented in **Appendix A, Figures A4 and A5** and in **Appendix B, Table B4**.

Any non-compliances for both upstream and downstream wells are discussed in the following sections.

2.4.1.1 Upstream Groundwater Wells

Wells GW3A and GW4

GW3A and GW4 monitor the sandstone strata classified as S3-East, and GW11B are installed in the sandstone strata classified as S2-West

The monitoring of upstream wells is undertaken to understand the groundwater quality upstream of the landfill. These wells provide insight to any potential contaminants that may originate from off-site sources, which may impact groundwater quality.

Both upstream wells are indicating negligible concentrations of contaminants this quarter.

Historically, manganese has continually been recorded above the assessment level in GW4 with continued fluctuations throughout the years showing no recognisable trend. The elevated concentrations recorded upstream are likely to be from steel works waste deposited to the north of the landfill and old mine workings in the area. Manganese is a typical contaminant of mine drainage, which is considered to be impacting the groundwater in the locale of the landfill.

2.4.1.2 Downstream Groundwater Wells

Wells GW6 and GW7

GW6 and GW7 have been installed in the centre of the valley in the sandstone strata classified as S1.

Both GW6 and GW7 exceed the assessment level of 1.0mg/l for manganese. GW6 has been compliant for manganese since its last exceedance in March 2014.

Manganese concentrations have fluctuated above the assessment level in GW7, exceeding in Q1 and Q3 of 2024.

Well GW9

GW9 is installed in the sandstone strata classified as S2-East and is compliant this quarter.

Well GW10

GW10 has been installed in the sandstone strata classified as S3-East.

GW10 has continued to exceed the assessment level of 1.0mg/l for manganese. The concentrations of manganese have historically fluctuated in this well dating from at least 2016. Continued fluctuation above assessment level in this well has been seen throughout 2022 and 2023 and has exceeded throughout all of 2024. Manganese levels have historically been known to fluctuate within this well, and it is considered that the concentrations are also impacted by the upstream groundwater which historically exhibited similar concentrations.

Well GW12

GW12 has been installed in the sandstone strata classified as S2-West.

GW12 has exceeded the assessment level of 1.0mg/l for manganese with a recorded concentration of 7.54mg/l. This is an unusually high reading from GW12 after concentrations remaining below 0.01mg/l throughout all of 2023 and two quarters of 2024. The concentration of 7.54mg/l is very unusual and an

extremely high value for this well, therefore we have questioned the laboratory on this value, and no response has been received to date.

It is noted that leachate concentrations of manganese within the waste body of the landfill are lower than the concentrations within the downstream wells (particularly GW12). This would indicate that the elevated manganese concentrations downstream are being impacted by an off-site source and not an issue with the landfill.

2.4.2 Groundwater Levels Monitoring

Groundwater levels are monitored on a quarterly basis in the compliance and upstream wells. The monitoring results are illustrated graphically in **Appendix A, Figure A6**. Water levels have remained relatively consistent this quarter with no significant differences from the 2023 readings.

2.5 Landfill Gas

2.5.1 Methane

The landfill gas monitoring results are presented in **Appendix B, Table B5**.

- Methane concentrations continue to be recorded below the respective control and trigger levels (where available) in all monitoring locations.

2.5.2 Carbon Dioxide

All monitoring wells remained compliant this quarter with the exception of the following:

- GMW2 red valve fluctuated above respective control (1.0%v/v) and trigger levels (1.5%v/v) in August with 1.6%v/v and September with 1.4%v/v. This follows one exceedance of the trigger level in June last quarter. In addition, GMW6 exceeded control level for the red valve in June last quarter. The red valve is now exceeding trigger levels of 4.3%v/v in August (4.5%v/v) and September (5.6%v/v). It is common for both wells to display higher carbon dioxide readings during the summer months. This trend has been identified in gas monitoring results from 2018 – 2023. It is anticipated levels will drop approaching the winter months, therefore no further action will be required, unless the trend is not followed.
- GMW4 red valve had exceeded the trigger level throughout all of 2024 in the red valve. A technical note investigating these exceedances is appended to this report ^[20]. This quarter, GMW4 has returned to compliance.
- GMW7 has exceeded the control level of 1.3%v/v within the yellow valve in August with a concentration of 1.5%v/v. This is the first exceedance of 2024. It is also noted that the piezo was damaged within the first quarter of the year. The well is undergoing an investigation by the site team to ensure it is fully functioning.
- GMW13 continues to fluctuate above control and trigger levels. GMW13 exceeded control and trigger level in April and May last quarter but returned to below control levels in from June to August. September has seen the carbon dioxide concentrations elevate above the control level of 5.5%v/v to a level of 5.6%v/v. These will be monitored closely for any emerging trends next quarter.
- GMW14/14A continues to remain compliant. GMW14/14a had been fluctuating above control and trigger levels the throughout 2023. An investigation into GMW14/14A including gas chromatography has been undertaken this quarter, a technical note will be written upon receipt of findings.

3. Conclusion

From the data received to date, there is no there is no evidence to suggest that there is a discernible impact on the surrounding environment and the landfill continues to comply with the requirements of the permit.

- Both GW6 and GW7 exceed the assessment level for manganese. This is the first exceedance in GW6 but GW7 has been fluctuating above the assessment level every 6months. Manganese levels have historically

been known to fluctuate within GW7, and it is considered that the concentrations are also impacted by the upstream groundwater likely to be from steel works waste deposited to the north of the landfill and old mine workings in the area.

- GW10 has continued to exceed the assessment level for manganese. Manganese levels have historically been known to fluctuate within this well, and it is considered that the concentrations are also impacted by the upstream groundwater which historically exhibited similar concentrations.
- GW12 exceeded the assessment level for manganese, with an unusually high concentration and a first for this well, after remaining compliant throughout 2023 and quarter 1 and quarter 2 of 2024. Manganese concentrations within the waste body of the landfill are lower than those within the downstream wells, indicating that the elevated manganese concentrations downstream are being impacted by an off-site source and not an issue with the landfill.
- GMW4 has achieved compliance after experiencing exceedances throughout 2024. The recent technical note (appended to this report Appendix C) indicated no historical trends of exceedances in this well. The findings from the next quarter will help determine if the exceedances reported in the first two quarters were due to reporting errors.
- GMW13 has been fluctuating throughout 2024, one exceedance of the control level has been highlighted this quarter. An investigation may be undertaken into this well on receipt of next quarter's findings.
- The outcome of the GMW14/14A gas chromatography will be submitted as a separate technical note.

References

- [1] Environment Agency, Silent Valley Landfill Site, Pollution Prevention and Control (England and Wales) Regulations 2000, Landfill (England and Wales) Regulations 2002, Permit number MP3835SV, November 2005, Permit amended as of 04/03/16.
- [2] Arup, Silent Valley Landfill, 2019 Annual Monitoring Report, 31st January 2020.
- [3] Arup, Silent Valley Landfill, 2023 Second Quarter Monitoring Report, 31st July 2024.
- [4] Arup, Silent Valley Landfill, Interim GW9 and Nant Merddog W, Issue May 2015.
- [5] Arup, Silent Valley Landfill, Aftercare Phase Environmental and Infrastructure Monitoring Program, Issue June 2013.
- [6] Arup, Silent Valley Landfill, Hydrogeological Risk Assessment, document reference 04/6363, November 2004.
- [7] Arup, Silent Valley Landfill, Investigation into the Western Flank of the Cut-off System. Compliance Well GW9 and GW10, document reference 115825, August 2011.
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- [10] Environment Agency, Guidance on the management of landfill gas, document reference LFTGN03, June 2014.
- [11] The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
- [12] Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG), "Metal Bioavailability Assessment Tool (M-BAT)," 2014.

- [13] Arup, Silent Valley Landfill, Hydrogeological Risk assessment, document reference 2019/9559, July 2019.
- [14] Golder Associates, Establishment of Trigger Levels at Silent Valley landfill site, letter report dated 21 December 2006.
- [15] Arup (2011) Silent Valley landfill Investigation into the Western Flank of the Cut-off System. Compliance Wells GW9 and GW10.
- [16] Arup (2013) Silent Valley Review of Geology South of Landfill Site.
- [17] Arup (2015) Silent Valley GW9 and Nant Merddog Monitoring Report.
- [18] Arup (2017) Review of Environmental Consequence of non-Compliance at GW9.
- [19] Arup (2020) Updated review of non-Compliance at GW9.
- [20] Arup (2024) Technical Note on Carbon Dioxide exceedances at GMW4.

Appendix A Monitoring Results - Graphs

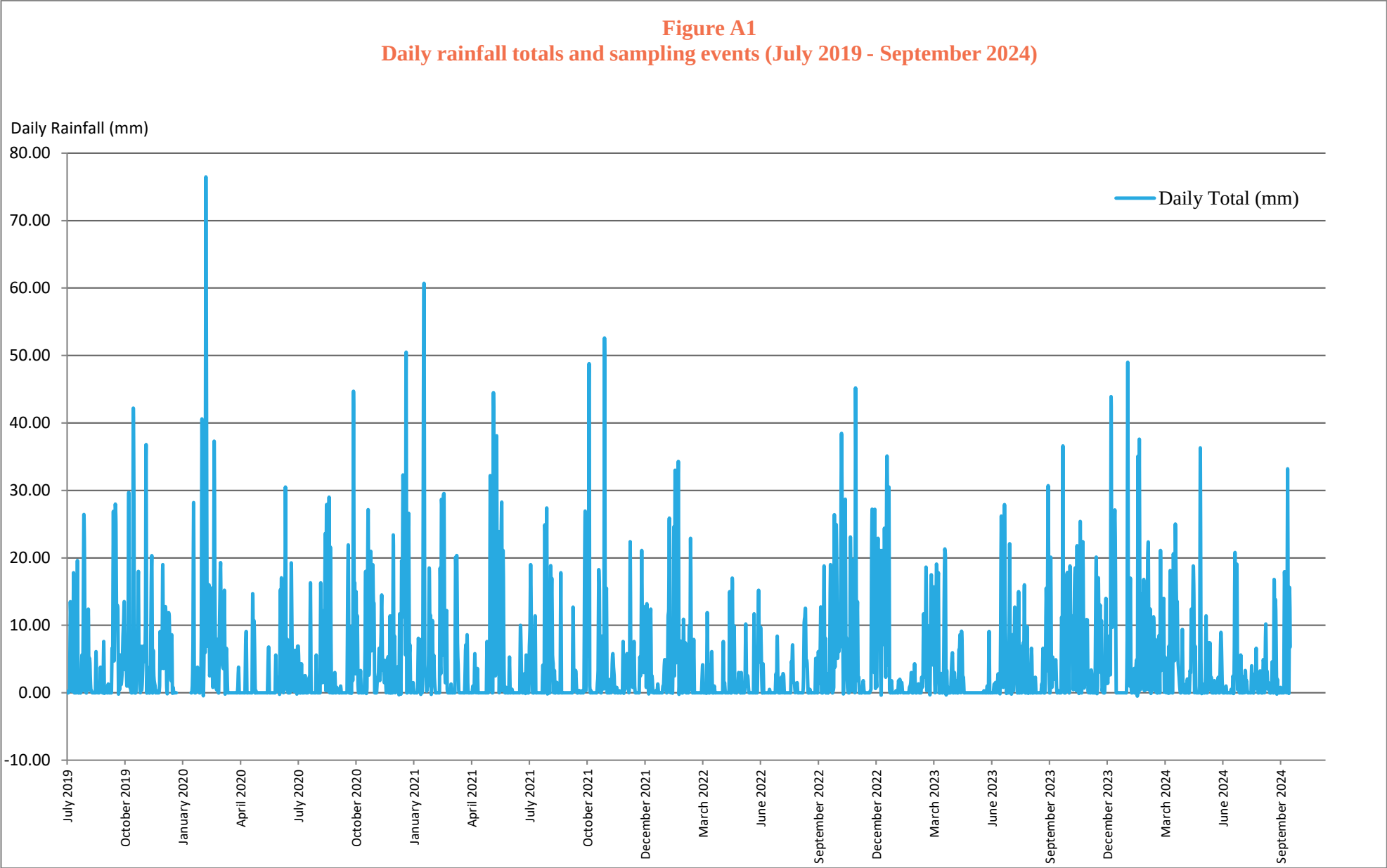


Figure A2
Monthly rainfall totals (January 2020 - March 2024)

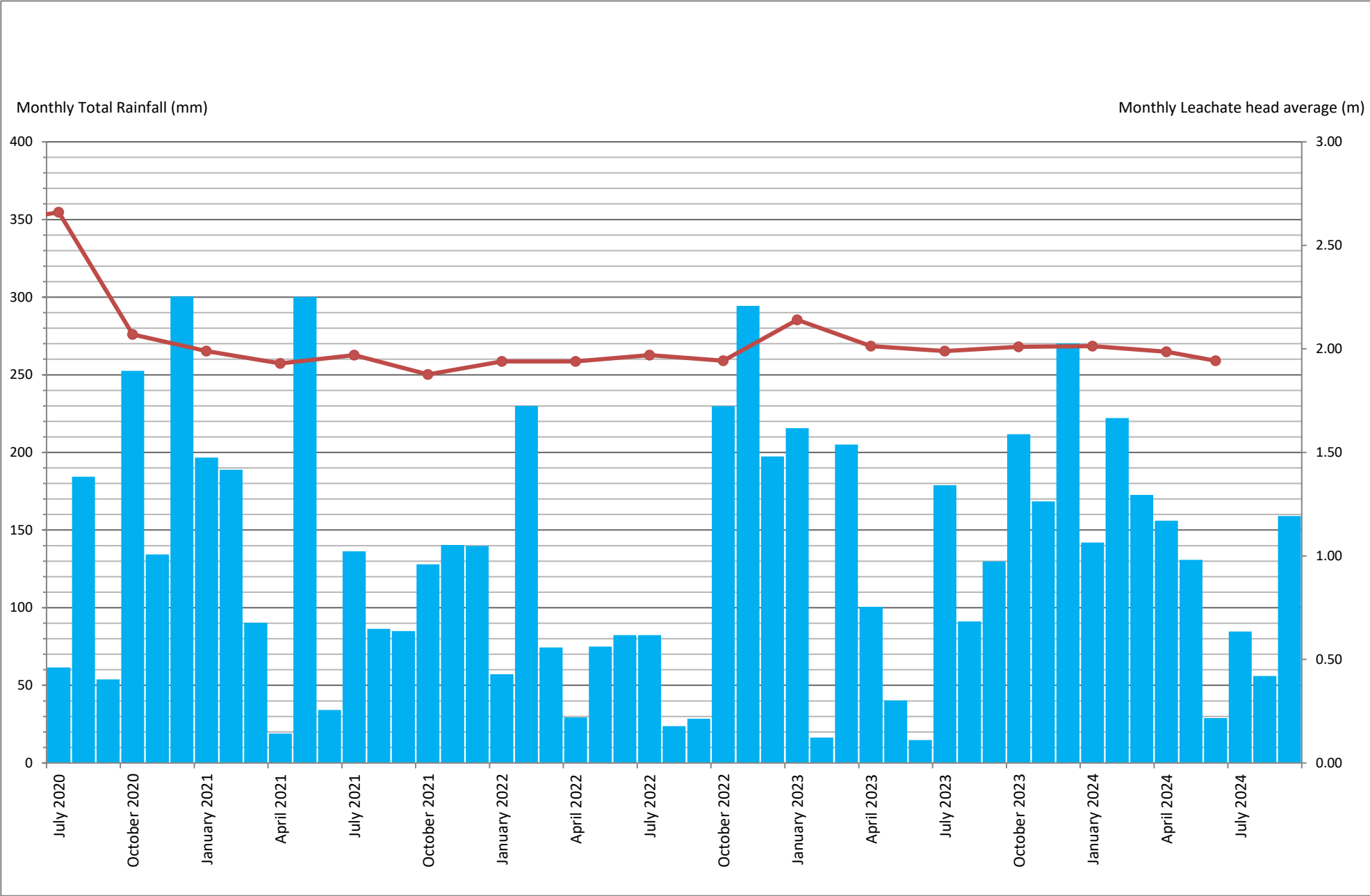


Figure A3
Surface water monitoring graphs

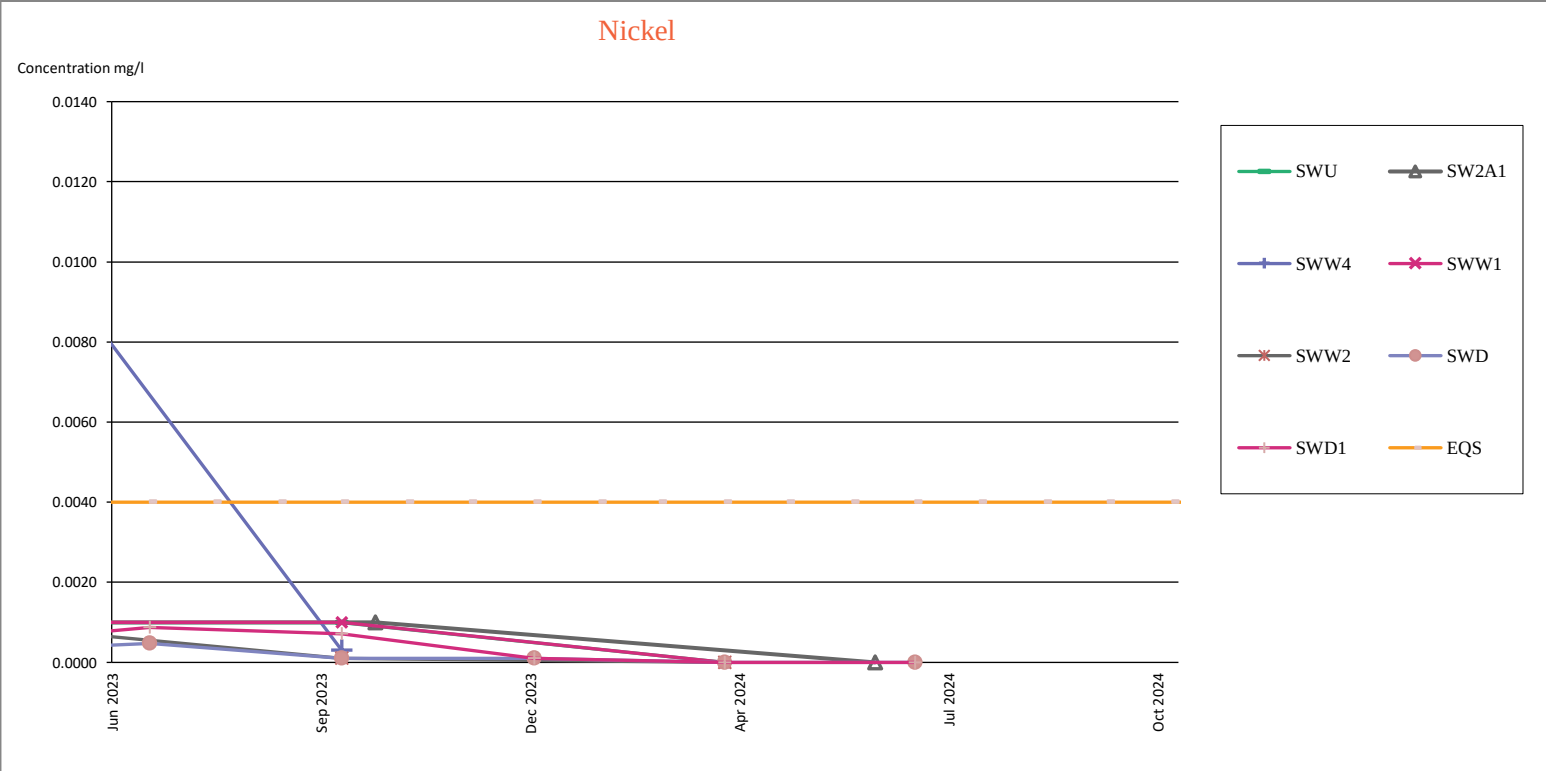
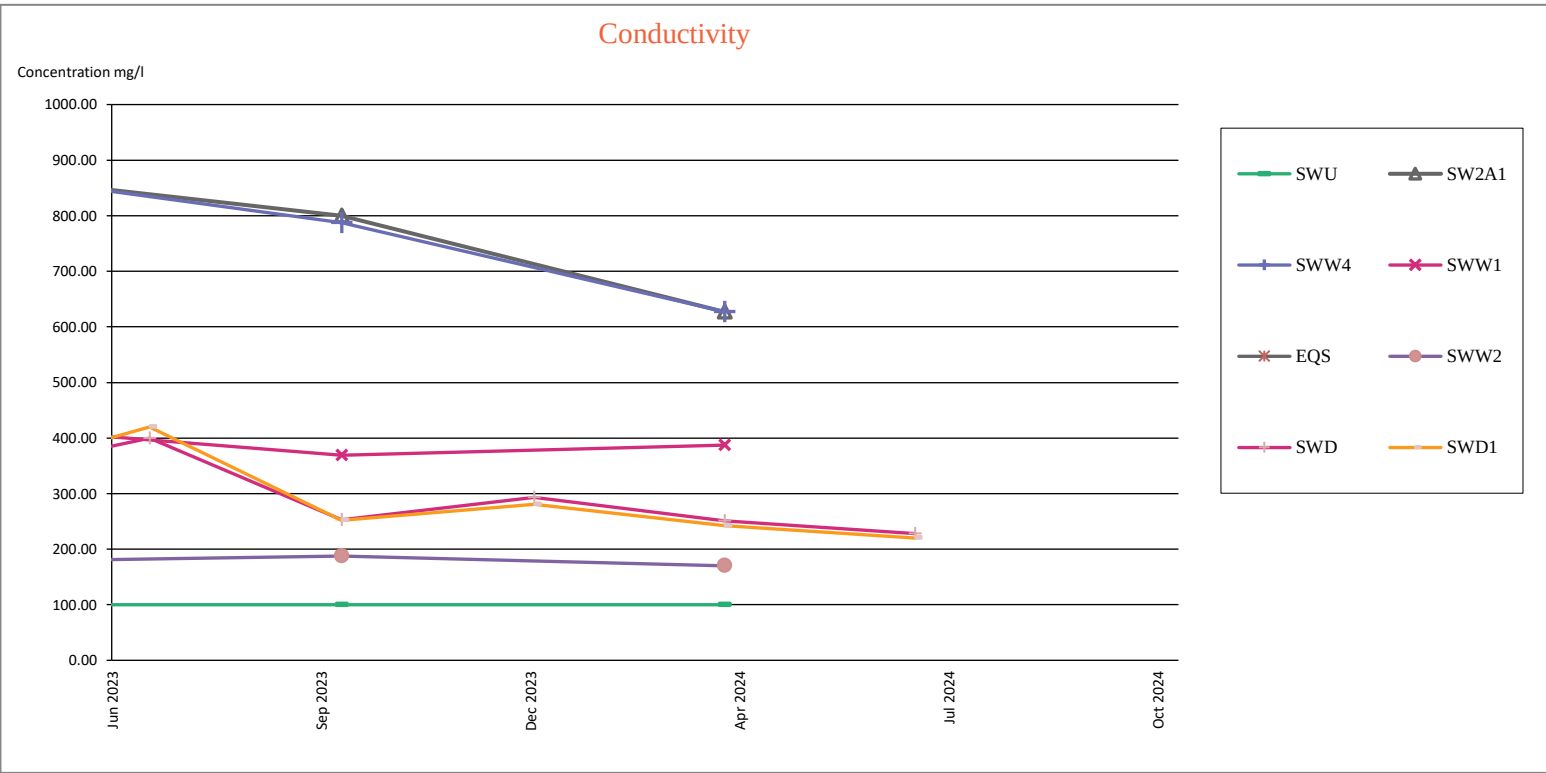
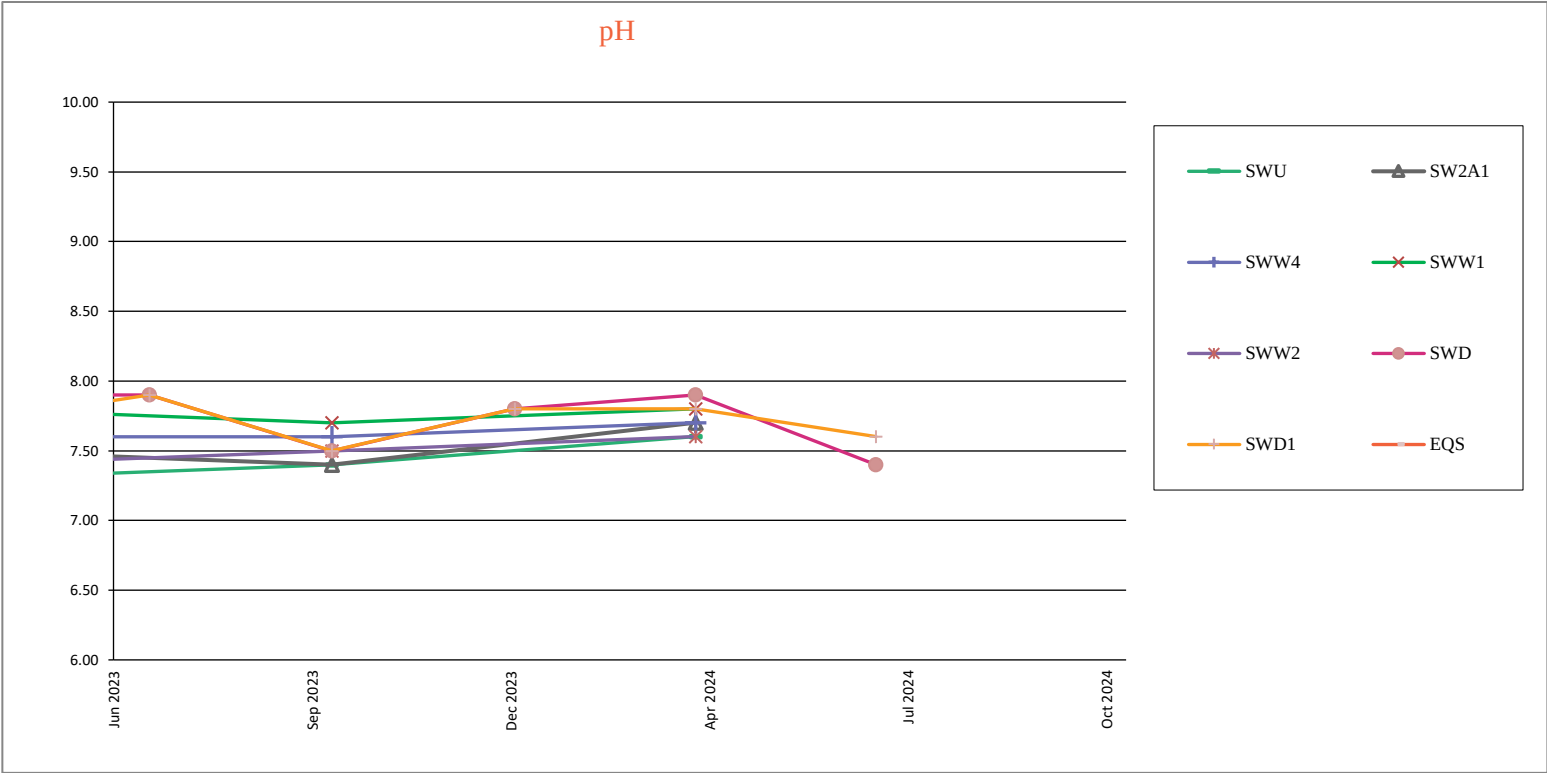


Figure A3
Surface water monitoring graphs

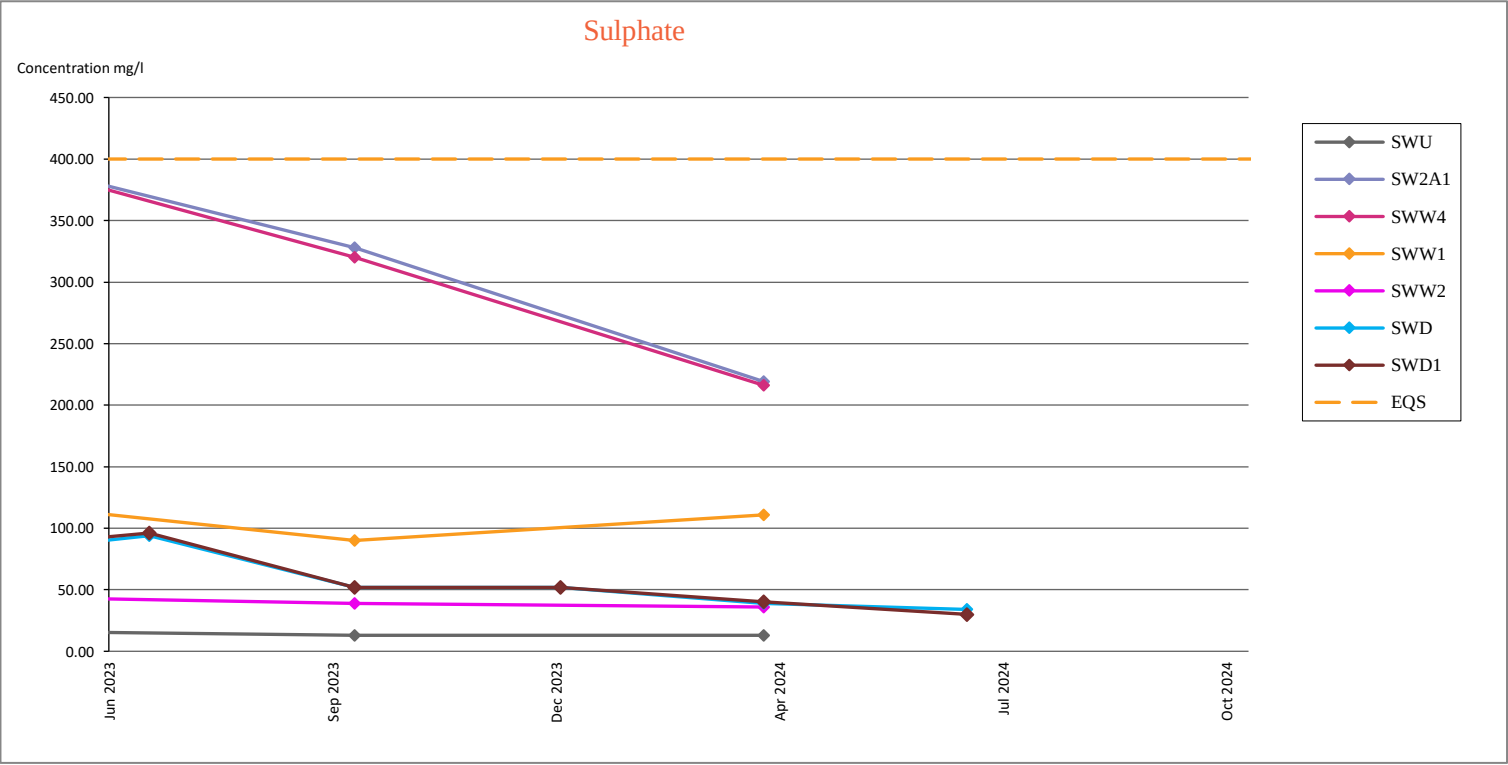
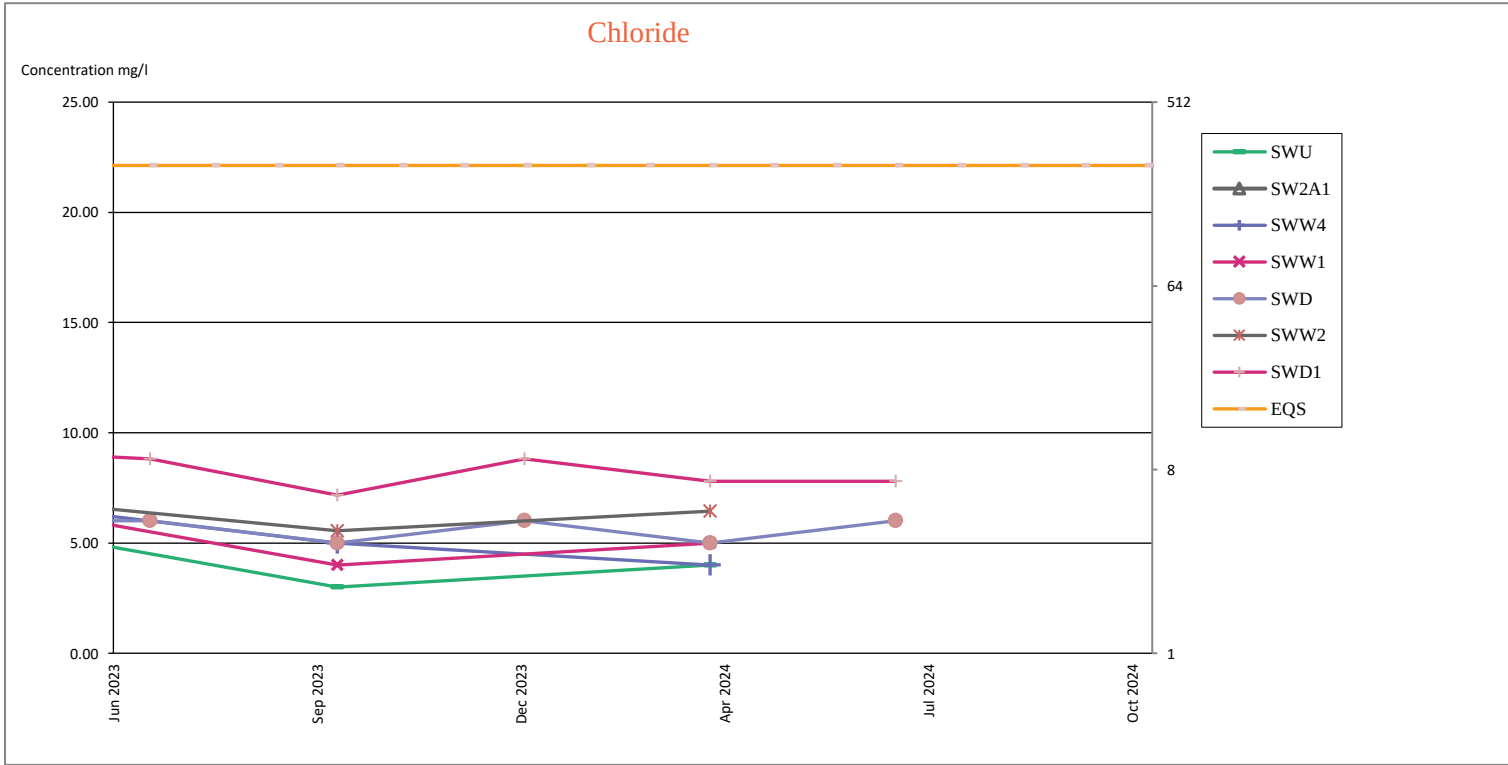
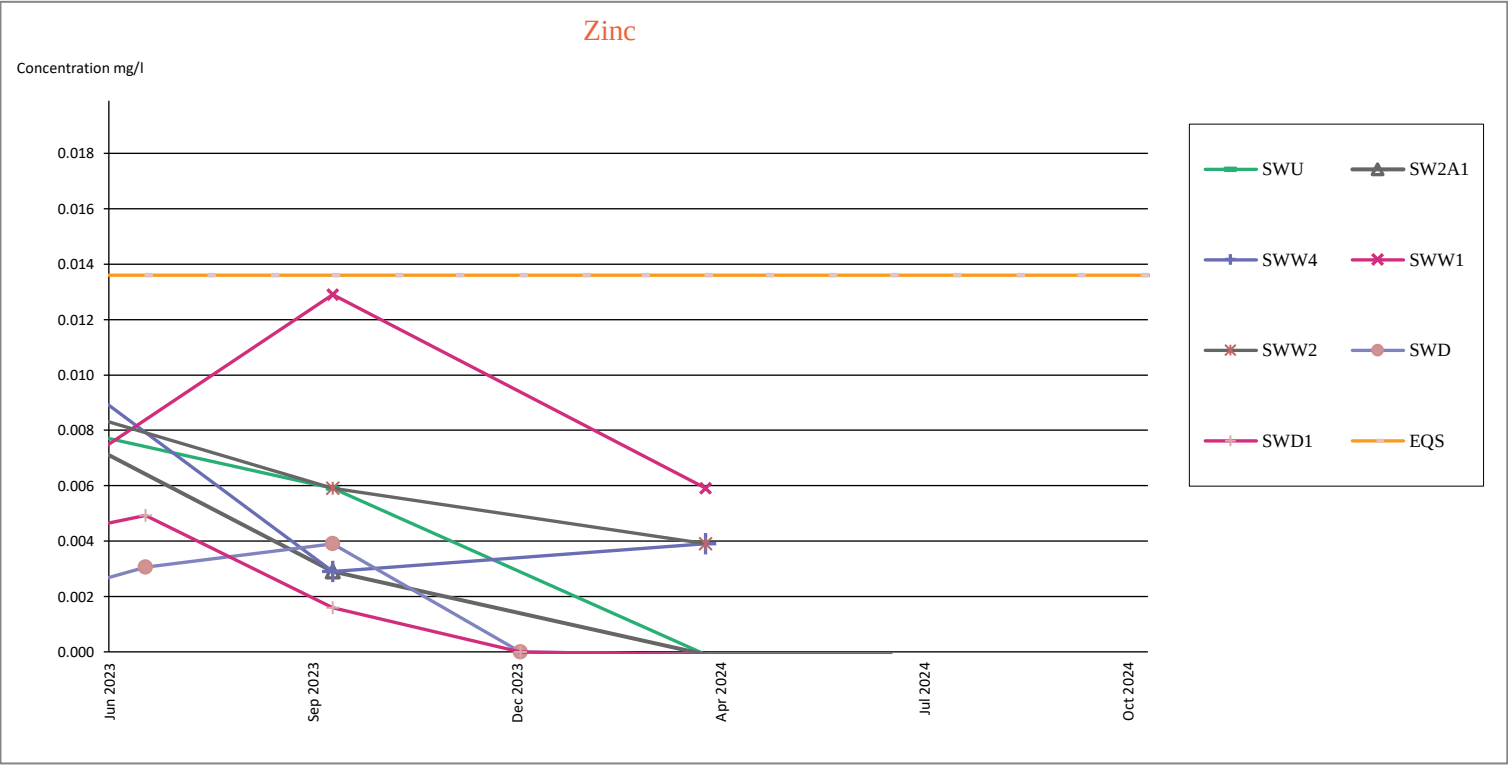
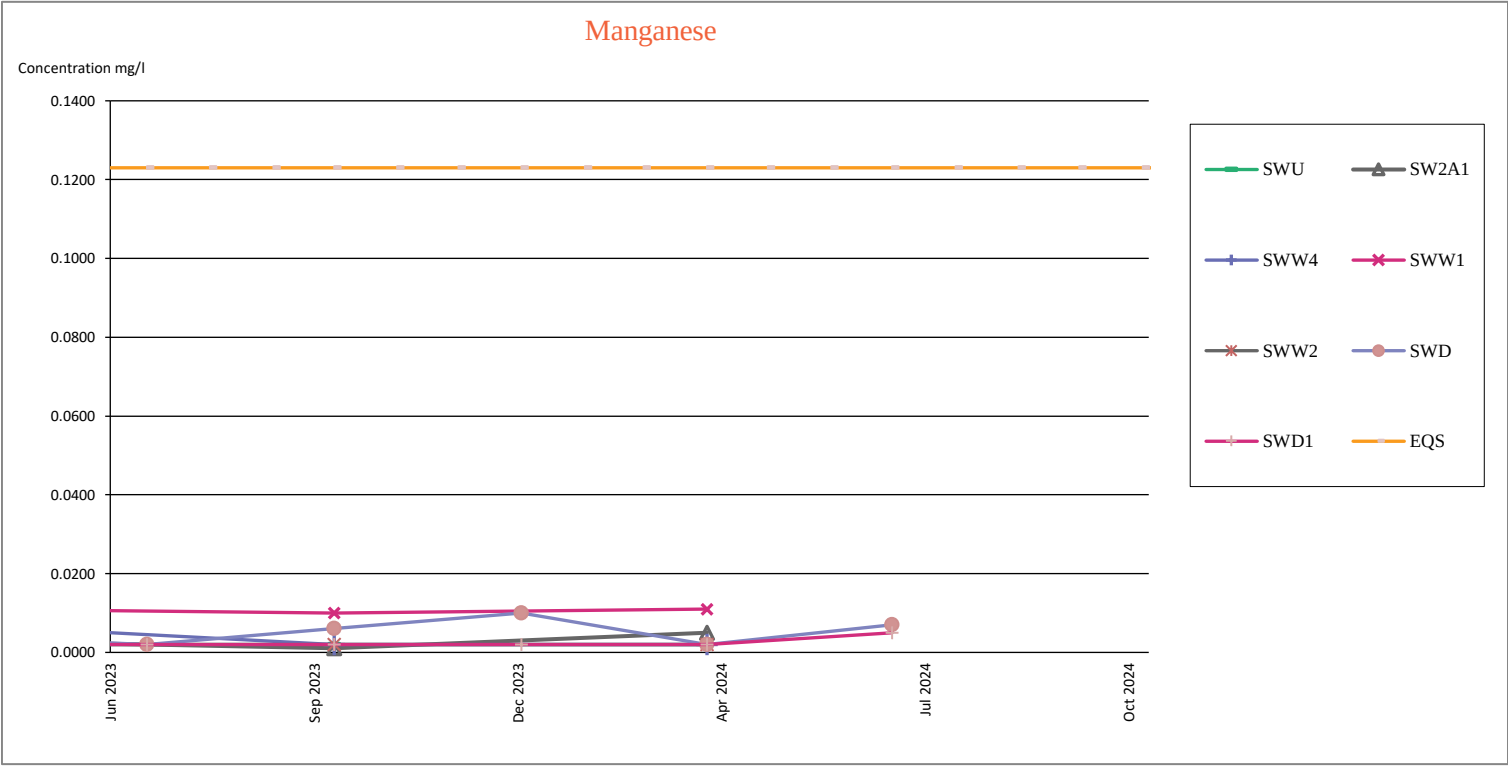


Figure A3
Surface water monitoring graphs

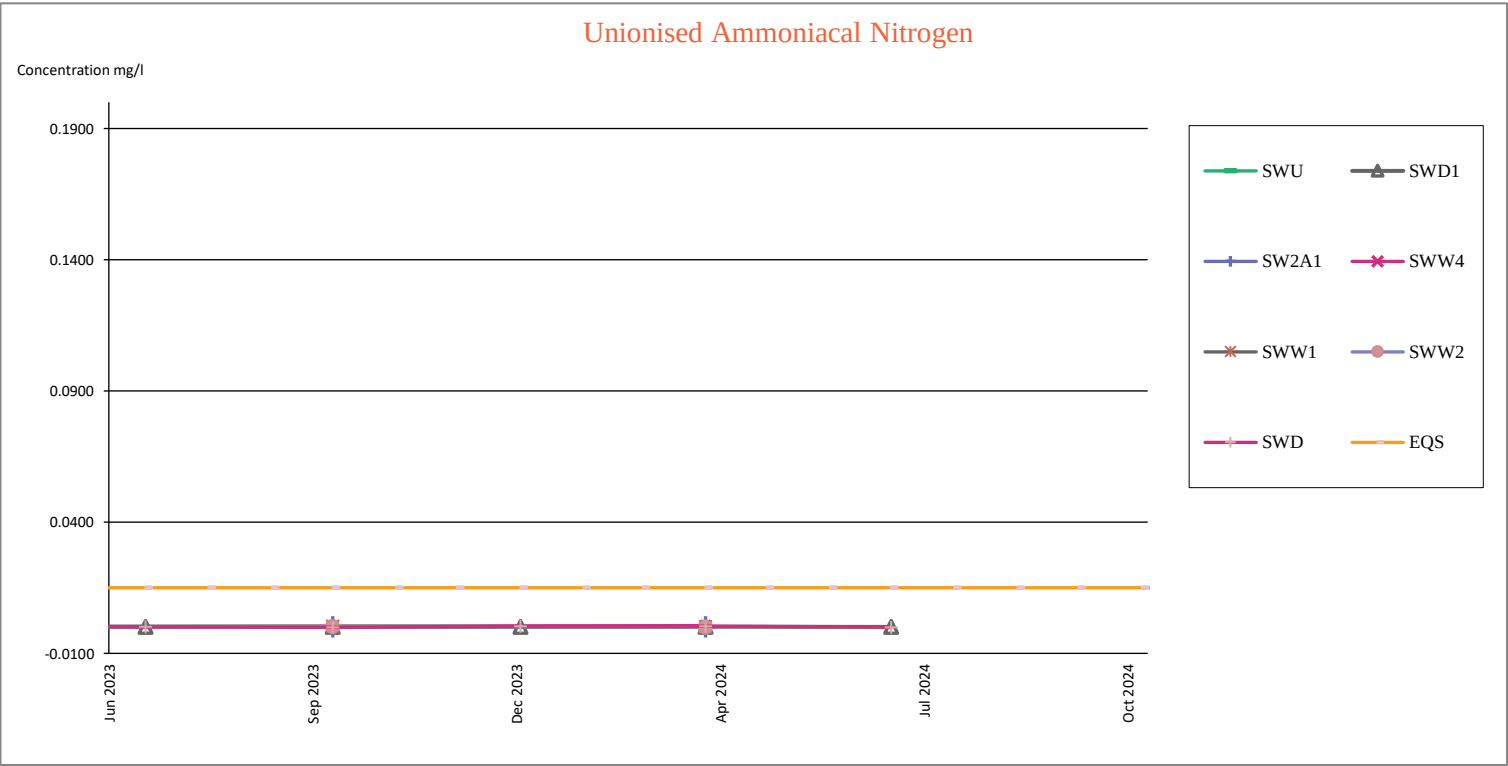
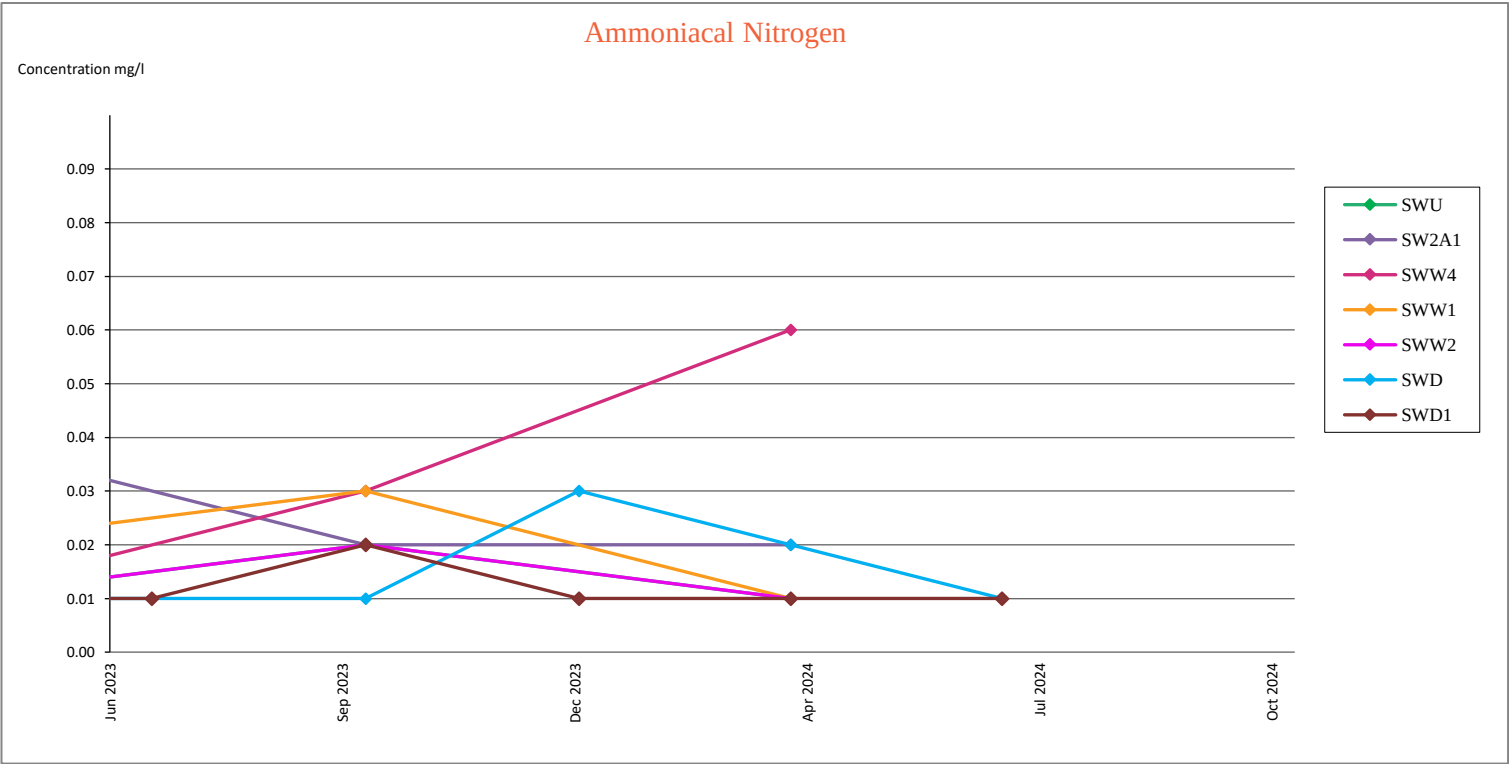


Figure A4
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

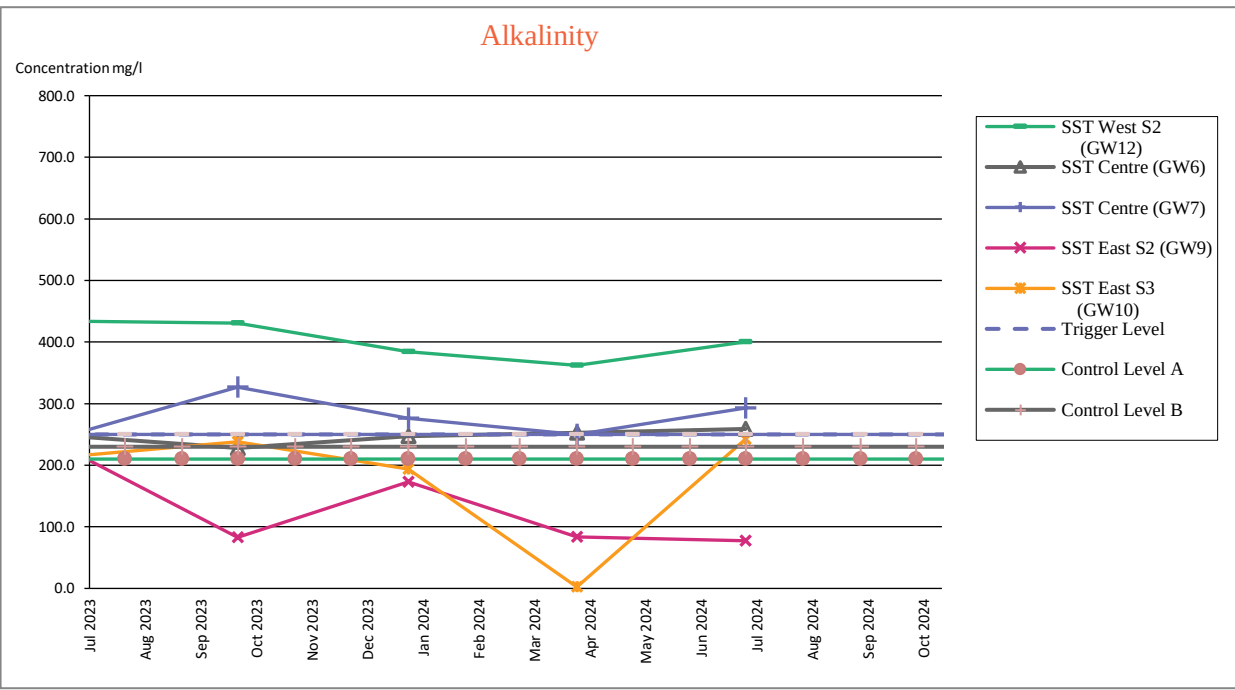
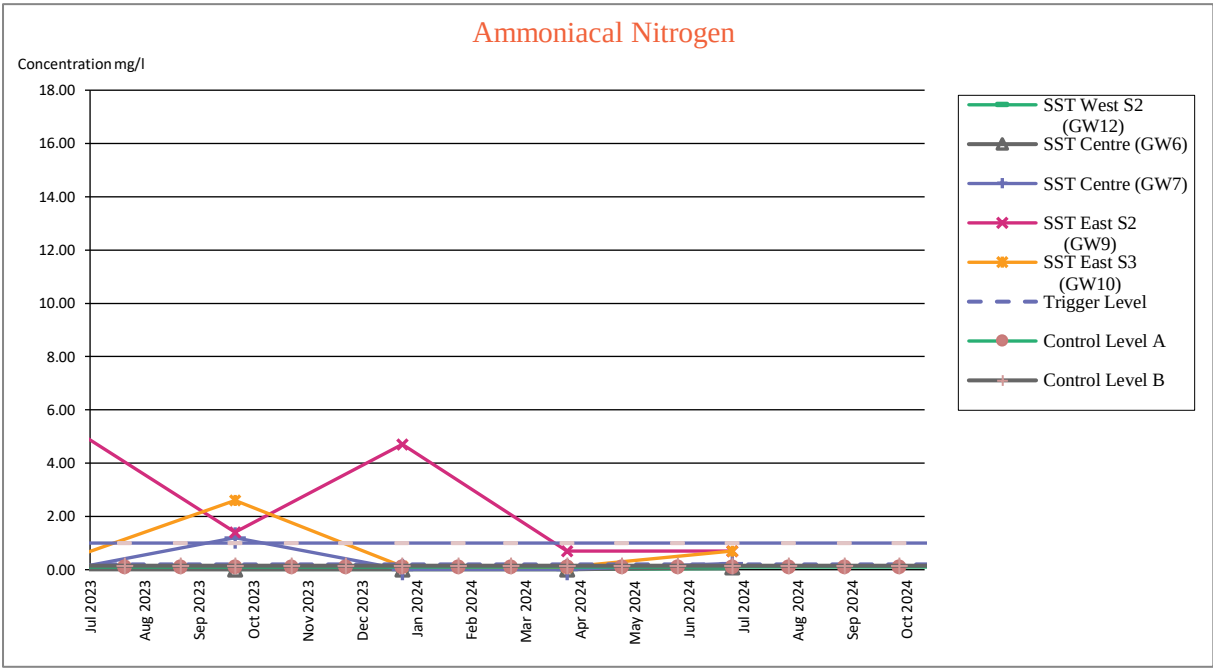
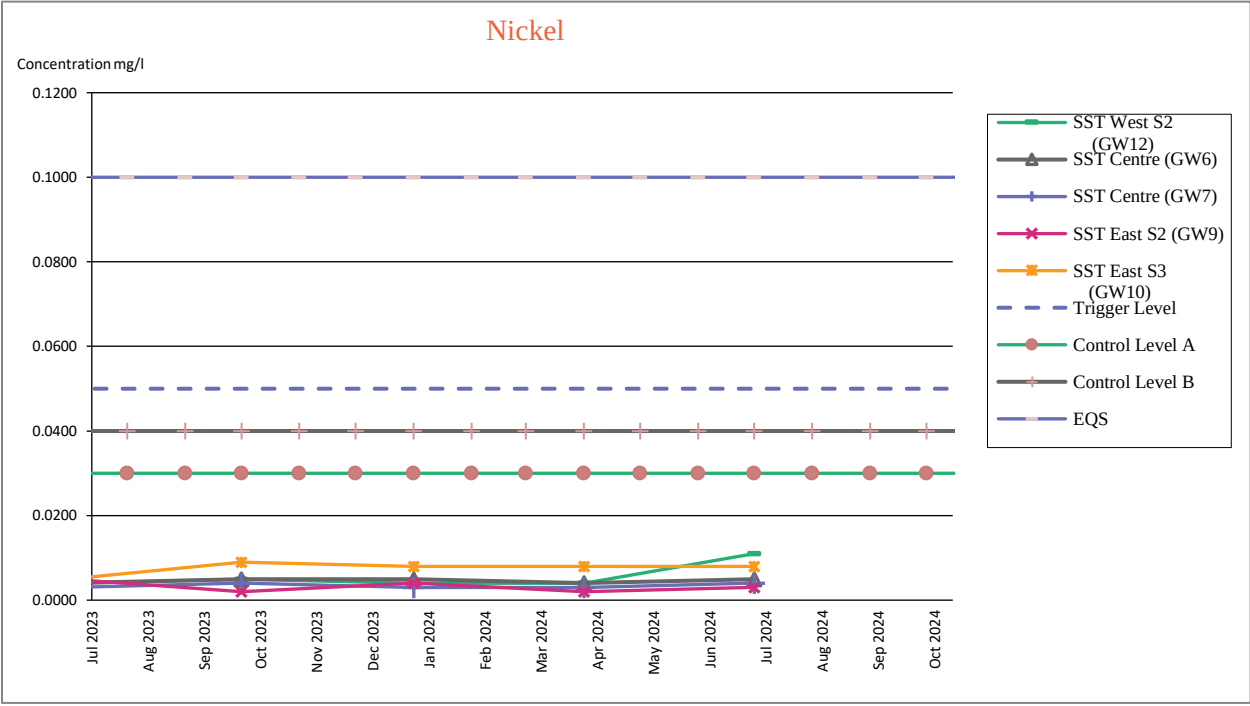
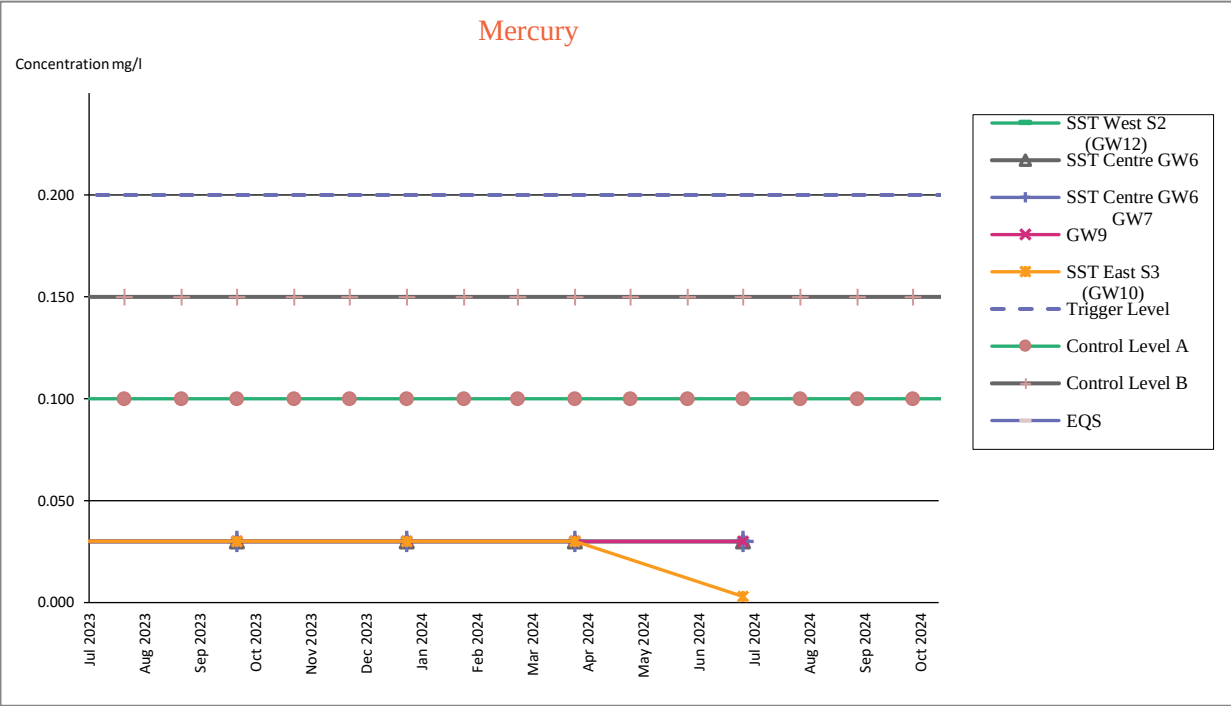


Figure A4
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

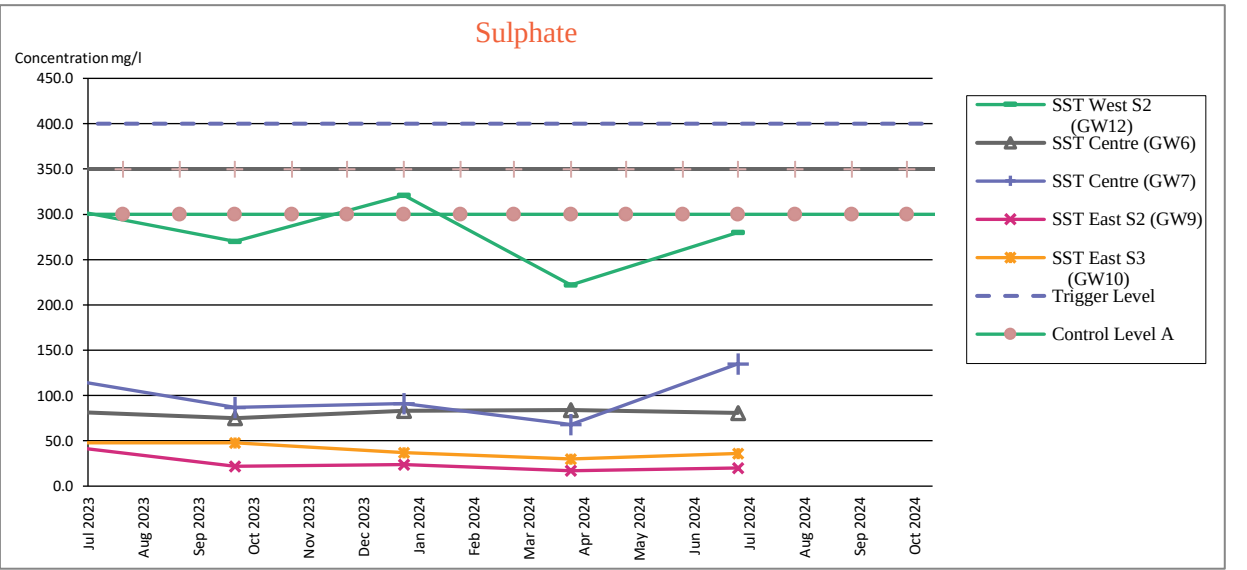
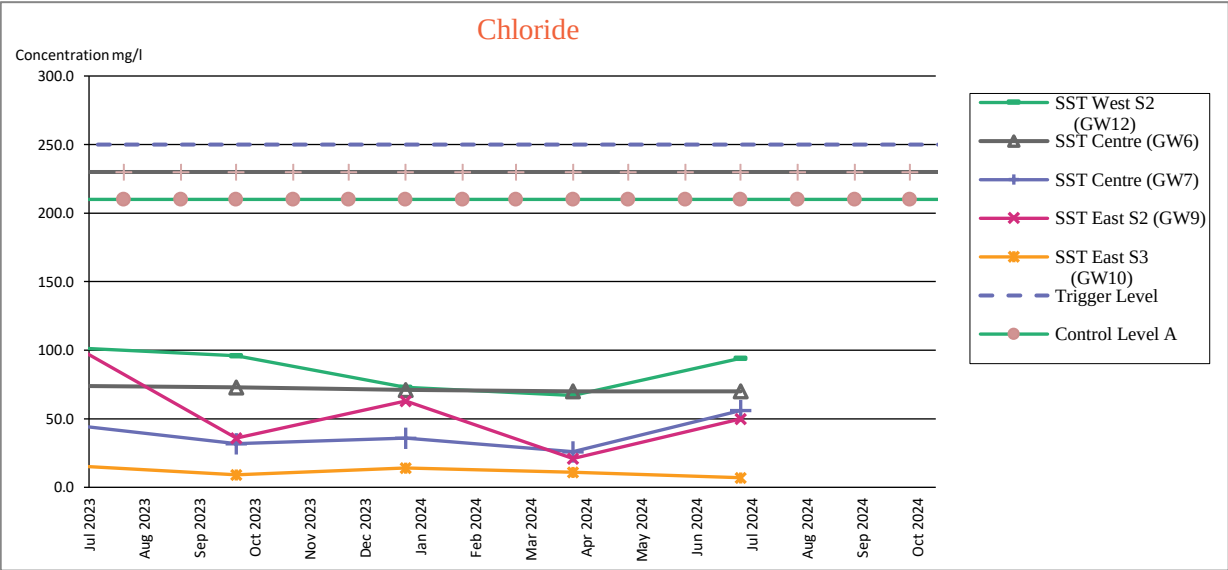
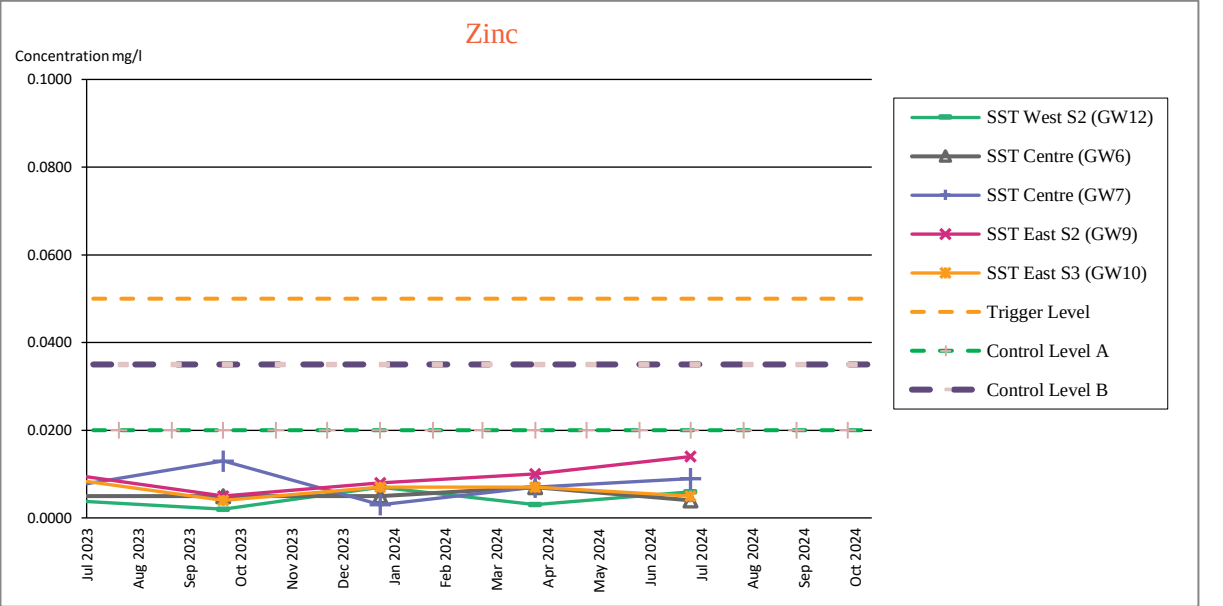
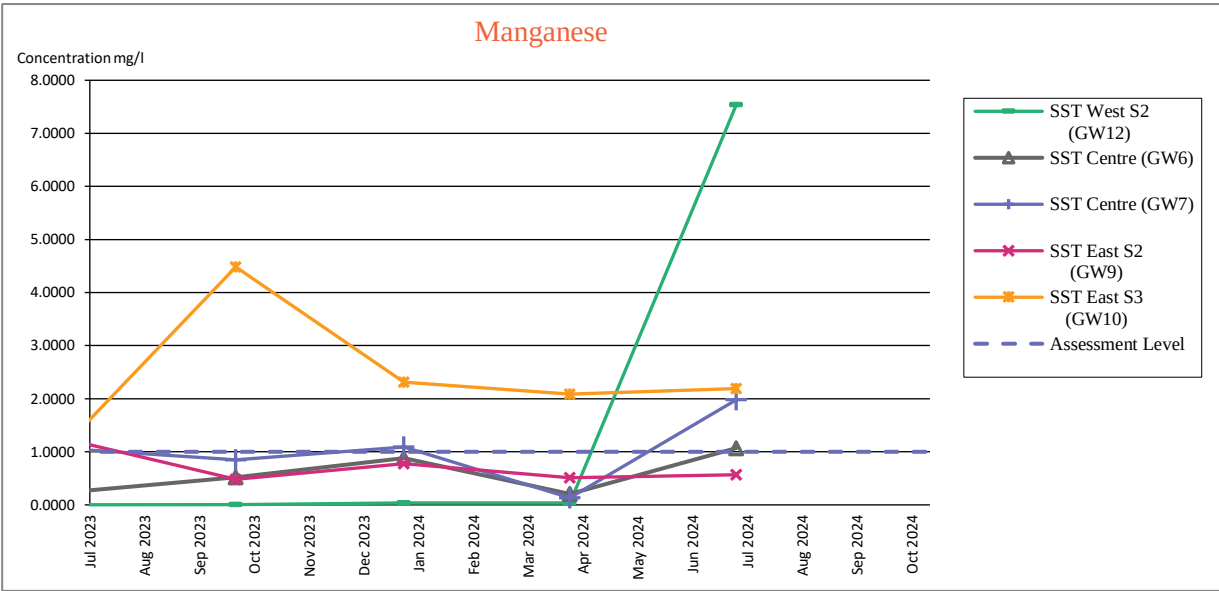


Figure A4
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

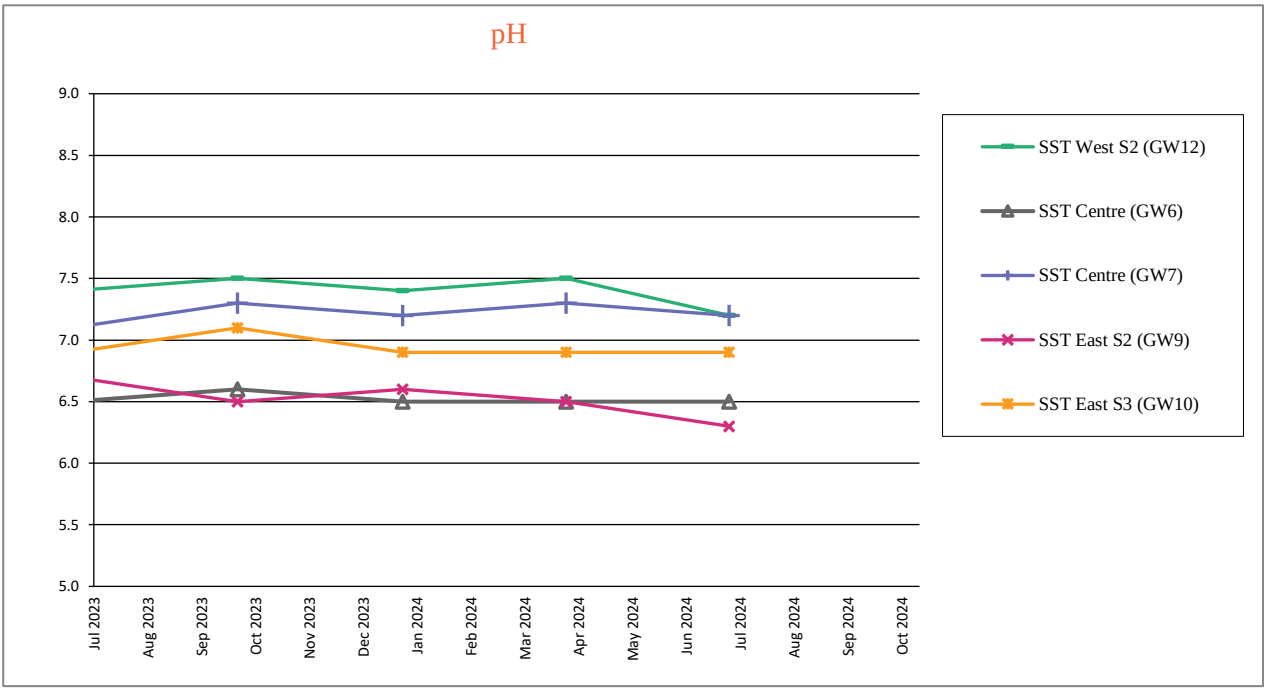


Figure A5
Groundwater quality monitoring results - Upstream wells graphs

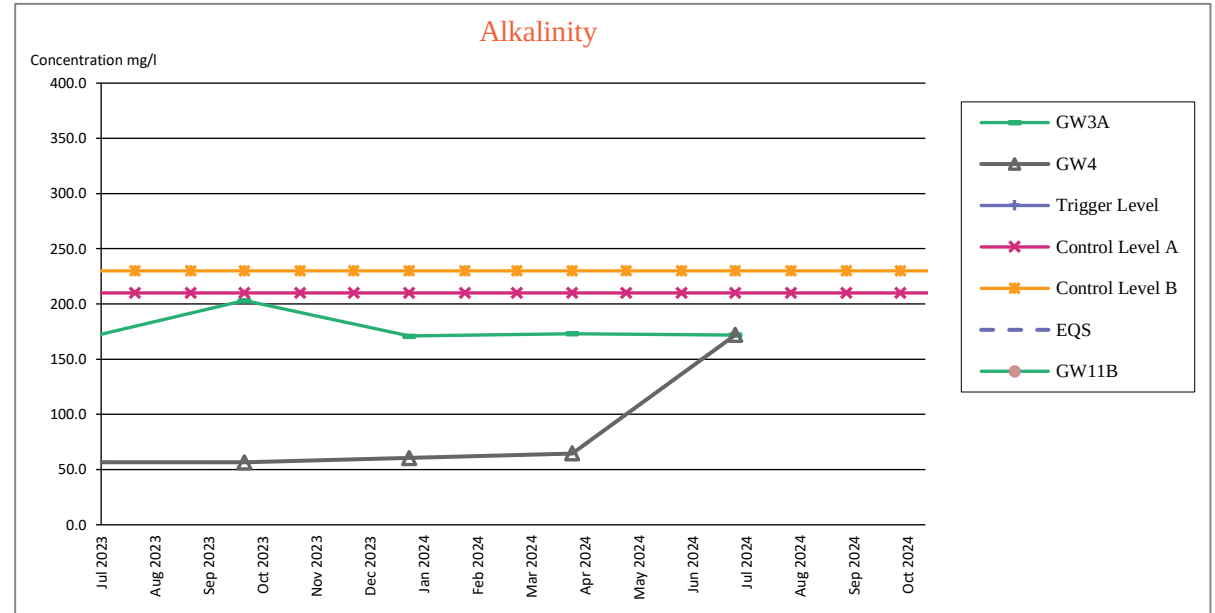
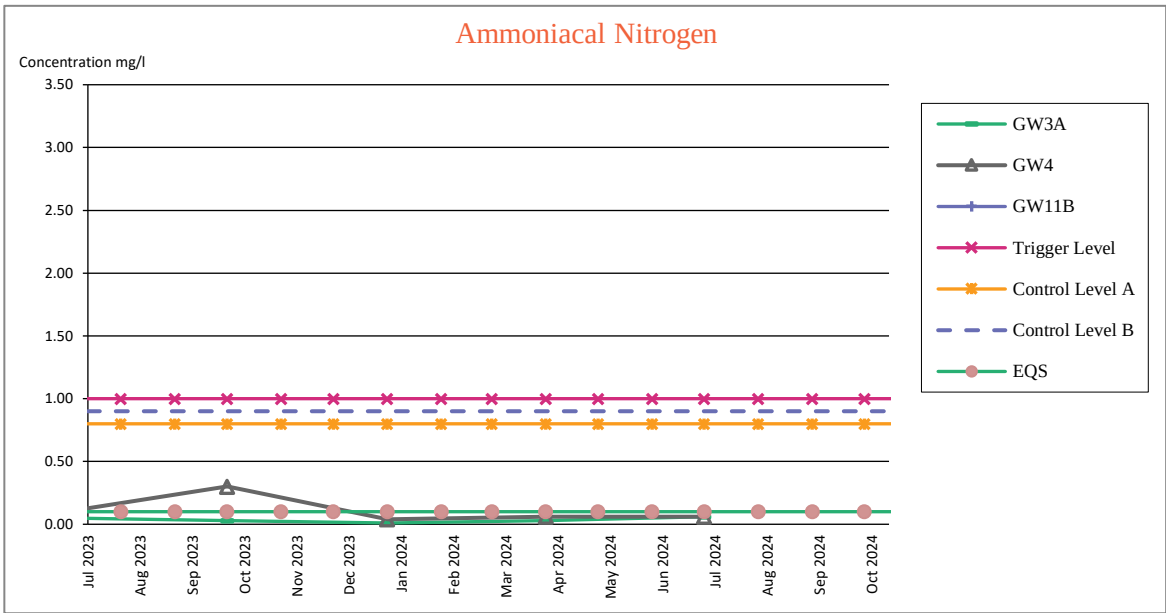
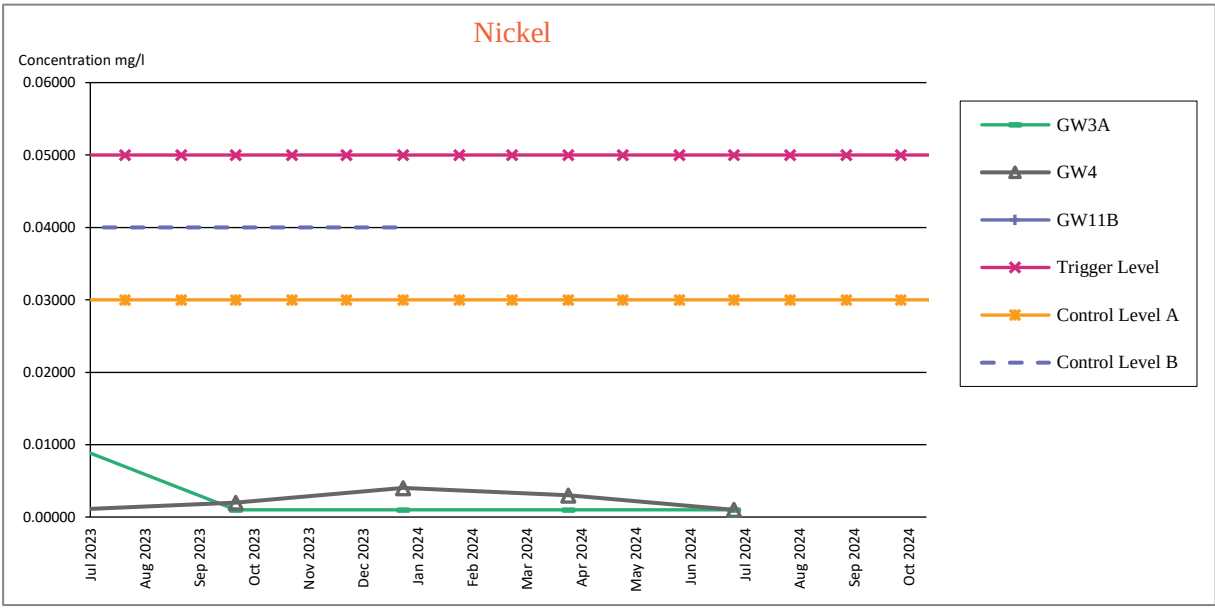
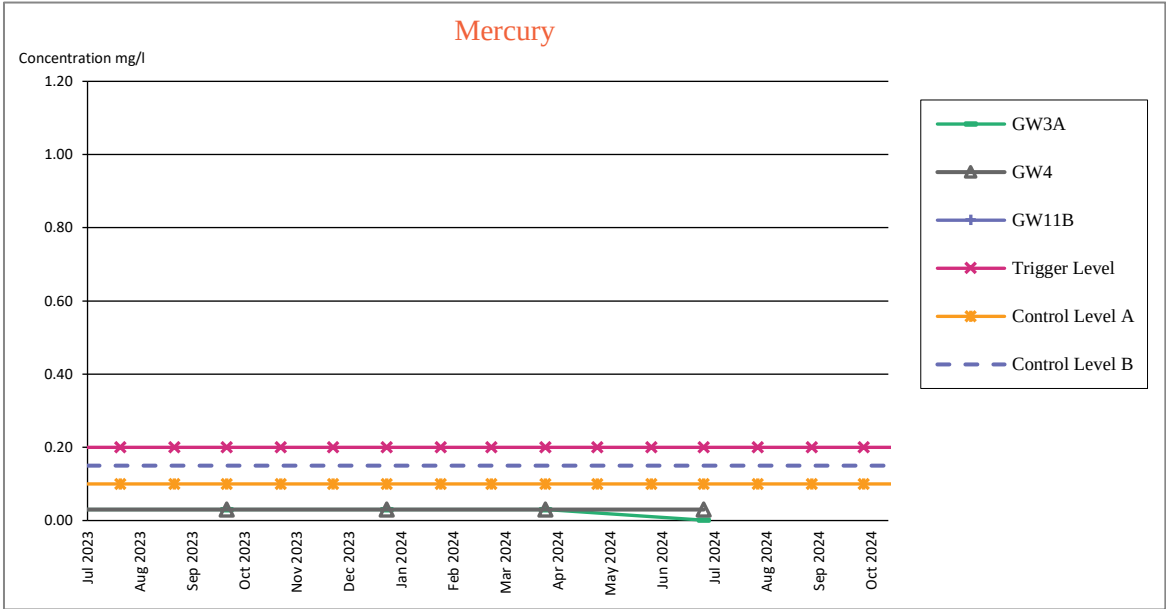


Figure A5
Groundwater quality monitoring results - Upstream wells graphs

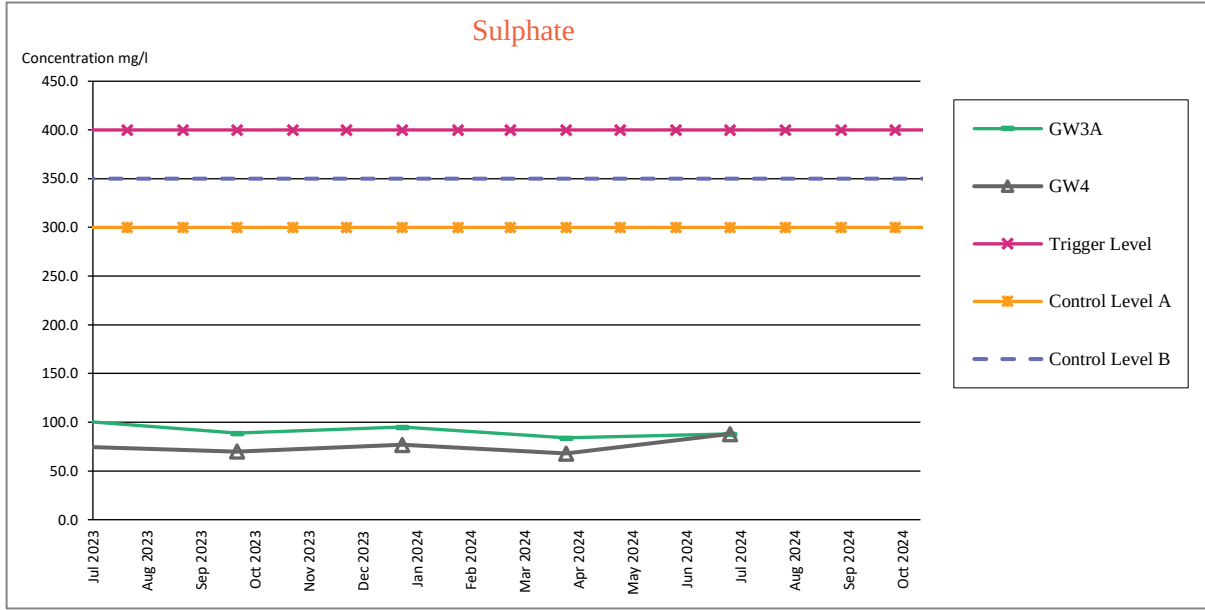
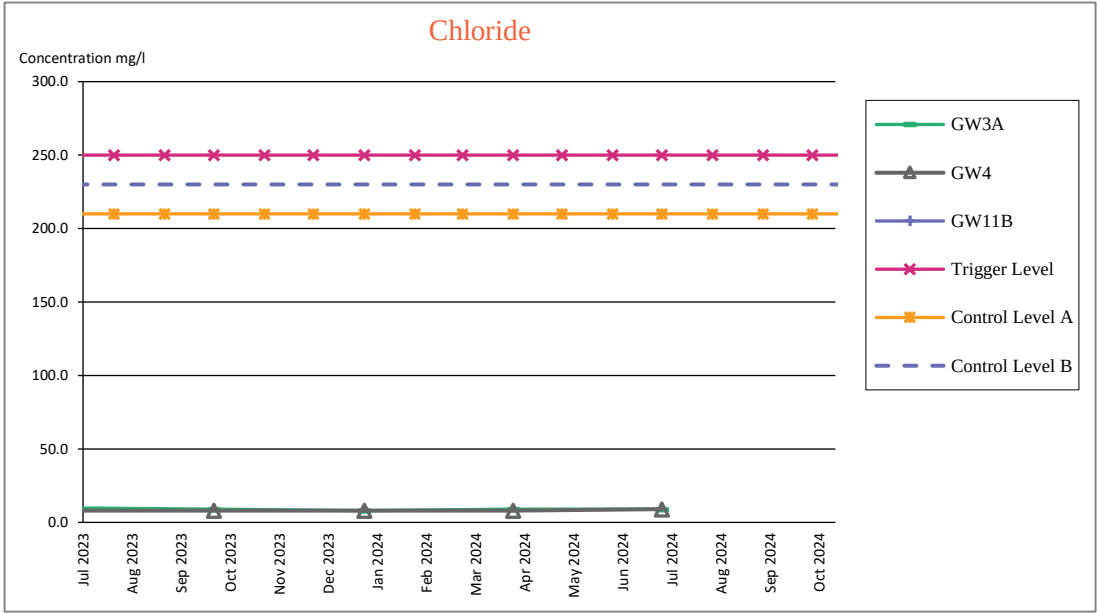
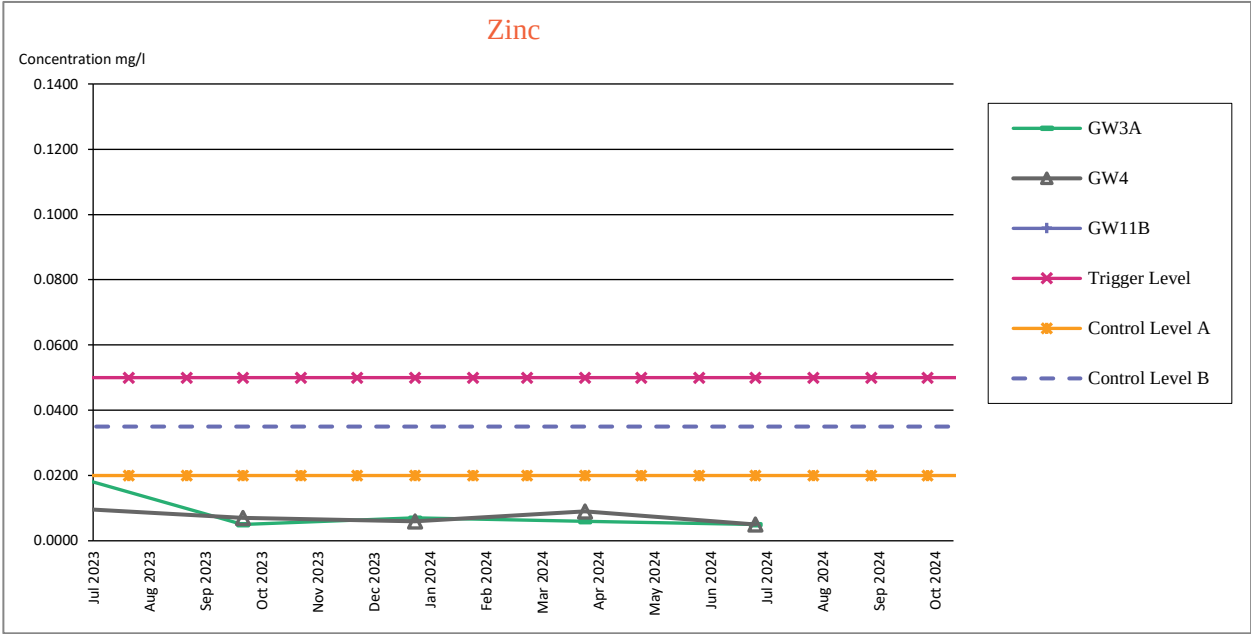
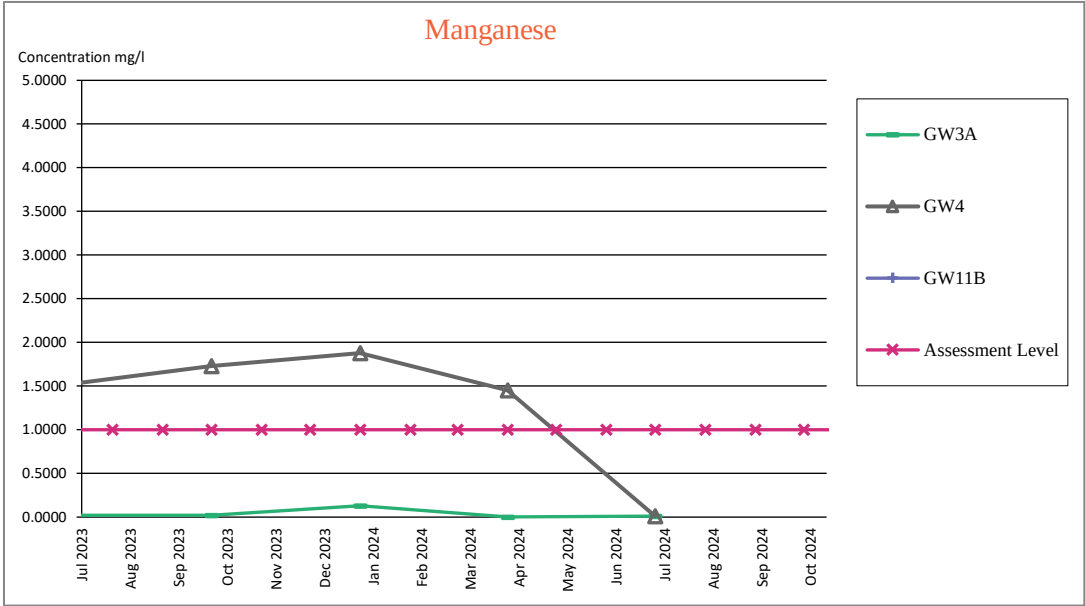


Figure A5
Groundwater quality monitoring results - Upstream wells graphs

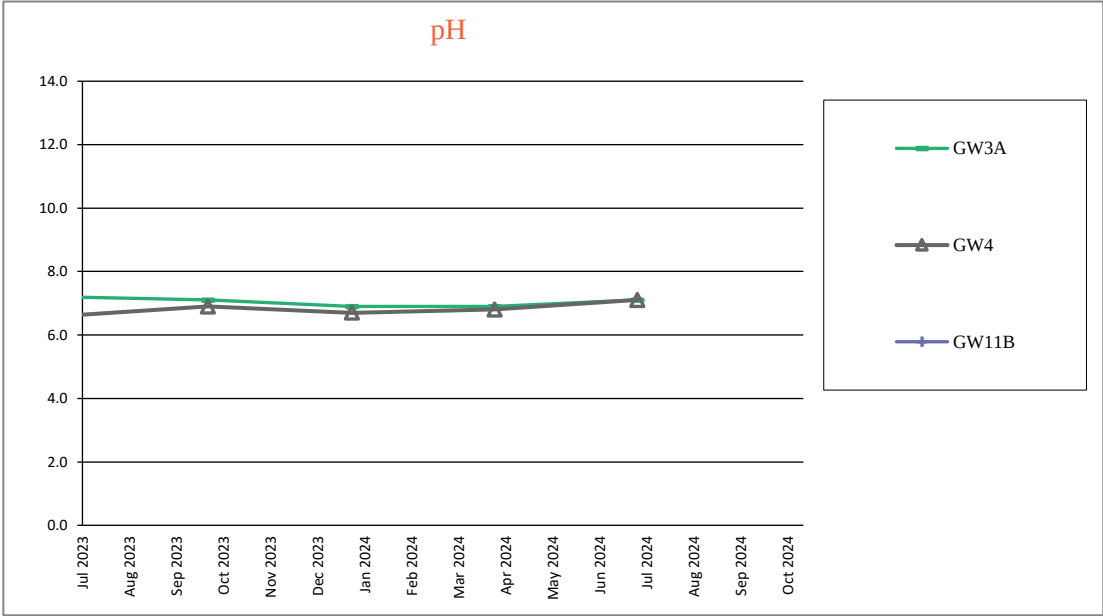


Figure A6
Groundwater monitoring levels downstream of compliance wells

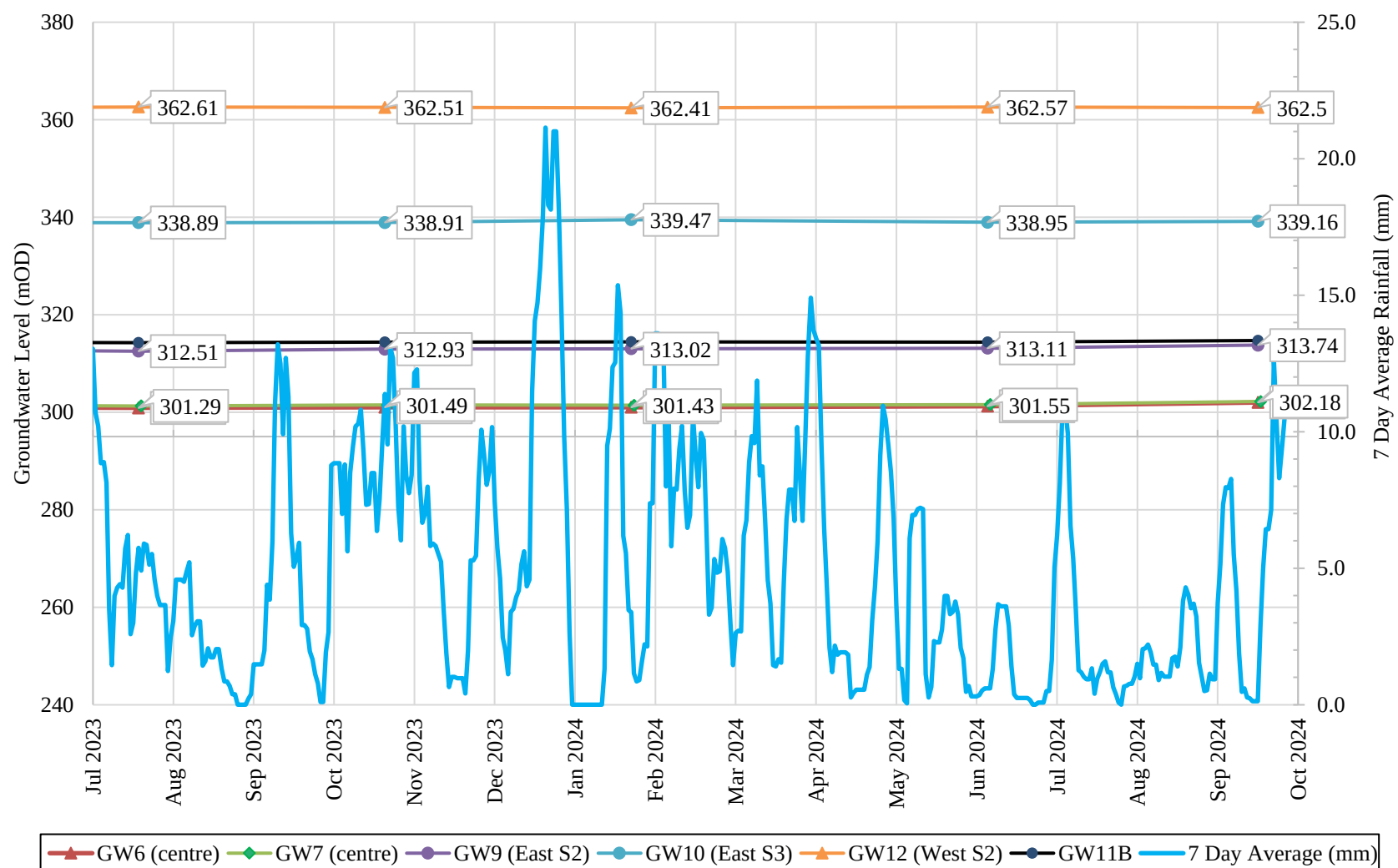
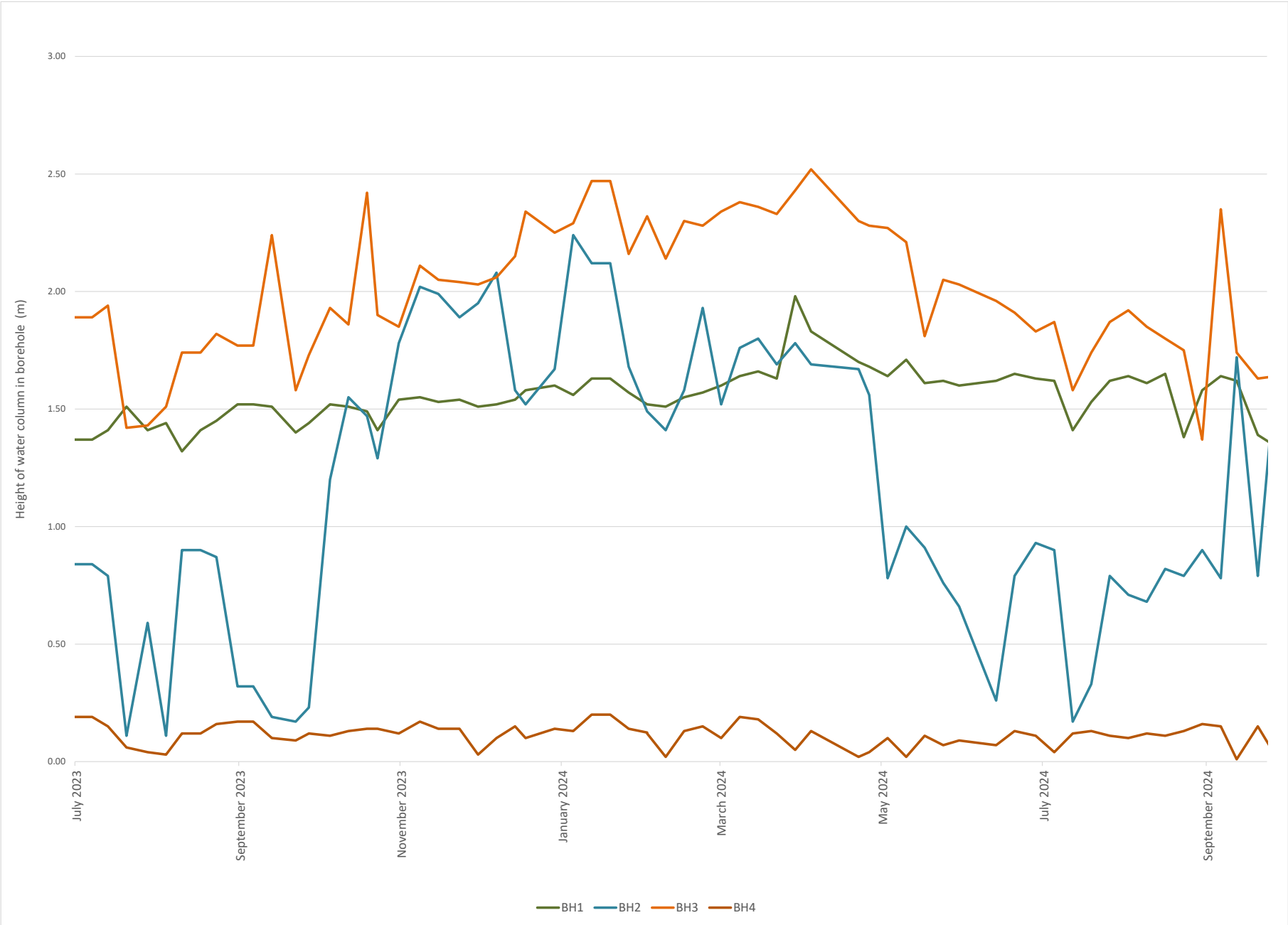


Figure A7
Height of water column (m) from base of well in boreholes BH1 to BH 4



Appendix B Monitoring Results - Tables

Appendix B
Table B1
Leachate Monitoring Results

July 2024													
LOCATION	Units	L1A	L1B	LC1A	LC2A	LC4A	LC5B	Maximum concentration (mg/l)	Monthly Average (mg/l)	Acceptable Maximum Concentration (AMC) (mg/l)	LP3A	LP4	
Date Sampled	-							-	-	-			
pH	pH Units	N/S	7.3	N/S	8.2	7.1	8.1	8.2	7.68	--	8.3	8	
Conductivity- Electrical 20C	uS/cm		1620		11100	3910	11100	11100	6933	--	1190	1830	
Redox Potential ^(see note 4)	mV		236		138	-89	82	236	92	--	222	200	
Dissolved Oxygen, Fixed*	mg/l		11.4		8.2	4	4	11.4	6.90	--	10.6	11.5	
Alkalinity as CaCO3	mg/l		480		4610	2130	4960	4960	3045	--	405	582	
Total Suspended Solids	mg/l		7		125	1420	230	1420	446	--	7	8	
Solids, Total Dissolved 180 deg C	mg/l		1110		5030	1610	4320	5030	3018	--	754	1210	
TOC (filtered)	mg/l		9.47		322	55.4	410	410	199	--	8.19	11.4	
Ammoniacal Nitrogen as N	mg/l		0.02		524	205	552	552	320	526	0.05	1.9	
Chloride as Cl	mg/l		86		649	145	582	649	366	1408	79	116	
Manganese in filtrate as Mn	mg/l	0.149	0.095	0.749	0.288	0.749	0.32	--	0.013	0.048			
Mercury, filt trace as Hg	mg/l	< 0.00003	< 0.0003	< 0.00003	< 0.0003	0.00030	0.0002	0.00056	< 0.00003	< 0.00003			
Nickel in filtrate as Ni	mg/l	0.004	0.087	0.005	0.082	0.087	0.04	0.0681	0.003	0.005			
Sulphate as SO4	mg/l	283	321	< 3	34	321	160	999	151	227			
Zinc, ultra-low filtered as Zn	mg/l	0.006	0.034	0.005	0.039	0.039	0.02	1.38	0.007	0.021			

- Notes
- 1. < denotes 'less than'.
 - 2. L1A,L1B, LC1A, LC2A,LC4A, LC5B: Wells in Waste.
 - 3. -- denotes 'no acceptable maximum concentration available'.
 - 4. The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis
 - 5. LC5B is a replacement for LC5A well.
 - 6. N/S denotes 'not sampled'.

Exceedance of AMC (per well)

Exceedance of AMC (monthly average)

Table B2
Leachate Head Levels

		Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24
LC1A	Elevation of base of landfill mAOD	357.62			357.62			357.62					
	Elevation at top of casing mAOD	398.85			398.85			398.85					
	Depth to leachate from top of casing (m)	40.38			40.30			40.26					
	Leachate elevation (mAOD)	358.47			358.55			358.59					
	Calculated leachate head (m)	0.85			0.93			0.97					
LC2A	Elevation of base of landfill mAOD	362.49			362.49			362.49					
	Elevation at top of casing mAOD	401.12			401.12			401.12					
	Depth to leachate from top of casing (m)	35.54			35.65			35.85					
	Leachate elevation (mAOD)	365.58			365.47			365.27					
	Calculated leachate head (m)	3.09			2.98			2.78					
LC4A	Elevation of base of landfill mAOD	372.27			372.27			372.27					
	Elevation at top of casing mAOD	401.14			401.14			401.14					
	Depth to leachate from top of casing (m)	26.77			26.82			26.79					
	Leachate elevation (mAOD)	374.37			374.32			374.35					
	Calculated leachate head (m)	2.10			2.05			2.08					
LC5B	Elevation of base of landfill mAOD	349.79			349.79			349.79					
	Elevation at top of casing mAOD	380.75			380.75			380.75					
	Depth to leachate from top of casing (m)	29.87			29.12			29.13					
	Leachate elevation (mAOD)	350.88			350.88			350.88					
	Calculated leachate head (m)	1.09			1.09			1.09					
L1	Casing height (mAOD)	357.00			357.00			357.00					
	Leachate (mbgl)	DRY			DRY			NS					
	Leachate (m AOD)	-			-								
	Base of landfill (m AOD)	336.80			336.80			336.80					
	Depth of well from top of casing (m)	20.02			21.02			NS					
	Base of well (m AOD)	336.98			335.98			-					
	Calculated leachate head (m)												
L1A*	Casing height (mAOD)	355.79			355.79			355.79					
	Leachate (mbgl)	DRY			40.30			DRY					
	Leachate (m AOD)	-			315.49								
	Base of landfill (m AOD)	316.64			316.64			316.64					
	Depth of well from top of casing (m)	20.95			20.92								
	Base of well (m AOD)	334.84			334.87			355.79					
	Calculated leachate head (m)				1.15								
L1B*	Casing height (mAOD)	354.80			354.80			354.80					
	Leachate (mbgl)	25.77			25.50			25.99					
	Leachate (m AOD)	329.03			329.30			328.81					
	Base of landfill (m AOD)	319.60			319.60			319.60					
	Depth of well from top of casing (m)	34.80			34.80								
	Base of well (m AOD)	320.00			320.00			354.80					
	Calculated leachate head (m)	9.43			9.70			9.21					

2024	Quarterly Leachate Head Averages (m)
January	2.01
February	
March	
April	1.99
May	
June	
July	1.94
August	
September	
October	
November	
December	

Minimum monthly leachate head average
Maximum monthly leachate head average

- Notes:
Top of casings were re-surveyed in August 2019
- LC1A top of casing is 1710mm above ground level.
 - LC2A top of casing is 820mm above GL.
 - LC4A top of casing is 1040mm above GL.

* Well not included in monthly average.
** NS - Not Sampled

Note: L1 is generally dry or with very little water in it.

Table B3
Surface Water Monitoring Results

Month	Location	Date	Mercury, ultra-low total as Hg	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Bioavailable Ni	Zinc, ultra-low total as Zn	Bioavailable Zn	pH	Conductivity-Electrical 20C	Ammoniacal Nitrogen as N	*Unionised Ammoniacal Nitrogen based on measured Temperature	Measured surface water temperature	Chloride as Cl	Sulphate as SO4	Total Suspended Solids	Dissolved Oxygen, fixed	TOC, filtered	Redox Potential	Alkalinity as CaCO3	Calcium							
Freshwater EQS**			ug/l	mg/l	mg/l	mg/l	mg/l	mg/l		uS/cm	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l	mV	mg/l	mg/l							
J a n u a r y	Upstream of Landfill	SWU	Six-monthly	Not sampled this quarter																								
		SW2AI																										
	SWW4																											
	NW Ditch System	SWW1	Six-monthly	Not sampled this quarter																								
SWW2																												
Downstream of Landfill	SWD	Quarterly	<	0.03	<	0.0100	<	0.0010	<	0.0001	0.008	<	0.0001	7.8	293	<	0.03	0.0003	8.7	6.00	52.0	<5	11	1.3	315.20	84	43	
	SWD1		<	0.03	<	0.0020		0.0020	<	0.0001	0.010	<	0.0001	7.8	281	<	0.01	0.0001	7.8	9.00	52.0	<5	12	1.6	12.10	72	36	
A p r i l	Upstream of Landfill	SWU	Six-monthly	<	0.03	<	0.002	<	0.002	<	0.0001	0.008	<	0.0001	7.6	100	0.01	0.00007	10.00	4.00	13.0	<5	11	0.5	357.20	12	4	
		SW2AI		<	0.04		0.005	<	0.001	<	0.0001	0.009	<	0.0001	7.7	627	0.02	0.00022	12.2	3.0	219.0		10	5.0	328.60	92	93	
		SWW4		<	0.07	<	0.002	<	0.001	<	0.0001	<	0.004	<	0.0001	7.7	627	0.06	0.00067	12.5	4.00	216.0	<5	11	6.0	328.90	94	86
	NW Ditch System	SWW1	Six-monthly	<	0.03	<	0.011	<	0.001	<	0.0001	0.006	<	0.0001	7.8	387.0	<	0.01	0.00012	10.7	5.00	111.0	<5	10	1.0	330.80	73	44
		SWW2		<	0.06	<	0.002	<	0.001	<	0.0001	0.004	<	0.0001	7.6	170.0	<	0.01	0.00007	9.5	5.00	36.0	<5	11	0.4	398.60	36	17
	Downstream of Landfill	SWD	Quarterly	<	0.03	<	0.0020	<	0.0010	<	0.0001	0.005	<	0.0001	7.9	251	0.02	0.00035	12.4	5.00	39.0	<5	10	1.3	346.70	81	36	
SWD1		<		0.03	<	0.0020		0.0030	<	0.0001	0.009	<	0.0001	7.8	242	<	0.01	0.00014	12.3	7.00	40.0	<5	10	1.9	313.70	64	29	
J u l y	Upstream of Landfill	SWU	Six-monthly	Not sampled this quarter																								
		SW2AI																										
	SWW4																											
NW Ditch System	SWW1	Six-monthly	Not sampled this quarter																									
	SWW2																											
Downstream of Landfill	SWD	Quarterly	<	0.03		0.007		0.001	<	0.0001	0.009	<	0.0001	7.4	228	<	0.01	0.00005	10.9	6	34	17	11.9	1.9	221.00	83	33	
	SWD1		<	0.03		0.005		0.002	<	0.0001	0.011	<	0.0001	7.6	220		0.01	0.00008	11.4	7	30	6	11.6	2.6	233.00	73	29	
O c t o b e r	Upstream of Landfill	SWU	Six-monthly																									
		SW2AI																										
	SWW4																											
NW Ditch System	SWW1	Six-monthly																										
	SWW2																											
Downstream of Landfill	SWD	Quarterly																										
	SWD1																											
Minimum				<	0.0020	<	0.0010	<	0.0001	<	0.0040	<	0.0001	7.4	100	<	<	0.0000	7.8	3.0	13.0	6.0	9.8	0.4	12.1	12.1000	4.0000	
Maximum				<	0.0110	<	0.0030	<	0.0001	<	0.0110	<	0.0001	7.9	627	<	<	0.0007	12.5	9	219	17	12.1	6	399	94	93	
Count					11		11		11		11		11		11		11		11		11		11		11		11	

- Notes
- The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis
 - N/S - Not analysed
 - Unionised ammoniacal nitrogen based on measured
 - Environmental Quality Standard EQS 1 for freshwater is derived to protect the most sensitive aquatic life.
 - NW Ditch - North Western (ditch system)

Exceedance of EQS

Upstream of Nant Merddog

Downstream of Nant Merddog

Table B4
Groundwater monitoring results

Location	Month	Date	Test reference number	Redox Potential	Mercury, filtrate as Hg	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Zinc, ultra-low filtered as Zn	pH	Electrical Conductivity 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen ***	Measure water temperature	Chloride as Cl	Sulphate as SO4	Calcium	D.O. concentration	TOC (Filtered)					
				mV	ug/l	mg/l	mg/l	mg/l	pH units	uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l					
	Trigger Level				(0.2*)		0.05	(0.05*)	--	--	--	1	--	--	250	400	--	--	--					
	Control Level A				(0.1**)	--	0.03	(0.02**)	--	--	--	0.8	--	--	210	300	--	--	--					
	Control Level B				(0.15**)	--	0.04	(0.035**)	--	--	--	0.9	--	--	230	350	--	--	--					
	Assessment Level				--	(1.0*)	--	--	--	--	--	--	--	--	--	--	--	--	--					
UPSTREAM WELLS																								
SST East S3	GW3A	Jan-23	21/02/23	1597147	-150	<	0.05	0.0240	0.00550	0.0120	7.8	540.0	340.0	3.00	0.0434	13.0	12.0	87.0	76.0	8.7	4.9			
		Feb-23	Quarterly																					
		Mar-23																						
		Apr-23	04/05/23	23050829-006	235.8	<	0.05	0.016	0.00200	0.0160	7.0	556.0	208.0	0.01	0.0000	13.4	10.0	80.0	84.0	8.7	1.4			
		May-23	Quarterly																					
		Jun-23																						
		Jul-23	20/07/23	23072702-006	12.1	<	0.03	<	0.0200	<	0.0100	<	0.0200	7.2	537.0	168.0	0.05	0.0002	13.8	10.0	102.0	72.0	12.1	3.3
		Aug-23	Quarterly																					
		Sep-23																						
		Oct-23	17/10/23	23102561-006	348.6	<	0.030	0.0190	<	0.001	0.0050	7.1	583.0	203	0.03	0.0001	13.5	9.0	89.0	84.0	8.8	4.0		
		Nov-23	Quarterly																					
		Dec-23																						
	GW3A	Jan-24	05/02/24	24020781-007	240	<	0.030	0.1300	<	0.00100	0.0070	6.9	528.0	171.0	<	0.01	0.00002	13.0	8.0	95.0	72.0	10.6	11.7	
		Feb-24	Quarterly																					
		Mar-24																						
		Apr-24	12/06/24	24052866-007	261.4	<	0.030	<	0.002	<	0.001	0.006	6.9	507	173	0.03	0.000058	13.6	9	84	61	6.5	6.45	
		May-24	Quarterly																					
		Jun-24																						
		Jul-24	17/10/24	24102838-007	133	<	0.00	0.0120	<	0.0010	0.0050	7.1	511.0	172.0	0.06	0.000179	13.3	9.0	88.0	66.0	10.9	1.5		
		Aug-24	Quarterly																					
		Sep-24																						
		Oct-24																						
		Nov-24																						
		Dec-24																						
GW4	GW4	Jan-23	21/02/23	1597148	-140	<	0.05	1.70	0.0079	0.0140	7.8	280.0	110.0	0.74	0.0083	9.5	9.9	68.0	21.0	7.5	3.5			
		Feb-23	Quarterly																					
		Mar-23																						
		Apr-23	04/05/23	23050829-007	270.9	<	0.050	1.94	0.0020	0.0160	6.7	285.0	64.0	0.03	0.0000	10.0	9.0	71.0	19.0	9.5	1.5			
		May-23	Quarterly																					
		Jun-23																						
		Jul-23	20/07/23	23072702-007	326.2	<	0.03	1.5100	0.0010	0.0100	6.6	301.0	56.8	0.10	0.0001	10.0	8.0	75.0	18.0	9.8	0.7			
		Aug-23	Quarterly																					
		Sep-23																						
		Oct-23	17/10/23	23102561-007	389.3	<	0.030	1.7300	0.002	0.0070	6.9	289.0	56.6	0.30	0.0004	9.6	8.0	70.0	17.0	7.8	4.0			
		Nov-23	Quarterly																					
		Dec-23																						
	GW4	Jan-24	05/02/24	24020781-008	331	<	0.030	1.88	0.0040	0.0060	6.7	296.0	60.5	0.04	0.00004	9.3	8.0	77.0	18.0	8.1	6.7			
		Feb-24	Quarterly																					
		Mar-24																						
		Apr-24	12/06/24	24052866-008	331.3	<	0.030	1.45	0.003	0.009	6.8	295	64.5	0.06	0.000071	10.1	8	68	15	8.7	4.65			
		May-24	Quarterly																					
		Jun-24																						
		Jul-24	17/10/24	24102838-008	133	<	0.03	0.0120	<	0.0010	0.0050	7.1	511.0	172.0	0.06	0.000141	10.1	9.0	88.0	66.0	10.9	1.5		
		Aug-24	Quarterly																					
		Sep-24																						
		Oct-24																						
		Nov-24																						
		Dec-24																						

Table B4
Groundwater monitoring results

Location	Month	Date	Test reference number	Redox Potential	Mercury, filtrate as Hg	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Zinc, ultra-low filtered as Zn	pH	Electrical Conductivity 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen ***	Measure water temperature	Chloride as Cl	Sulphate as SO4	Calcium	D.O. concentration	TOC (Filtered)			
				mV	ug/l	mg/l	mg/l	mg/l	pH units	uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l			
Trigger Level					(0.2*)		0.05	(0.05*)	--	--	--	1	--	--	250	400	--	--	--			
Control Level A					(0.1**)	--	0.03	(0.02**)	--	--	--	0.8	--	--	210	300	--	--	--			
Control Level B					(0.15**)	--	0.04	(0.035**)	--	--	--	0.9	--	--	230	350	--	--	--			
Assessment Level					--	(1.0*)	--	--	--	--	--	--	--	--	--	--	--	--	--			
DOWNSTREAM WELLS / COMPLIANCE WELLS																						
SST West S2																						
GW12	Jan-23	21/02/23	1597153	-72	<	0.050	0.0090	0.0073	0.0039	8.2	1600.0	420.0	0.20	0.0111	19.2	83.0	270.0	150.0	7.3	10.0		
	Feb-23	Quarterly																				
	Mar-23																					
	Apr-23	04/05/23	23050829-012	287.9	<	0.050	<	0.002	0.0040	0.0050	7.4	1650.0	152.0	0.01	0.0001	19.2	87.0	240.0	151.0	8.9	15.1	
	May-23	Quarterly																				
	Jun-23																					
	Jul-23	20/07/23	23072702-012	11.2	<	0.03	<	0.0020	0.0040	0.0040	7.4	1810.0	434.0	<	0.10	0.0008	18.1	102.0	306.0	162.0	11.2	10.3
	Aug-23	Quarterly																				
	Sep-23																					
	Oct-23	17/10/23	23102561-012	315.5	<	0.030		0.0040	0.005	0.0020	7.5	1750.0	431	0.01	0.0001	18.7	96.0	270.0	156.0	9.1	9.1	
	Nov-23	Quarterly																				
	Dec-23																					
	Jan-24	05/02/24	24020781-013	316	<	0.030		0.0390	0.0040	0.0070	7.4	1450.0	384.0	0.01	0.0001	19.5	73.0	321.0	142.0	9.8	30.5	
	Feb-24	Quarterly																				
	Mar-24																					
	Apr-24	12/06/24	24052866-013	368.2	<	0.030		0.038	0.004	0.0030	7.5	1410	362	<	0.01	0.0001	19.3	67	222.0	143	7.8	9.89
	May-24	Quarterly																				
	Jun-24																					
Jul-24	17/10/24	24102838-013	254	<	0.03		7.5400	0.0110	0.0060	7.2	1670.0	400.0	0.05	0.0003	18.2	94.0	280.0	154.0	6.4	9.1		
Aug-24	Quarterly																					
Sep-24																						
Oct-24																						
Nov-24																						
Dec-24																						
SST Centre																						
GW6	Jan-23	21/02/23	1597149	-120	<	0.050	0.0071	0.0067	0.0063	7.3	770.0	250.0	0.32	0.0013	11.7	73.0	83.0	34.0	8.5	6.5		
	Feb-23	Quarterly																				
	Mar-23																					
	Apr-23	04/05/23	23050829-008	289.1	<	0.050		0.04	0.003	0.002	6.6	952	319	0.08	0.0001	12.0	72	75	77	9	9.4	
	May-23	Quarterly																				
	Jun-23																					
	Jul-23	20/07/23	23072702-008	369.9	<	0.030		0.2410	0.0040	0.0050	6.5	893.0	248.0	0.02	0.00001	11.7	74.0	82.0	50.0	10.5	13.7	
	Aug-23	Quarterly																				
	Sep-23																					
	Oct-23	17/10/23	23102561-008	388.8	<	0.030		0.5220	0.005	0.0050	6.6	866.0	228	0.01	0.00001	11.7	73.0	75.0	42.0	8.5	<	4.0
	Nov-23	Quarterly																				
	Dec-23																					
	Jan-24	05/02/24	24020781-009	335	<	0.030		0.8830	0.0050	0.0050	6.5	871.0	247.0	0.02	0.00001	12.5	71.0	83.0	49.0	9.6	6.2	
	Feb-24	Quarterly																				
	Mar-24																					
	Apr-24	12/06/24	24052866-009	343	<	0.030		0.207	0.004	0.007	6.5	892	253	0.02	0.000015	12.9	70	84	47	7.5	6.29	
	May-24	Quarterly																				
	Jun-24																					
Jul-24	17/10/24	24102838-009	236	<	0.030		1.0700	0.0050	0.0040	6.5	892.0	259.0	0.09	0.000063	12.3	70.0	81.0	50.0	10.8	3.7		
Aug-24	Quarterly																					
Sep-24																						
Oct-24																						
Nov-24																						
Dec-24																						
GW7	Jan-23	21/02/23	1597150	-95	<	0.05	0.7700	0.0079	0.0120	7.9	830.0	380.0	0.26	0.004	11.7	46.0	110.0	76.0	7.8	8.0		
	Feb-23	Quarterly																				
	Mar-23																					
	Apr-23	04/05/23	23050829-009	284.8	<	0.050		0.282	0.0030	0.0080	7.2	714.0	731.0	0.02	0.000	11.6	28.0	78.0	74.0	8.7	4.3	
	May-23	Quarterly																				
	Jun-23																					
	Jul-23	20/07/23	23072702-009	349.5	<	0.030		1.0600	0.0030	0.0070	7.1	903.0	248.0	<	0.01	0.000	12.0	46.0	118.0	99.0	8.8	5.0
	Aug-23	Quarterly																				
	Sep-23																					
	Oct-23	17/10/23	23102561-009	347.5	<	0.030		0.8510	0.004	0.0130	7.3	914.0	327	1.20	0.0054	12.6	32.0	87.0	105.0	9.4	5.7	
Nov-23	Quarterly																					
Dec-23																						
Jan-24	05/02/24	24020781-010	308	<	0.030		1.0900	0.0030	0.0030	7.2	827.0	276.0	<	0.01	0.00003	12.3	36.0	91.0	94.0	9.6	5.5	
Feb-24	Quarterly																					
Mar-24																						
Apr-24	12/06/24	24052866-010	326.3	<	0.030		0.134	0.003	0.007	7.3	726	250	<	0.01	0.00005	13.3	26	68	74	10	3.81	
May-24	Quarterly																					
Jun-24																						
Jul-24	17/10/24	24102838-010	213	<	0.030		1.9800	0.0040	0.0090	7.2	982.0	293.0	0.24	0.00082	12.0	56.0	135.0	98.0	10.5	5.8		
Aug-24	Quarterly																					
Sep-24																						
Oct-24																						
Nov-24																						
Dec-24																						

Table B4
Groundwater monitoring results

Location	Month	Date	Test reference number	Redox Potential	Mercury, filtrate as Hg	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Zinc, ultra-low filtered as Zn	pH	Electrical Conductivity 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen ***	Measure water temperature	Chloride as Cl	Sulphate as SO4	Calcium	D.O. concentration	TOC (Filtered)			
				mV	ug/l	mg/l	mg/l	mg/l	pH units	uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l			
	Trigger Level				(0.2 ^u)		0.05	(0.05 ^u)	--	--	--	1	--	--	250	400	--	--	--			
	Control Level A				(0.1 ^{uu})	--	0.03	(0.02 ^{uu})	--	--	--	0.8	--	--	210	300	--	--	--			
	Control Level B				(0.15 ^{uu})	--	0.04	(0.035 ^{uu})	--	--	--	0.9	--	--	230	350	--	--	--			
	Assessment Level				--	(1.0 ^u)	--	--	--	--	--	--	--	--	--	--	--	--	--			
SST East S2																						
GW9	Jan-23	21/02/23	1597151	-94	<	0.05	0.8800	0.0100	0.0100	8.5	7300.0	500.0	16.00	1.0	11.7	140.0	34.0	67.0	6.2	15.0		
	Feb-23	Quarterly																				
	Mar-23																					
	Apr-23	04/05/23	23050829-010	268.1	<	0.05	0.505	0.0030	0.0140	6.5	697.0	431.0	3.60	0.003	13.4	55.0	31.0	43.0	7.6	12.6		
	May-23	Quarterly																				
	Jun-23																					
	Jul-23	20/07/23	23072702-010	341.2	<	0.03	1.2300	0.0050	0.0100	6.7	1080.0	226.0	5.40	0.006	12.3	106.0	44.0	61.0	9.3	6.7		
	Aug-23	Quarterly																				
	Sep-23																					
	Oct-23	17/10/23	23102561-010	390	<	0.030	0.4820	0.002	0.0050	6.5	553.0	82.6	1.40	0.001	12.1	36.0	22.0	30.0	5.6	5.4		
	Nov-23	Quarterly																				
	Dec-23																					
	GW9	Jan-24	05/02/24	24020781-011	328	<	0.030	0.7750	0.0040	0.0080	6.6	868.0	173.0	4.70	0.004	11.6	63.0	24.0	48.0	8.6	10.8	
		Feb-24	Quarterly																			
		Mar-24																				
		Apr-24	12/06/24	24052866-011	340.1	<	0.030	0.515	0.002	0.01	6.5	405	83.6	0.7	0.00048	12.2	21	17	27	2.9	7.02	
		May-24	Quarterly																			
		Jun-24																				
		Jul-24	17/10/24	24102838-011	228	<	0.03	0.5670	0.0030	0.0140	6.3	740.0	77.4	0.70	0.00029	11.7	50.0	20.0	41.0	11.1	4.9	
		Aug-24	Quarterly																			
		Sep-24																				
		Oct-24																				
		Nov-24																				
		Dec-24																				
SST East S3																						
GW10	Jan-23	21/02/23	1597152	-67	<	0.05	0.9300	0.0095	0.0079	8.4	620.0	310.0	0.44	0.0208	10.8	26.0	50.0	66.0	7.0	7.4		
	Feb-23	Quarterly																				
	Mar-23																					
	Apr-23	04/05/23	23050829-011	280.3	<	0.05	7.18	0.0120	0.0150	6.9	627.0	81.8	0.16	0.0002	10.6	21.0	49.0	74.0	8.4	15.6		
	May-23	Quarterly																				
	Jun-23																					
	Jul-23	20/07/23	23072702-011	257.1	<	0.03	1.1800	0.0050	0.0090	6.9	615.0	214.0	0.40	0.0006	10.5	16.0	48.0	80.0	8.4	9.9		
	Aug-23	Quarterly																				
	Sep-23																					
	Oct-23	17/10/23	23102561-011	238.2	<	0.030	4.4800	0.009	0.0040	7.1	589.0	238	2.60	0.0067	11.3	9.0	48.0	81.0	3.5	7.1		
	Nov-23	Quarterly																				
	Dec-23																					
	GW10	Jan-24	05/02/24	24020781-012	333	<	0.030	2.3100	0.0080	0.0070	6.9	528.0	194.0	0.12	0.00020	11.4	14.0	37.0	72.0	7.9	47.4	
		Feb-24	Quarterly																			
		Mar-24																				
		Apr-24	12/06/24	24052866-012	377.6	<	0.03	2.09	0.008	0.007	6.9	549	2.4	<	0.1	0.00016	10.8	11	30	75	8.3	9.14
		May-24	Quarterly																			
		Jun-24																				
		Jul-24	17/10/24	24102838-012	215	<	0.00	2.1900	0.0080	0.0050	6.9	578.0	242.0	0.70	0.00115	11.5	7.0	36.0	83.0	10.2	6.1	
		Aug-24	Quarterly																			
		Sep-24																				
		Oct-24																				
		Nov-24																				
		Dec-24																				

	Exceedance of Control Level
	Exceedance of Trigger Level
	Exceedance of Assessment Level

Notes
* The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis{*/}
** Unionised ammoniacal nitrogen based on measured Temperature and pH; unionised ammoniacal nitrogen = total ammonia/(1+10^{(10.055-(0.0324*°C)-pH)}), where T°C is measured water temperature.
^ Ammonia result confirmed on duplicate analysis.

Table B5
Landfill Gas Monitoring Results

		METHANE (% by Volume)												CARBON DIOXIDE (% by Volume)													
Location	Valve	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Comments	
Date monitored																											
GMW2	Red Valve	0	0	0.1	0	0	0.1	0	0.1	0.1				0.2	0.4	0.3	0.6	0.6	1.5	0.6	1.6	1.4				Red Valve, 25.5m depth	GMW2
	Yellow Valve	0	0	0	0	0	0.1	0	0.1	0.1				0	0	0	0.1	0.1	0.3	0	0.2	0.2				Yellow Valve,14m depth	
	White Valve	0.1	0.1	0.1	0.1	0	0.1	0	0.1	0.1				0	0	0.2	8.4	2.6	0.1	0	0	0				White Valve, 4m depth	
	Trigger Levels	1												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels
	Control Levels	0.5												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels
	Trigger Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Red
	Trigger Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Yellow
	Trigger Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level White
	Control Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Red
	Control Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Yellow
	Control Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level White
GMW3	Red Valve	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1				0.5	0.1	0.4	1	3.8	0.7	2.5	1.7	1.9				Red Valve, 19m depth	GMW3
	Yellow Valve	0.1	0.1	0.1	0	0.1	0.1	0	0.1	0.1				0.3	0.2	0.1	0.2	0.8	0.15	0	0.7	1.7				Yellow Valve,9m depth	
	White Valve	0	0	0.1	0	0	0	0	0.1	0.1				0.8	0.8	1.2	0.2	1.1	0.7	0.1	0.1	1.9				White Valve, 3.5m depth	
	Trigger Levels	1												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels
	Control Levels	0.5												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels
	Trigger Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Red
	Trigger Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Yellow
	Trigger Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level White
	Control Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Red
	Control Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Yellow
	Control Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level White
GMW4	Red Valve	0	0	0	0	0	0	0	0.1	0.1				1.5	2.1	2.1	2.7	1.8	2.4	0	0.8	0.8				Red Valve, 30m depth	GMW4
	Yellow Valve	0	0	0	0	0.1	0	0	0.1	0.1				0	0.1	0.1	0.2	0.3	0.1	0	0.2	0.1				Yellow Valve,20m depth	
	White Valve	0	0	0	nt	0	0	0	0.1	0.1				0	0	0	nt	0	0	0	0.3	1.3				White Valve, 5m depth	
	Trigger Levels	1												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels
	Control Levels	0.5												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels
	Trigger Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Red
	Trigger Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Yellow
	Trigger Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level White
	Control Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Red
	Control Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Yellow
	Control Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level White
GMW5	Red Valve	0	0	0	0	0	0	0	0.1	0.1				4	4.9	5.2	5.2	5	5.2	2	1.1	6.2				Red Valve, 26.3m depth	GMW5
	Yellow Valve	0	0	0	0	0	0	0	0	0.1	0.1			0.2	0.2	0.5	0.3	0.4	0.4	0.2	0.2	0.3				Yellow Valve,15m depth	
	White Valve	0	0	0	0	0	0	0	0.1	0.1				2.5	2.6	3.2	3.6	2.4	3.4	1.6	3.3	2				White Valve, 5m depth	
	Trigger Levels	1												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels
	Control Levels	0.5												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels
	Trigger Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Red
	Trigger Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Yellow
	Trigger Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level White
	Control Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Red
	Control Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Yellow
	Control Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level White
GMW6	Red Valve	0	0	0	0	0	0.1	0	0.1	0.1				2.5	2.9	2.9	2.7	2.7	4	1.2	4.5	5.6				Red Valve, 26.3m depth	GMW6
	Yellow Valve	0	0	0	0	0	0.1	0	0.1	0.1				2.5	3.3	2.8	2.4	2.1	1.5	0.9	1.8	1.8				Yellow Valve,15m depth	
	White Valve	0	0	0	0	0	0.1	0	0.1	0				1.3	1.4	1.5	1.6	1.5	1.9	0.7	1.2	1.3				White Valve, 5m depth	
	Trigger Levels	1												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels
	Control Levels	0.5												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels
	Trigger Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Red
	Trigger Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level Yellow
	Trigger Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Level White
	Control Level Red	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Red
	Control Level Yellow	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level Yellow
	Control Level White	-												-	-	-	-	-	-	-	-	-	-	-	-	-	Control Level White

Table B5
Landfill Gas Monitoring Results

		METHANE (% by Volume)												CARBON DIOXIDE (% by Volume)													
Location	Valve	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Comments	
GMW7	Yellow Valve	0	0	0	0	0	0.1	0	0.1	0.1				0	0.2	0.1	0.2	0.3	0.5	0.1	1.5	0.9				Yellow Valve,12 depth	GMW7
	White Valve	damaged	damaged	damaged	0	nt	nt	nt	nt	0.1				piezo damaged	piezo damaged	piezo damaged	0.2	nt	nt	nt	nt	0.9				White Valve, 5m depth	
	Trigger Levels	1												-												Trigger Levels	
	Control Levels	0.5												-												Control Levels	
	Trigger Level Yellow	-												1.8												Trigger Level Yellow	
	Trigger Level White	-												1.82												Trigger Level White	
	Control Level Yellow	-												1.3												Control Level Yellow	
	Control Level White	-												1.32												Control Level White	
GMW12	Red Valve	0	0	0	0	0.1	0	0	0.1	0				1.2	1.7	1	0.8	0.3	0.9	0.3	0.3	0.4				Red Valve, 26.3m depth	GMW12
	Yellow Valve	0	0	0	0	0.1	0	0	0.1	0				1.7	0.8	3.3	0.6	0.5	1.95	0.3	0.2	0.3				Yellow Valve,15m depth	
	White Valve	0	0	0	0	0.1	0	0	0.1	0				0.6	1.4	0.1	0.5	0.2	0.3	0.3	0.3	0.3				White Valve, 5m depth	
	Trigger Level Red	1.89												4.5												Trigger Level Red	
	Trigger Level Yellow	1												2.9												Trigger Level Yellow	
	Trigger Level White	1												5.5												Trigger Level White	
	Control Level Red	1.39												4												Control Level Red	
	Control Level Yellow	0.5												2.4												Control Level Yellow	
GMW13	Red Valve	0	0	0	0	0	0	0	0.1	0				1	1.1	1.1	1	1.2	1.05	0.9	1.5	1.3				Red Valve, 26.3m depth	GMW13
	Yellow Valve	0	0	0	0	0	0	0	0.1	0				2.7	2.8	2.6	5.6	6	4.1	3.1	5.2	5.6				Yellow Valve,15m depth	
	White Valve	0	0	0	0	0	0	0	0.1	0				1.6	1.9	1.1	1.4	2.4	1.25	1.8	3.4	3.5				White Valve, 5m depth	
	Trigger Level Red	1.14												7.9												Trigger Level Red	
	Trigger Level Yellow	1.2												6												Trigger Level Yellow	
	Trigger Level White	1												5.82												Trigger Level White	
	Control Level Red	0.64												7.4												Control Level Red	
	Control Level Yellow	0.7												5.5												Control Level Yellow	
GMW14/14A	Red Valve	0	0	0.9	0	0.1	0.1	0	0.1	0				1	0.7	20.8	0.6	0	0.1	0.3	0.3	0.4				Red Valve, 26.3m depth	GMW14/14A
	Yellow Valve	0	0	0.7	0	0.1	0.1	0	0.1	0				2.1	3.4	21.2	0.1	0	2.9	0.1	0	0.1				Yellow Valve,15m depth	
	White Valve	0	0	0.6	0	0.1	0.1	0	0.1	0				0.3	0.4	21.4	1.2	0	1.9	0	0	0				White Valve, 5m depth	
	Trigger Level Red	1												1.5												Trigger Level Red	
	Trigger Level Yellow	1.2												5.9												Trigger Level Yellow	
	Trigger Level White	1.2												5.4												Trigger Level White	
	Control Level Red	0.5												1												Control Level Red	
	Control Level Yellow	0.7												5.4												Control Level Yellow	
GMW1**	Red Valve	0	0	0	0	0	0.1	0.2	0.1	0.1				0.4	0.9	0	0	1.4	1.6	0.9	2.5	2				Red Valve, 23.5m depth	GMW1**
	Yellow Valve	0.9	1.5	0.8	0.1	0.7	1.1	.9	0.2	12.8				1.4	1.8	1.7	0.2	1.9	5.8	1.8	11	1.5				Yellow Valve,14.7m depth	
	White Valve	0.3	0.3	0.4	0.1	0.1	8	0.8	1.2	0.1				1.2	1.5	1.6	0.3	1	2.1	0.8	1.2	2.5				White Valve, 6.5m depth	
GMW8*	Yellow Valve	9.6	11.1	11.8	1.1	4	0.9	2.9	0.5	0.9				6.2	6	6.3	2.3	2.3	4.3	7.9	3	4.5				Yellow Valve,17.5m depth	GMW8*
	White Valve	0	0	0	0	0	0	0.5	0.1	0.1				3.9	4	4.1	3.6	3.5	3.8	5.3	5.1	0.9				White Valve, 5.7m depth	
GMW9*	Red Valve	0	0	0	0	0	0.1	0	0.1	0.1				1.7	1.8	1.9	1.1	1.2	0.3	2.1	2	0.2				Red Valve, 27m depth	GMW9*
	Yellow Valve	27.5	29.3	31.6	32	30.1	24.4	20.9	22.7	27.2				7.9	8.2	8.5	8.2	9.2	12	11	14.9	12				Yellow Valve,15m depth	
	White Valve	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.2	0.1				0	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.3				White Valve, 8.5m depth	
GMW10*	Red Valve	1.1	0.1	4.4	3.8	0.1	5.6	4	5.4	5.4				2.8	4.5	1	2.2	4.5	2.4	1.8	12.9	2.29				Red Valve, 19.5m depth	GMW10*
	Yellow Valve	16	7.2	23.9	26.8	28.9	30.6	29	12	0.1				2	1.9	2.4	2.8	3.1	4.1	7	14	4.5				Yellow Valve,15m depth	
	White Valve	8.7	27.2	0.1	0.1	0.2	0.5	4.1	0.8	0.1				3.6	2.9	4	7.1	4.6	9	2	9.6	3.3				White Valve, 8m depth	
GMW17**	Red Valve	0	0	1.5	0	0	0	0	0.1	0				0.7	0	15.9	1.3	1.2	1	0.8	1.4	1.3				Red Valve, 26.3m depth	GMW17**
	Yellow Valve	0	0	5.4	0	0	0.1	0	0.1	0				5.2	5.3	10.7	5.7	5.6	5.2	6.1	3.8	3.6				Yellow Valve,15m depth	
	White Valve	0	0	3.5	0	0	0.1	0	0.1	0				3.6	4	17.5	3.9	3.5	3.7	5.2	4	3.5				White Valve, 5m depth	
GMW18**	Yellow Valve	0	0	0	0	nt	0	0	0	0				0	0.2	21.6	2	nt	1	0.1	1.5	0				Yellow Valve,12 depth	GMW18**
	White Valve	0	0	6	0	0	0	0	0.1	0				5.4	5.4	17.2	5.3	5.4	4.2	2	4.3	3.5				White Valve, 5m depth	

Notes:
1. Water denotes 'water in well - reading abandoned'.
2. NT denotes 'reading not taken'.
3. NT in GMW14 is due to cattle quarantine paddock around well location.
4. Where the asterisc (*) is present, no trigger levels have been set, as high levels of methane and carbon dioxide gas are recorded. This is likely to be associated with the presence of bog/marshland.
5. Where two asteriscs (**) are present, no trigger levels have been set, as not require by the Permit (Reference [2]).
ntc - reading not taken due to cattle presence at location of the well

Exceedance of Trigger
Exceedance of Control

Date	BH1		BH2		BH3		BH4		Water column (m)			
	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base(m)	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base (m)	BH1	BH2	BH3	BH4
06/01/2023	18.70	20.02	7.81	8.68	4.51	6.76	9.91	10.12	1.32	0.87	2.25	0.21
12/01/2023	18.60	20.02	7.50	8.68	4.55	6.76	9.90	10.12	1.42	1.18	2.21	0.22
20/01/2023	18.50	20.03	7.10	8.68	4.20	6.76	9.89	10.13	1.53	1.58	2.56	0.24
27/01/2023	18.55	20.03	7.10	8.68	4.46	6.76	9.98	10.12	1.48	1.58	2.30	0.14
01/02/2023	18.80	20.03	7.19	8.68	4.70	6.76	9.80	10.12	1.23	1.49	2.06	0.32
17/02/2023	18.87	20.02	7.91	8.68	4.80	6.76	9.88	10.12	1.15	0.77	1.96	0.24
21/02/2023	18.81	20.03	7.90	8.66	4.80	6.77	9.99	10.12	1.22	0.76	1.97	0.13
03/03/2023	18.91	20.02	8.30	8.68	5.08	6.76	9.95	10.11	1.11	0.38	1.68	0.16
09/03/2023	18.75	20.03	7.90	8.67	4.88	6.77	9.94	10.11	1.28	0.77	1.89	0.17
16/03/2023	18.80	20.03	7.90	8.67	4.85	6.77	9.91	10.12	1.23	0.77	1.92	0.21
23/03/2023	18.60	20.03	7.90	8.68	4.80	6.74	9.90	10.13	1.43	0.78	1.94	0.23
30/03/2023	18.62	20.02	7.80	8.68	4.64	6.74	9.89	10.12	1.40	0.88	2.10	0.23
07/04/2023	18.45	20.03	6.83	8.67	4.52	6.74	9.92	10.13	1.58	1.84	2.22	0.21
14/04/2023	18.59	20.02	6.92	8.67	4.55	6.74	9.92	10.12	1.43	1.75	2.19	0.20
21/04/2023	18.61	20.02	7.15	8.62	4.52	6.74	9.96	10.12	1.41	1.47	2.22	0.16
12/05/2023	18.56	20.08	7.96	8.66	4.70	6.74	9.99	10.12	1.52	0.70	2.04	0.13
19/05/2023	18.51	19.98	7.80	8.69	4.71	6.74	9.99	10.95	1.47	0.89	2.03	0.96
26/05/2023	18.53	20.02	7.85	8.68	4.83	6.74	9.90	10.13	1.49	0.83	1.91	0.23
02/06/2023	18.48	20.03	7.91	8.68	4.86	6.76	9.93	10.13	1.55	0.77	1.90	0.20
09/06/2023	18.59	20.02	7.98	8.77	4.84	6.74	9.95	10.12	1.43	0.79	1.90	0.17
16/06/2023	18.62	20.02	7.98	8.77	4.84	6.74	9.95	10.12	1.40	0.79	1.90	0.17
21/06/2023	18.60	20.03	7.86	8.68	4.89	6.74	9.90	10.12	1.43	0.82	1.85	0.22
30/06/2023	18.65	20.02	7.85	8.69	4.85	6.74	9.94	10.13	1.37	0.84	1.89	0.19
07/07/2023	18.65	20.02	7.85	8.69	4.85	6.74	9.94	10.13	1.37	0.84	1.89	0.19
13/07/2023	18.61	20.02	7.90	8.69	4.80	6.74	9.98	10.13	1.41	0.79	1.94	0.15
20/07/2023	18.51	20.02	8.59	8.70	5.33	6.75	10.08	10.14	1.51	0.11	1.42	0.06
28/07/2023	18.60	20.01	8.10	8.69	5.31	6.74	10.09	10.13	1.41	0.59	1.43	0.04
04/08/2023	18.57	20.01	8.60	8.71	5.23	6.74	10.07	10.10	1.44	0.11	1.51	0.03
10/08/2023	18.70	20.02	7.79	8.69	4.98	6.72	10.01	10.13	1.32	0.90	1.74	0.12
17/08/2023	18.60	20.01	7.79	8.69	4.98	6.72	10.01	10.13	1.41	0.90	1.74	0.12
23/08/2023	18.56	20.01	7.80	8.67	4.92	6.74	9.96	10.12	1.45	0.87	1.82	0.16
31/08/2023	18.49	20.01	8.35	8.67	4.95	6.72	9.96	10.13	1.52	0.32	1.77	0.17
06/09/2023	18.49	20.01	8.35	8.67	4.95	6.72	9.96	10.13	1.52	0.32	1.77	0.17
13/09/2023	18.51	20.02	8.50	8.69	4.50	6.74	10.02	10.12	1.51	0.19	2.24	0.10
22/09/2023	18.62	20.02	8.52	8.69	5.15	6.73	10.03	10.12	1.40	0.17	1.58	0.09
27/09/2023	18.59	20.03	8.46	8.69	5.00	6.73	10.01	10.13	1.44	0.23	1.73	0.12
05/10/2023	18.50	20.02	7.49	8.69	4.80	6.73	10.01	10.12	1.52	1.20	1.93	0.11
12/10/2023	18.50	20.01	7.14	8.69	4.86	6.72	9.99	10.12	1.51	1.55	1.86	0.13
19/10/2023	18.52	20.01	7.14	8.61	4.30	6.72	9.99	10.13	1.49	1.47	2.42	0.14
23/10/2023	18.60	20.01	7.40	8.69	4.82	6.72	9.98	10.12	1.41	1.29	1.90	0.14
31/10/2023	18.49	20.03	6.91	8.69	4.88	6.73	10.01	10.13	1.54	1.78	1.85	0.12
08/11/2023	18.48	20.03	6.67	8.69	4.62	6.73	9.96	10.13	1.55	2.02	2.11	0.17
15/11/2023	18.50	20.03	6.70	8.69	4.68	6.73	9.99	10.13	1.53	1.99	2.05	0.14
23/11/2023	18.48	20.02	6.80	8.69	4.68	6.72	9.98	10.12	1.54	1.89	2.04	0.14
30/11/2023	18.51	20.02	6.72	8.67	4.70	6.73	10.10	10.13	1.51	1.95	2.03	0.03
07/12/2023	18.51	20.03	6.81	8.89	4.66	6.72	10.02	10.12	1.52	2.08	2.06	0.10
14/12/2023	18.48	20.02	7.10	8.68	4.58	6.73	9.97	10.12	1.54	1.58	2.15	0.15
18/12/2023	18.42	20.00	7.16	8.68	4.41	6.75	10.00	10.10	1.58	1.52	2.34	0.10
29/12/2023	18.43	20.03	7.01	8.68	4.50	6.75	9.98	10.12	1.60	1.67	2.25	0.14
05/01/2024	18.46	20.02	6.45	8.69	4.44	6.73	9.99	10.12	1.56	2.24	2.29	0.13
12/01/2024	18.39	20.02	6.56	8.68	4.27	6.74	9.90	10.10	1.63	2.12	2.47	0.20
19/01/2024	18.39	20.02	6.56	8.68	4.27	6.74	9.90	10.10	1.63	2.12	2.47	0.20
26/01/2024	18.46	20.03	7.01	8.69	4.58	6.74	9.98	10.12	1.57	1.68	2.16	0.14
02/02/2024	18.50	20.02	7.19	8.68	4.42	6.74	10.00	10.12	1.52	1.49	2.32	0.12
09/02/2024	18.51	20.02	7.27	8.68	4.60	6.74	10.10	10.12	1.51	1.41	2.14	0.02
16/02/2024	18.47	20.02	7.10	8.68	4.44	6.74	9.99	10.12	1.55	1.58	2.30	0.13
23/02/2024	18.46	20.03	6.75	8.68	4.46	6.74	9.97	10.12	1.57	1.93	2.28	0.15
01/03/2024	18.42	20.02	7.16	8.68	4.40	6.74	10.00	10.10	1.60	1.52	2.34	0.10
08/03/2024	18.39	20.03	6.92	8.68	4.36	6.74	9.94	10.13	1.64	1.76	2.38	0.19
15/03/2024	18.37	20.03	6.88	8.68	4.38	6.74	9.95	10.13	1.66	1.80	2.36	0.18
22/03/2024	18.40	20.03	6.99	8.68	4.41	6.74	9.90	10.02	1.63	1.69	2.33	0.12
29/03/2024	18.05	20.03	6.90	8.68	4.29	6.72	9.98	10.03	1.98	1.78	2.43	0.05
04/04/2024	18.20	20.03	6.98	8.67	4.20	6.72	9.99	10.12	1.83	1.69	2.52	0.13
22/04/2024	18.32	20.02	7.01	8.68	4.44	6.74	10.00	10.02	1.70	1.67	2.30	0.02
26/04/2024	18.35	20.03	7.12	8.68	4.44	6.72	9.99	10.03	1.68	1.56	2.28	0.04
03/05/2024	18.39	20.03	7.91	8.69	4.46	6.73	10.02	10.12	1.64	0.78	2.27	0.10
10/05/2024	18.32	20.03	7.69	8.69	4.52	6.73	10.10	10.12	1.71	1.00	2.21	0.02
17/05/2024	18.42	20.03	7.78	8.69	4.92	6.73	10.01	10.12	1.61	0.91	1.81	0.11

Date	BH1		BH2		BH3		BH4		Water column (m)			
	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base(m)	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base (m)	BH1	BH2	BH3	BH4
24/05/2024	18.41	20.03	7.93	8.69	4.68	6.73	10.05	10.12	1.62	0.76	2.05	0.07
30/05/2024	18.43	20.03	8.03	8.69	4.70	6.73	10.03	10.12	1.60	0.66	2.03	0.09
13/06/2024	18.41	20.03	8.43	8.69	4.77	6.73	10.05	10.12	1.62	0.26	1.96	0.07
20/06/2024	18.38	20.03	7.90	8.69	4.82	6.73	9.99	10.12	1.65	0.79	1.91	0.13
28/06/2024	18.40	20.03	7.76	8.69	4.90	6.73	10.01	10.12	1.63	0.93	1.83	0.11
05/07/2024	18.41	20.03	7.79	8.69	4.86	6.73	10.08	10.12	1.62	0.90	1.87	0.04
07/07/2023	18.65	20.02	7.85	8.69	4.85	6.74	9.94	10.13	1.37	0.84	1.89	0.19
13/07/2023	18.61	20.02	7.9	8.69	4.8	6.74	9.98	10.13	1.41	0.79	1.94	0.15
20/07/2023	18.51	20.02	8.59	8.7	5.33	6.75	10.08	10.14	1.51	0.11	1.42	0.06
28/07/2023	18.6	20.01	8.1	8.69	5.31	6.74	10.09	10.13	1.41	0.59	1.43	0.04
04/08/2023	18.57	20.01	8.6	8.71	5.23	6.74	10.07	10.1	1.44	0.11	1.51	0.03
10/08/2023	18.7	20.02	7.79	8.69	4.98	6.72	10.01	10.13	1.32	0.9	1.74	0.12
17/08/2023	18.6	20.01	7.79	8.69	4.98	6.72	10.01	10.13	1.41	0.9	1.74	0.12
23/08/2023	18.56	20.01	7.8	8.67	4.92	6.74	9.96	10.12	1.45	0.87	1.82	0.16
31/08/2023	18.49	20.01	8.35	8.67	4.95	6.72	9.96	10.13	1.52	0.32	1.77	0.17
06/09/2023	18.49	20.01	8.35	8.67	4.95	6.72	9.96	10.13	1.52	0.32	1.77	0.17
13/09/2023	18.51	20.02	8.5	8.69	4.5	6.74	10.02	10.12	1.51	0.19	2.24	0.1
22/09/2023	18.62	20.02	8.52	8.69	5.15	6.73	10.03	10.12	1.4	0.17	1.58	0.09
27/09/2023	18.59	20.03	8.46	8.69	5	6.73	10.01	10.13	1.44	0.23	1.73	0.12
05/10/2023	18.5	20.02	7.49	8.69	4.8	6.73	10.01	10.12	1.52	1.2	1.93	0.11
12/10/2023	18.5	20.01	7.14	8.69	4.86	6.72	9.99	10.12	1.51	1.55	1.86	0.13
19/10/2023	18.52	20.01	7.14	8.61	4.3	6.72	9.99	10.13	1.49	1.47	2.42	0.14
23/10/2023	18.6	20.01	7.4	8.69	4.82	6.72	9.98	10.12	1.41	1.29	1.9	0.14
31/10/2023	18.49	20.03	6.91	8.69	4.88	6.73	10.01	10.13	1.54	1.78	1.85	0.12
08/11/2023	18.48	20.03	6.67	8.69	4.62	6.73	9.96	10.13	1.55	2.02	2.11	0.17
15/11/2023	18.5	20.03	6.7	8.69	4.68	6.73	9.99	10.13	1.53	1.99	2.05	0.14
23/11/2023	18.48	20.02	6.8	8.69	4.68	6.72	9.98	10.12	1.54	1.89	2.04	0.14
30/11/2023	18.51	20.02	6.72	8.67	4.7	6.73	10.1	10.13	1.51	1.95	2.03	0.03
07/12/2023	18.51	20.03	6.81	8.89	4.66	6.72	10.02	10.12	1.52	2.08	2.06	0.1
14/12/2023	18.48	20.02	7.1	8.68	4.58	6.73	9.97	10.12	1.54	1.58	2.15	0.15
18/12/2023	18.42	20	7.16	8.68	4.41	6.75	10	10.1	1.58	1.52	2.34	0.1
29/12/2023	18.43	20.03	7.01	8.68	4.5	6.75	9.98	10.12	1.6	1.67	2.25	0.14
05/01/2024	18.46	20.02	6.45	8.69	4.44	6.73	9.99	10.12	1.56	2.24	2.29	0.13
12/01/2024	18.39	20.02	6.56	8.68	4.27	6.74	9.9	10.1	1.63	2.12	2.47	0.2
19/01/2024	18.39	20.02	6.56	8.68	4.27	6.74	9.9	10.1	1.63	2.12	2.47	0.2
26/01/2024	18.46	20.03	7.01	8.69	4.58	6.74	9.98	10.12	1.57	1.68	2.16	0.14
02/02/2024	18.5	20.02	7.19	8.68	4.42	6.74	10	10.12	1.52	1.49	2.32	0.12
09/02/2024	18.51	20.02	7.27	8.68	4.6	6.74	10.1	10.12	1.51	1.41	2.14	0.02
16/02/2024	18.47	20.02	7.1	8.68	4.44	6.74	9.99	10.12	1.55	1.58	2.3	0.13
23/02/2024	18.46	20.03	6.75	8.68	4.46	6.74	9.97	10.12	1.57	1.93	2.28	0.15
01/03/2024	18.42	20.02	7.16	8.68	4.4	6.74	10	10.1	1.6	1.52	2.34	0.1
08/03/2024	18.39	20.03	6.92	8.68	4.36	6.74	9.94	10.13	1.64	1.76	2.38	0.19
15/03/2024	18.37	20.03	6.88	8.68	4.38	6.74	9.95	10.13	1.66	1.8	2.36	0.18
22/03/2024	18.4	20.03	6.99	8.68	4.41	6.74	9.9	10.02	1.63	1.69	2.33	0.12
29/03/2024	18.05	20.03	6.9	8.68	4.29	6.72	9.98	10.03	1.98	1.78	2.43	0.05
04/04/2024	18.2	20.03	6.98	8.67	4.2	6.72	9.99	10.12	1.83	1.69	2.52	0.13
22/04/2024	18.32	20.02	7.01	8.68	4.44	6.74	10	10.02	1.7	1.67	2.3	0.02
26/04/2024	18.35	20.03	7.12	8.68	4.44	6.72	9.99	10.03	1.68	1.56	2.28	0.04
03/05/2024	18.39	20.03	7.91	8.69	4.46	6.73	10.02	10.12	1.64	0.78	2.27	0.1
10/05/2024	18.32	20.03	7.69	8.69	4.52	6.73	10.1	10.12	1.71	1	2.21	0.02
17/05/2024	18.42	20.03	7.78	8.69	4.92	6.73	10.01	10.12	1.61	0.91	1.81	0.11
24/05/2024	18.41	20.03	7.93	8.69	4.68	6.73	10.05	10.12	1.62	0.76	2.05	0.07
30/05/2024	18.43	20.03	8.03	8.69	4.7	6.73	10.03	10.12	1.6	0.66	2.03	0.09
13/06/2024	18.41	20.03	8.43	8.69	4.77	6.73	10.05	10.12	1.62	0.26	1.96	0.07
20/06/2024	18.38	20.03	7.9	8.69	4.82	6.73	9.99	10.12	1.65	0.79	1.91	0.13
28/06/2024	18.4	20.03	7.76	8.69	4.9	6.73	10.01	10.12	1.63	0.93	1.83	0.11
05/07/2024	18.41	20.03	7.79	8.69	4.86	6.73	10.08	10.12	1.62	0.9	1.87	0.04
12/07/2024	18.62	20.03	8.52	8.69	5.15	6.73	10	10.12	1.41	0.17	1.58	0.12
19/07/2024	18.5	20.03	8.36	8.69	4.99	6.73	9.99	10.12	1.53	0.33	1.74	0.13
26/07/2024	18.41	20.03	7.9	8.69	4.86	6.73	10.01	10.12	1.62	0.79	1.87	0.11
02/08/2024	18.39	20.03	7.98	8.69	4.81	6.73	10.02	10.12	1.64	0.71	1.92	0.1
09/08/2024	18.42	20.03	8.01	8.69	4.88	6.73	10	10.12	1.61	0.68	1.85	0.12
16/08/2024	18.38	20.03	7.87	8.69	4.93	6.73	10.01	10.12	1.65	0.82	1.8	0.11
23/08/2024	18.65	20.03	7.9	8.69	4.98	6.73	9.99	10.12	1.38	0.79	1.75	0.13
30/08/2024	18.45	20.03	7.79	8.69	5.36	6.73	9.96	10.12	1.58	0.9	1.37	0.16
06/09/2024	18.39	20.03	7.9	8.68	4.38	6.73	9.98	10.13	1.64	0.78	2.35	0.15
12/09/2024	18.4	20.02	6.9	8.62	4.99	6.73	10.01	10.02	1.62	1.72	1.74	0.01
20/09/2024	18.64	20.03	7.9	8.69	5.1	6.73	9.98	10.13	1.39	0.79	1.63	0.15

Date	BH1		BH2		BH3		BH4		Water column (m)			
	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base(m)	Water level depth (m)	Well depth to base (m)	Water level depth (m)	Well depth to base (m)	BH1	BH2	BH3	BH4
27/09/2024	18.68	20.02	6.99	8.67	5.09	6.73	10	10.02	1.34	1.68	1.64	0.02
04/10/2024	18.63	20.04	6.9	8.67	5.11	6.74	10	10.12	1.41	1.77	1.63	0.12
11/10/2024	18.66	20.03	7.3	8.67	5	6.74	9.9	10.12	1.37	1.37	1.74	0.22
18/10/2024	18.6	20.2	7.85	8.67	4.9	6.74	9.7	10.12	1.6	0.82	1.84	0.42

Appendix C GMW4 Technical Note

Technical Note

Project title	Silent Valley Landfill
Job number	115825-00
File reference	4-70
cc	
Prepared by	
Date	20 December 2024
Subject	Investigation into GMW4 Red Valve Carbon Dioxide Exceedances

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1. Introduction

This Technical Note has been prepared based on the recommendations of the 2024 Second Quarter Monitoring Report ⁱ. The report's findings recommended further investigation into the two consecutive quarter exceedances of gas well GMW4 in line with the guidance from Golder Associates ⁱⁱ; *"single exceedances do not require to be actioned. However, if ongoing exceedances are recorded then the relevant people require to be informed, and appropriate measures of identification and solutions identified"*.

2. Background

GMW4 is located approximately 20m east of the landfill boundary. The well consists of three monitoring points; Red Valve at 30m bgl, Yellow Valve at 20m bgl and White Valve 5m bgl. Golder highlight that the borehole is potentially located within coal measures and there are no receptors located within 300m of the wellⁱ.

3. GMW4 non-compliance

GMW4 has exceeded carbon dioxide trigger levels of 1.5%v/v within the red valve for two consecutive quarters (Q1 and Q2) as seen in Table 1. Concentrations have ranged between 1.5%v/v and 2.7%v/v with no clear trend.

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Table 1 - GMW4 Carbon dioxide concentrations from 2024

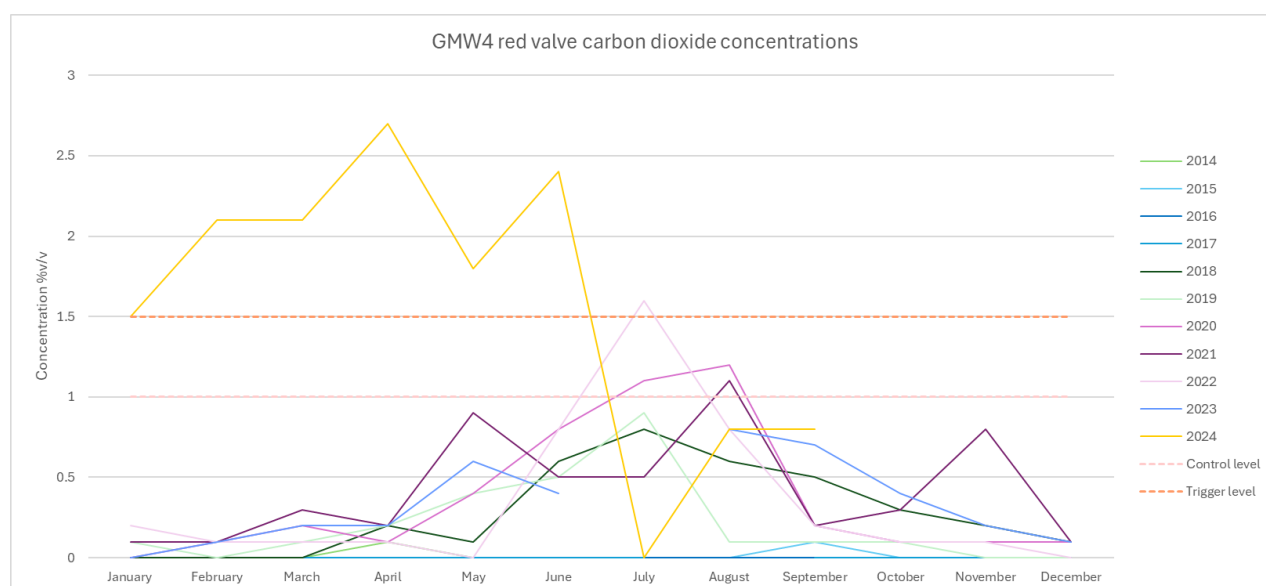
CARBON DIOXIDE (% by Volume)												Comments
Jan 24	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	
1.5	2.1	2.1	2.7	1.8	2.4	0	0.8	0.8				Red Valve, 30m depth
0	0.1	0.1	0.2	0.3	0.1	0	0.2	0.1				Yellow Valve, 20m depth
0	0	0	NT	0	0	0	0.3	1.3				White Valve, 5m depth
1.5												Trigger Level Red
4.3												Trigger Level Yellow
12.1												Trigger Level White
1												Control Level Red
3.8												Control Level Yellow
11.6												Control Level White
NT denotes 'reading not taken'												
Exceedance of Trigger Exceedance of Control												

Historically, carbon dioxide concentrations in the red valve have peaked between July and August, with results from 2020 and 2021 exceeding the control level of 1.0% v/v. Prior to 2024, the only exceedance of the trigger level was in July 2022 where concentrations reached 1.6% v/v, however the well subsequently returned to compliance.

Throughout 2024, there was a steady increase in carbon dioxide concentrations which can be seen in Figure 1. Levels fluctuated above the trigger level, increasing from 1.5% v/v in January to 2.7% v/v in April, then decreasing to 1.8% v/v in May, before increasing again to 2.4% v/v in June, surpassing the previous peak in 2022.

It should be noted that the third quarter (Q3) carbon dioxide concentrations have now fallen below their respective control and trigger levels, returning to values similar to those observed in 2023.

Figure 1 - Graph displaying carbon dioxide concentrations within the red valve of GMW4 in 2024



Job number

115825-00

Date

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Figure 2 - Atmospheric pressure and carbon dioxide concentrations in the red valve of GMW4 between 2014 and 2024

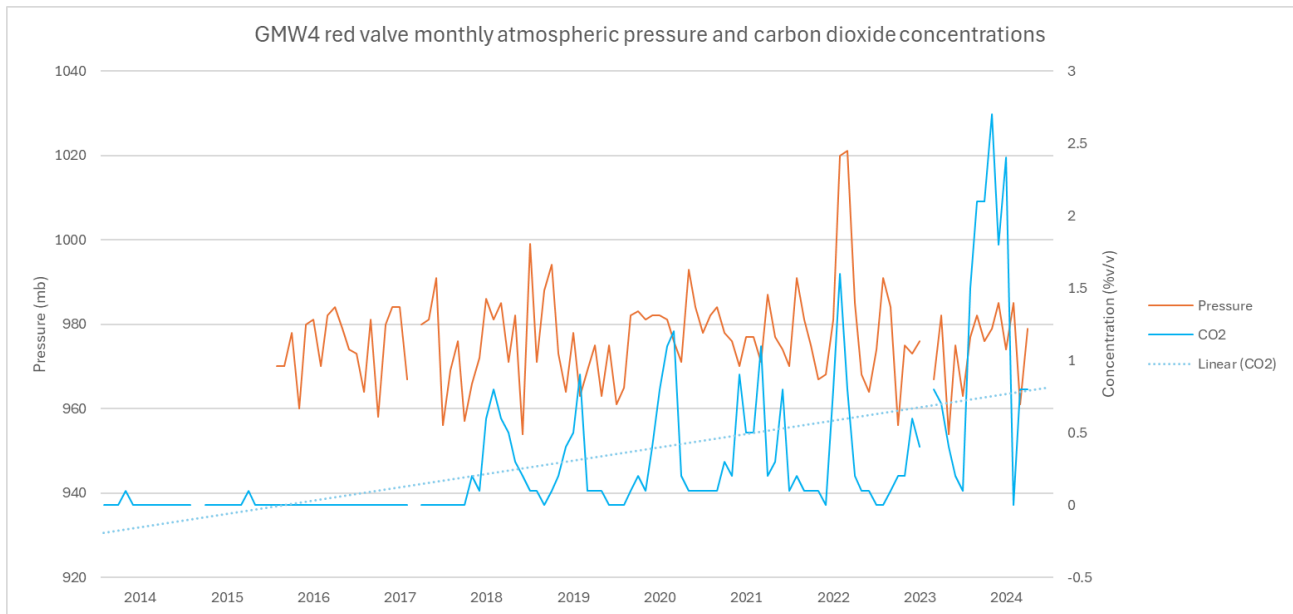


Figure 3 - Rainfall and carbon dioxide concentrations in the red valve of GMW4 between 2014 and 2024

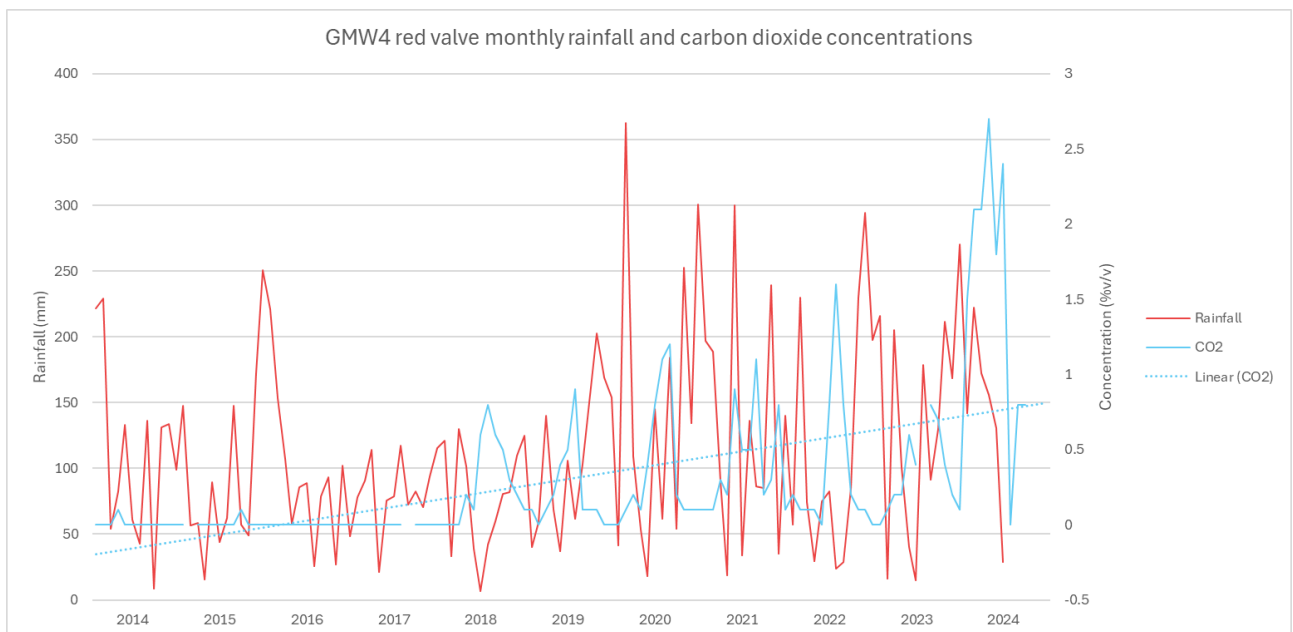


Figure 2 and Figure 3 illustrate the trends of carbon dioxide concentrations from the red valve of GMW4 plotted against atmospheric pressure and rainfall. However, the trendline does indicate an increase in carbon dioxide concentration within GMW4 since 2018.

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Upon receiving the Q3 data, carbon dioxide levels have decreased again to historic concentrations. However, the findings from the next quarter (Q4) will help confirm whether these concentrations remain compliant.

4. Conclusions and recommendations

This note was prepared to further investigate the ongoing carbon dioxide gas exceedances in the red valve of GMW4, in accordance with the Environmental Permit.

Based on the above discussion, the summary is as follows;

- The carbon dioxide concentrations within the red values of GMW4 in Q1 and Q2 are unusual in comparison to historical monitoring. Historical monitoring data of GMW4 does not show control or trigger levels being exceeded to this extent.
- There is no clear trend between GMW4's red valve CO₂ concentrations and atmospheric pressure or rainfall.
- All necessary checks surrounding the GMW4 well have been undertaken by the landfill operator highlighting no unusual activity within the vicinity of the well and no new procedural changes implemented.
- Following receipt of the Q3 data, carbon dioxide concentrations have become compliant with their respective control and trigger levels and, aligning with historical concentrations.
- Stated in the 2006 Golders Reportⁱ, GMW4 is located in a low-risk area for potential receptors, highlighting are no identified receptors within 300m of the well.
- Considering the landfill is capped and any landfill gas is extracted or flared, it is unlikely that the elevated concentrations of CO₂ in GMW4 are associated with the landfill. GMW4 is located greater than 20metres from the landfill boundary.

It is recommended that the findings from next quarter (Q4) should be closely monitored to determine if the exceedances reported in the first two quarters were due to reporting errors.

No further action will be undertaken until the receipt of the Q4 findings.

DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
Name			
Signature			

ⁱ Arup (2024) Silent Valley Landfill 2024 Second Quarter Monitoring Report.

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ⁱⁱ Golder Associates (2006), Establishment of Trigger Levels at Silent Valley landfill site, letter report dated 21 December 2006.