

Blaenau Gwent County Borough Council

Silent Valley Landfill

2023 Annual and Fourth Quarter Monitoring Report

Reference: 4-50

Issue | 31 January 2024



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1. Introduction

This 2023 Annual Monitoring Report presents the surface water, groundwater, landfill gas and leachate results for the monitoring undertaken in the period January to December 2023 in accordance with Silent Valley Environmental Permit ^[1] (Permit no. MP3835SV) and the Aftercare Phase Environmental and Infrastructure Monitoring Program^[7].

This report also includes the Fourth Quarter Monitoring results for the period October to December 2023.

The data has been collected as referenced in Schedule 3 of the Consolidated Permit ^[1]. This report refers to the 2023 Third Quarter Monitoring Report ^[3] and 2022 Annual Monitoring Report ^[5].

1.1 Monitoring Regime

The monitoring regime is undertaken in accordance with the Aftercare Phase Environmental and Infrastructure Monitoring Program^[7] 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 to A3**.

Fourth Quarter Summary

Based on the available data, December recorded the highest monthly rainfall total with 270.3mm and the highest daily rainfall total of 43.9mm. This was the second wettest December since recording began in 2008. November recorded the driest month with a total 168.4mm and 9 non-consecutive days without rainfall.

Annual Summary

The combined rainfall total for the year 2023 is 1,6423mm which is higher than the previous year of 1,408mm. The annual total continues to exceed the long-term average for the region of 1,260mm^[8].

Eight of the twelve months recorded monthly rainfall exceeding 100mm with the highest monthly total recorded in December (270.2mm). February recorded its lowest monthly total of 16.3mm since recording began in 2008. June was the driest month with a monthly total of 14.8mm and had 21 consecutive days of no rainfall. The driest period was 31 consecutive days from June into July.

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**.

The Acceptable Maximum Concentrations (AMC) have been compared with the overall average (mean) concentrations from the wells. Exceedance of an AMC will trigger contingency actions.

To note, LC5A has not been in service in this monitoring round, however works have been undertaken to install a new leachate monitoring well (LC5B) in the locale of LC5A, and this will be developed in the coming months and including in subsequent monitoring rounds in 2024.

Fourth Quarter Summary

No quarterly average leachate levels were above the AMC. Individual well trends are discussed below.

All leachate wells remain compliant this quarter with exception of the following:

- LC2A exceeding nickel AMC (0.0681mg/l) with a value of 0.08mg/l. This concentration has decreased from the previous quarter of 0.102mg/l.
- LC2A continues to exceed ammoniacal nitrogen AMC (526mg/l) with a value of 742mg/l. This has increased from the previous quarter of 588mg/l.

Annual Summary

The overall average well concentrations for the monitored contaminants have been recorded below their respective AMCs throughout 2023.

LC2A continues to be the only well exceeding AMC throughout 2023 for nickel and ammoniacal nitrogen. A change in laboratory resolved the fluctuating ammoniacal nitrogen results and levels have returned to their historic levels from 2021. A technical note was appended to the 2021 Annual Monitoring Report discussing these trends.

2.2.2 Leachate Level Monitoring

Leachate head level monitoring results are presented in **Appendix B, Table B2**.

Fourth Quarter Summary

The monthly average level for all the wells remains below the required 3.0m, as per the Permit ^[1].

Annual Summary

The average leachate head per year has increased by 0.09m from 2022 to 2023 as detailed in Table 1 below.

Annual leachate head levels began decreasing in 2018. The driver for the higher average leachate heads previously was LC5A as other wells have remained relatively stable over the years. LC5B (replacement of LC5A) has been inactive all through 2023 but has recently been reinstalled and will be monitored in 2024.

Table 1 - Annual leachate head results

Year	Maximum leachate Head	Average leachate Head	Average Leachate Head <3m
2013	2.45m	1.01m	Yes
2014	3.95m	1.14m	Yes
2015	4.96m	1.84m	Yes
2016	4.83m	2.54m	Yes
2017	5.09m	2.70m	Yes
2018	5.36m	2.58m	Yes
2019	5.05m	2.74m	Yes
2020	4.89m	2.47m	Yes
2021	3.09m	1.94m	Yes
2022	3.09m	1.95m	Yes
2023	2.93m	2.04m	Yes

2.2.3 BSC Pipe

Leachate head measurements are 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 there is no indication of the pipe's efficacy being reduced. Results are included **Appendix A Figure A8 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 A4**.

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.

Fourth Quarter Summary

These wells were monitored this quarter and show all locations are compliant.

Annual Summary

Results show all upstream surface water locations have been compliant with the freshwater EQS concentrations during 2023.

2.3.2 Downstream Surface Water

Fourth Quarter Summary

The results show SWD and SWD1 remain compliant for this quarter.

Annual Summary

Downstream surface water remains compliant throughout all of 2023 with the exception of ammoniacal nitrogen in the first quarter. This has remained compliant in the remaining quarters.

2.4 Groundwater

2.4.1 Groundwater Quality Monitoring

Groundwater quality monitoring results are presented in **Appendix A, Figures A5 and A6** 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

Fourth Quarter Summary

Both GW3A and GW4 remain compliant this quarter with the exception of manganese in GW4 exceeding assessment level of 1.0mg/l with a concentration of 1.73mg/l. Note being upstream, these groundwater wells are monitoring background concentrations.

Annual Summary

GW3A has remained compliant for ammoniacal nitrogen after exceeding all of 2022 and the first quarter of 2023. It was concluded that these were reporting errors from the previous laboratory.

GW4 continues to exceed assessment level for manganese. Manganese has exceeded continuously throughout 2021, 2022 and 2023, however average concentrations have increased from 2022.

2.4.1.2 Downstream Groundwater Wells

Fourth Quarter Summary

GW6 and GW7 have been installed in the centre of the valley in the sandstone strata classified as S1. GW6 remains compliant while GW7 has exceeded the trigger level (1.0mg/l) for ammoniacal nitrogen this quarter with a concentration of 1.2mg/l after remaining compliant the previous quarter.

GW9 is installed in the sandstone strata classified as S2-East. GW9 continues to exceed trigger levels (1.0mg/l) for ammoniacal nitrogen with a concentration of 1.4mg/l however this has decreased from the previous quarter and is very much below the historic levels this well has exhibited.

GW10 has been installed in the sandstone strata classified as S3-East. GW10 continues to exceed assessment level (1mg/l) for manganese with a concentration of 4.4mg/l, increasing from the previous quarter. GW10 also exceeds trigger levels for ammoniacal nitrogen this quarter. This is the first exceedance this year.

GW12 has been installed in the sandstone strata classified as S2-West and has remained compliant this quarter.

Annual Summary

GW7 has exceeded ammoniacal nitrogen trigger levels in the fourth quarter. This is the first exceedance since the first quarter of 2022.

GW9 continues to exceed trigger levels for ammoniacal nitrogen throughout all of 2022 and 2023, however throughout 2023, there has been a gradual decrease in concentration from the first quarter.

GW10 continues to exceed manganese assessment level throughout 2023 for three consecutive rounds. The concentrations of manganese have continued to fluctuate in this well from 2022. Ammoniacal nitrogen exceeded trigger level for the first time after remaining compliant throughout 2022 and 2023. This will be monitored closely in the next quarter.

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 A7**.

Fourth Quarter Summary

Water levels have remained relatively consistent this quarter.

Annual Summary

Overall, groundwater levels have remained constant from 2022 readings ^[5].

2.5 Landfill Gas

2.5.1 Landfill Gas Quality Monitoring

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

Fourth Quarter Summary

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

Carbon dioxide concentrations were recorded below the respective control and trigger levels, where available however carbon dioxide levels have been recorded above the control and/or trigger levels in the following wells (valves):

- GMW6 (red valve) exceeds trigger levels in October and November and control level December.
- GMW14/14A (red valve) exceeds trigger level in October and December and control level in November.

Annual Summary

- Throughout 2023 methane levels have remain compliant and below their respective control and trigger levels (where available) in all monitoring locations with the random exceptions of GMW14/14A red, yellow and white valves in March. These results have remained compliant the remainder of 2023.

Carbon dioxide continues to record exceedances in control and trigger levels across numerous wells.

- GMW2 exceeded control and trigger levels from June to September in the red valve (maximum value 5.3%). These readings coincide with previous years with higher recordings during the summer months.
- GMW3 exceeded control and trigger levels in February and May in the yellow valve but have remained compliant since.
- GMW6 continues to exceed trigger level for red valve from July to November (maximum concentration 5.1%) and control levels in June and December. These exceedances have occurred within similar months from 2018 - 2022.

- GMW12 exceeded control levels in July and August but have remained compliant since.
- GMW13 exceeded trigger levels in August but remained compliant the remainder of 2023.
- GMW14/14A continues to exceed control and trigger levels throughout 2023 (maximum concentration 14.5%) however has significantly decreased from 2022 readings. Both yellow and white valves exceeded trigger levels in March however remain compliant the remainder of 2023.
- Levels of carbon dioxide continue to be recorded in GMW1, GMW8, GMW9, GMW10, GMW17 and GMW18. However, no control or trigger levels have been derived for these monitoring locations as they are not required by the Permit ^[2].

3. Conclusion

The monitoring data and interpretation produced in this report has not identified any significant issues relating to contaminant levels recorded above the screening criteria within the leachate and groundwater. Where limited minor exceedances have been identified there is no evidence to suggest they are having a discernible impact on the surrounding environment and the landfill continues to comply with the requirements of the permit.

The annual and fourth quarter report has noted the following:

- LC2A continues to exceed AMC concentrations for nickel and ammoniacal nitrogen. A technical note was appended to the 2021 Annual Monitoring Report discussing these trends.
- GW4 and GW10 exceed manganese assessment levels. The elevated concentrations recorded upstream (GW4) are likely to be from steel works waste deposited to the north of the landfill, upstream of the waste mass, and the presence of old mine workings in the area. This is then recorded in the downstream wells. Manganese is a typical contaminant of mine drainage, which is considered to be impacting the groundwater in the locale of the landfill.
- GW9 continues to be non-compliant for ammoniacal nitrogen concentrations, however this has historically been investigated, which concluded that the exceedances of GW9 do not have a discernible impact on downstream receptors. It should be noted that the current ammoniacal nitrogen concentrations are very much reduced from the historic levels that were encountered in GW9.
- GW7 and GW10 have both recorded non-compliance for ammoniacal nitrogen this year. Both were recorded in the fourth quarter and will be monitored closely into 2024.
- GMW14/14A has shown a decline in carbon dioxide concentrations throughout 2023 with compliances within in yellow and white valves. The red valve continues to exceed trigger and control levels. A technical note was written in 2021 discussing these levels. Following this annual report, the technical note from 2021 shall be reviewed and updated, further investigation will be undertaken for example gas chromatography.

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 Third Quarter Monitoring Report, 31st October 2023.
- [4] Arup, Silent Valley Landfill, 2021 Annual and Fourth Quarter Monitoring Report, 31st January 2022.
- [5] Arup, Silent Valley Landfill, 2022 Annual Monitoring Report, 31st January 2023.
- [6] Arup, Silent Valley Landfill, Interim GW9 and Nant Merddog W, Issue May 2015.
- [7] Arup, Silent Valley Landfill, Aftercare Phase Environmental and Infrastructure Monitoring Program, Issue June 2013.
- [8] Arup, Silent Valley Landfill, Hydrogeological Risk Assessment, document reference 04/6363, November 2004.
- [9] Arup, Silent Valley Landfill, Investigation into the Western Flank of the Cut-off System. Compliance Well GW9 and GW10, document reference 115825, August 2011.
- [10] Environment Agency, Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water, report reference LFTGN02, June 2014.
- [11] Arup, Silent Valley Landfill, Hydrogeological Risk Assessment (Supplementary Revision May 2009), document reference 09/7543, June 2009.
- [12] Environment Agency, Guidance on the management of landfill gas, document reference LFTGN03, June 2014.
- [13] The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
- [14] Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG), “Metal Bioavailability Assessment Tool (M-BAT),” 2014.
- [15] Arup, Silent Valley Landfill, Hydrogeological Risk assessment, document reference 2019/9559, July 2019.

Appendix A: Monitoring Results - Graphs

Figure A1
Daily rainfall totals and sampling events (October 2018 - December 2023)

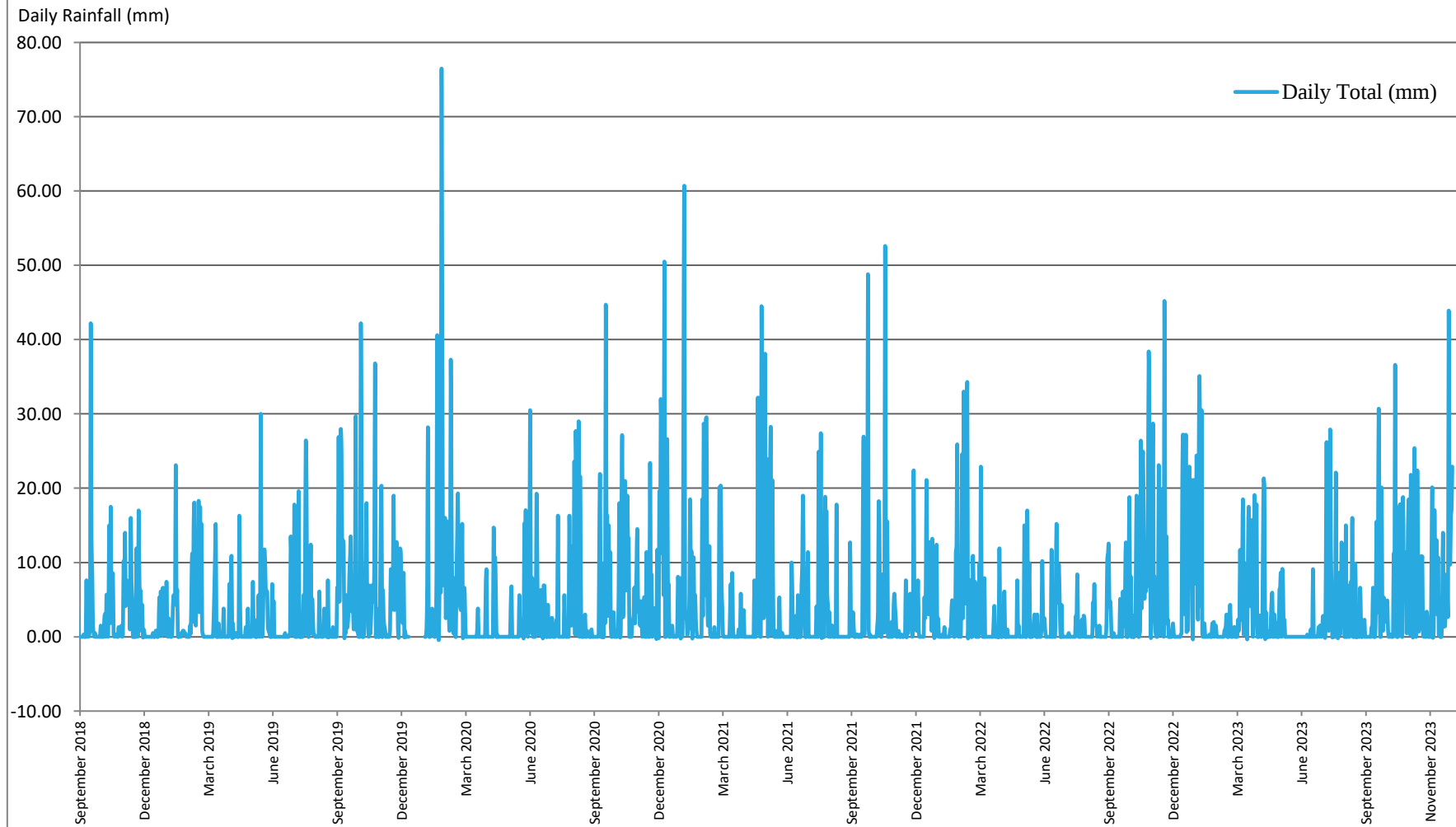
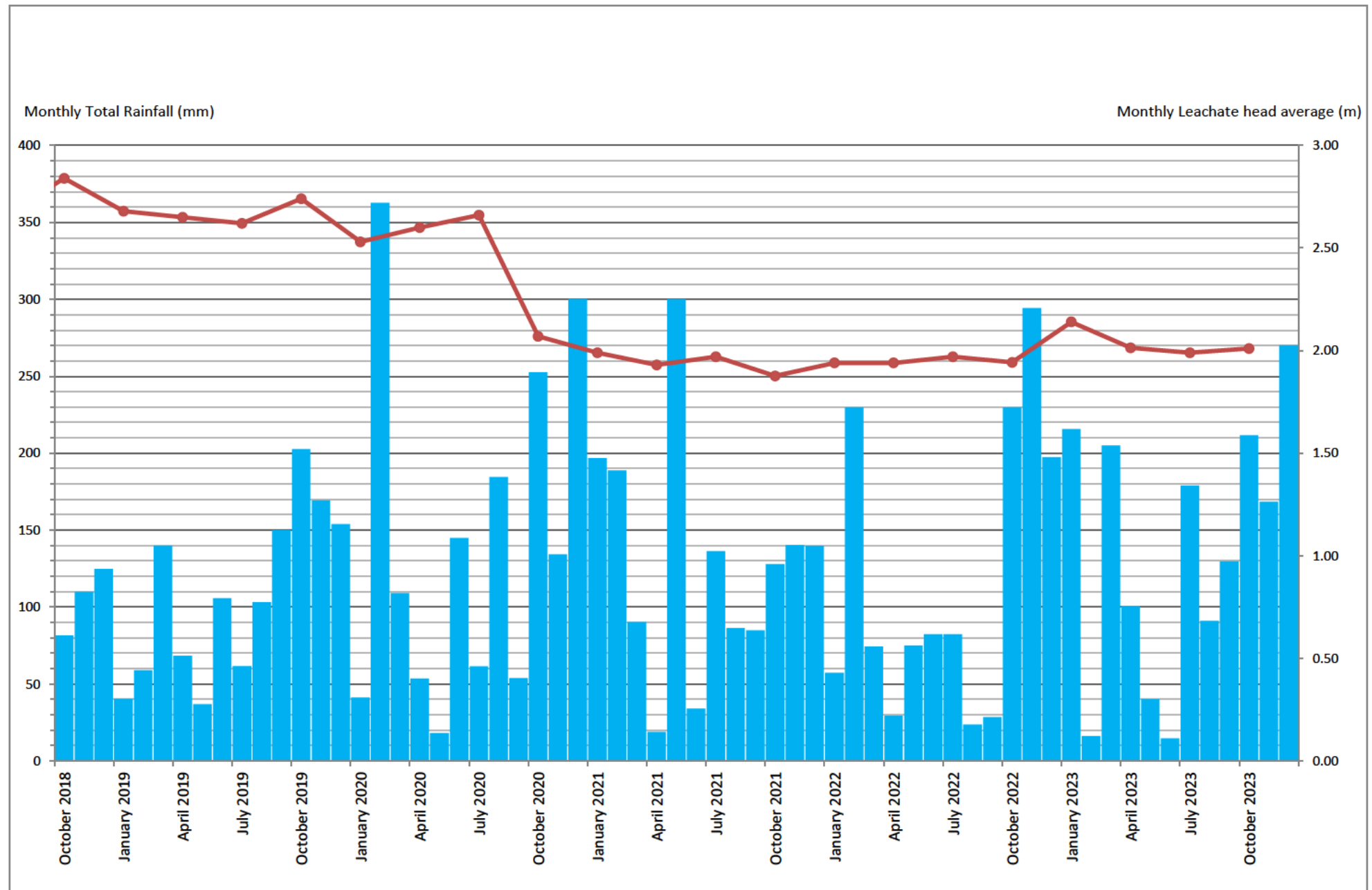


Figure A2
Monthly rainfall totals (October 2018 - December 2023)



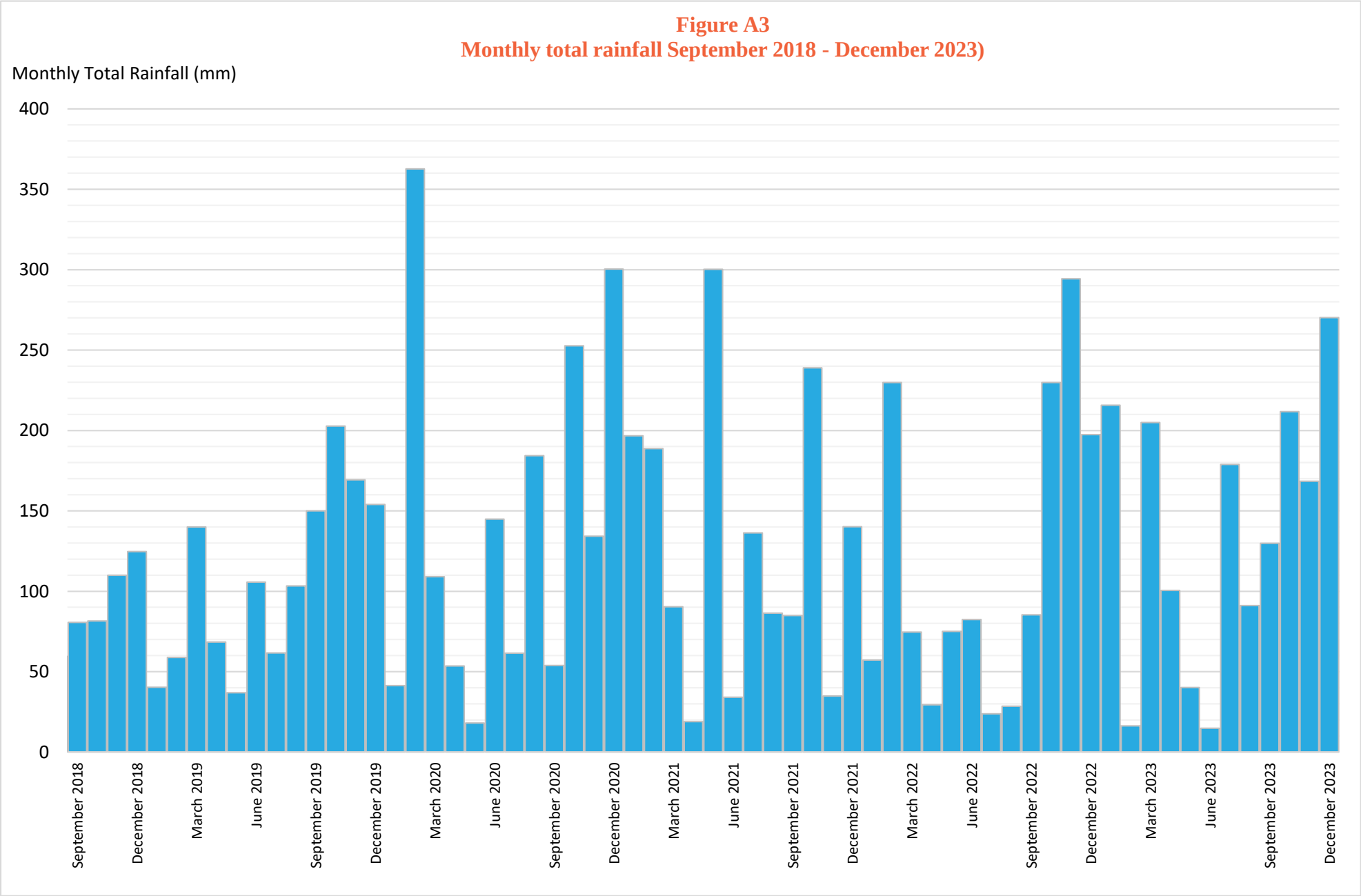


Figure A4
Surface water monitoring graphs

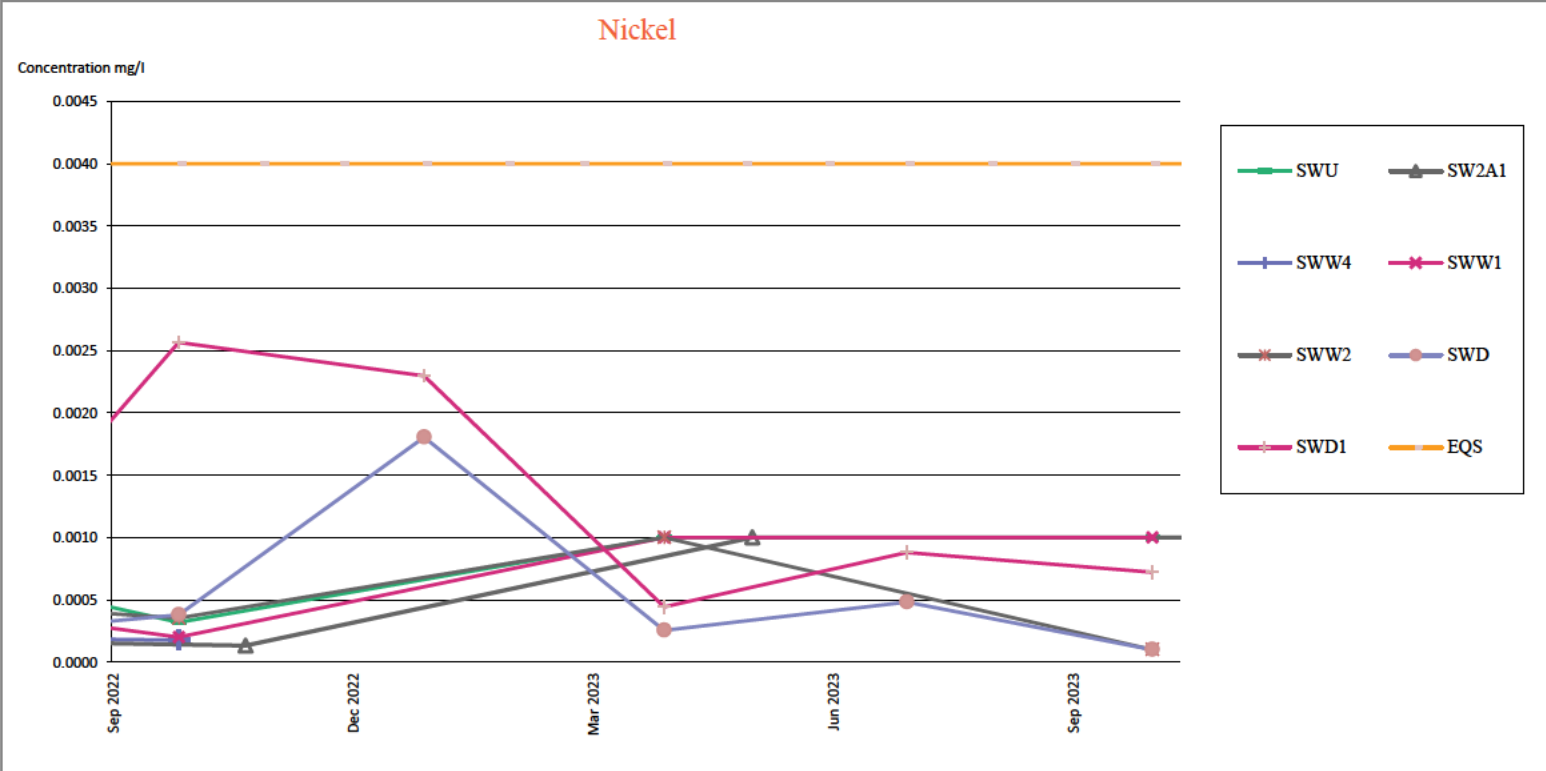
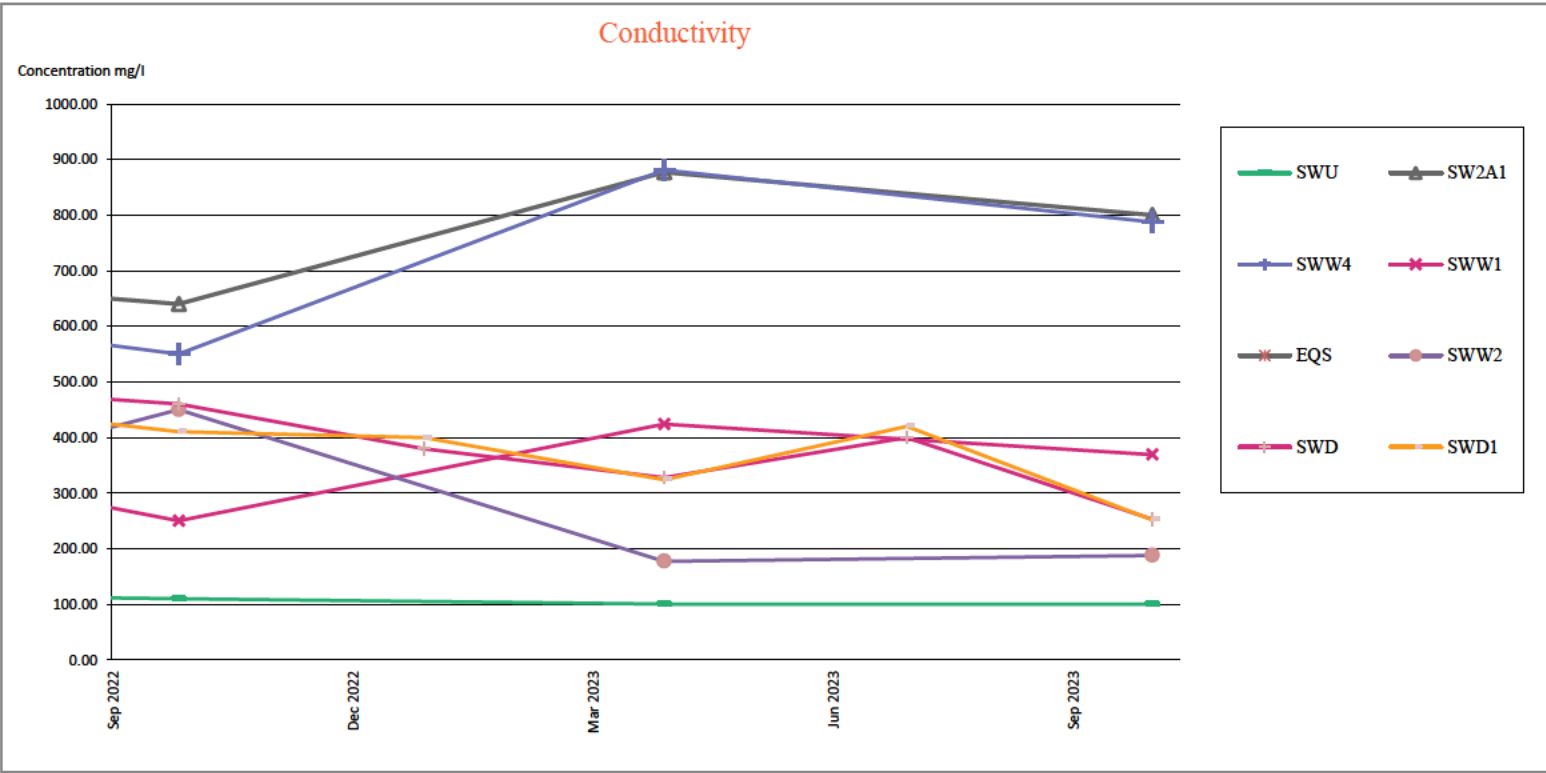
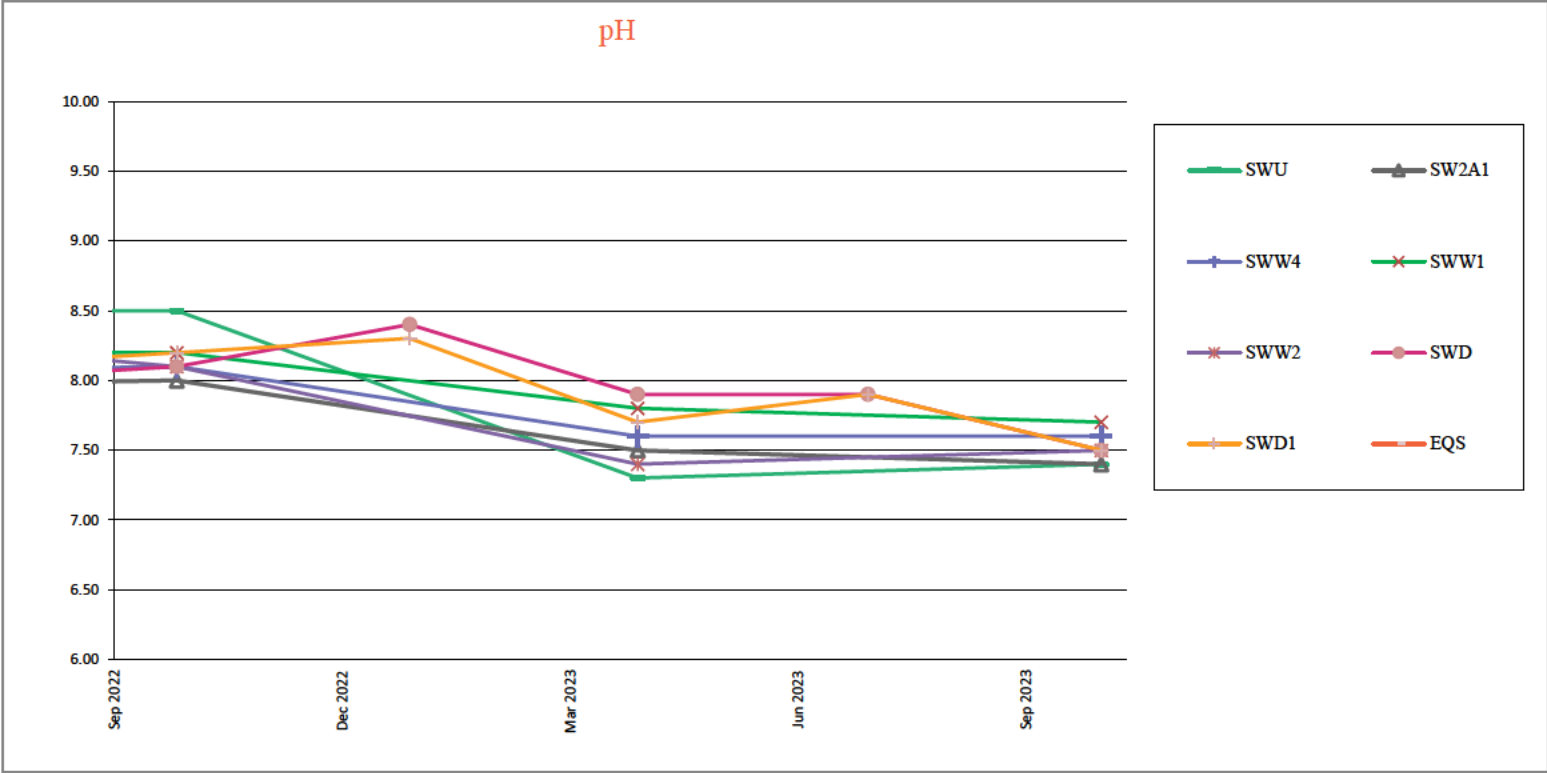


Figure A4
Surface water monitoring graphs

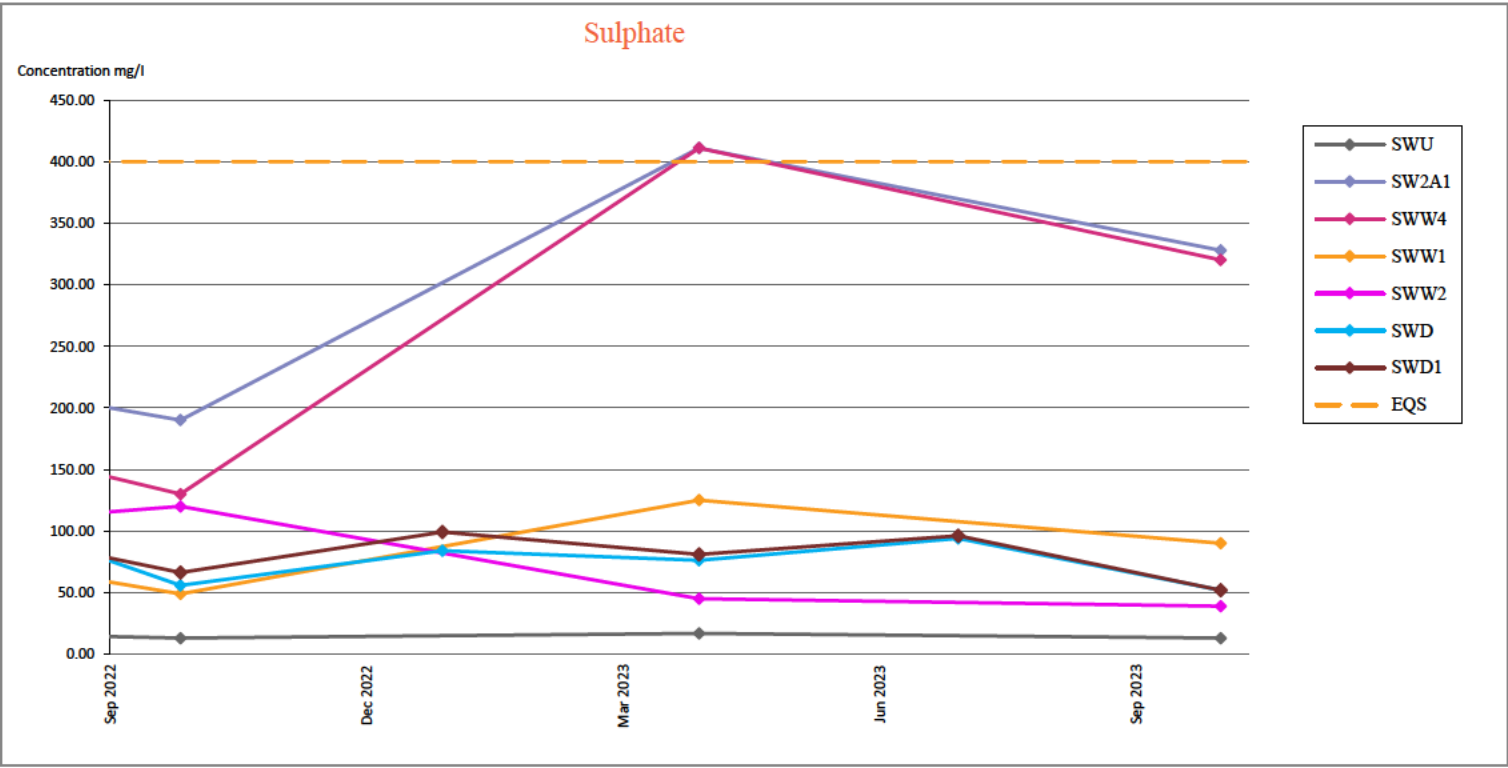
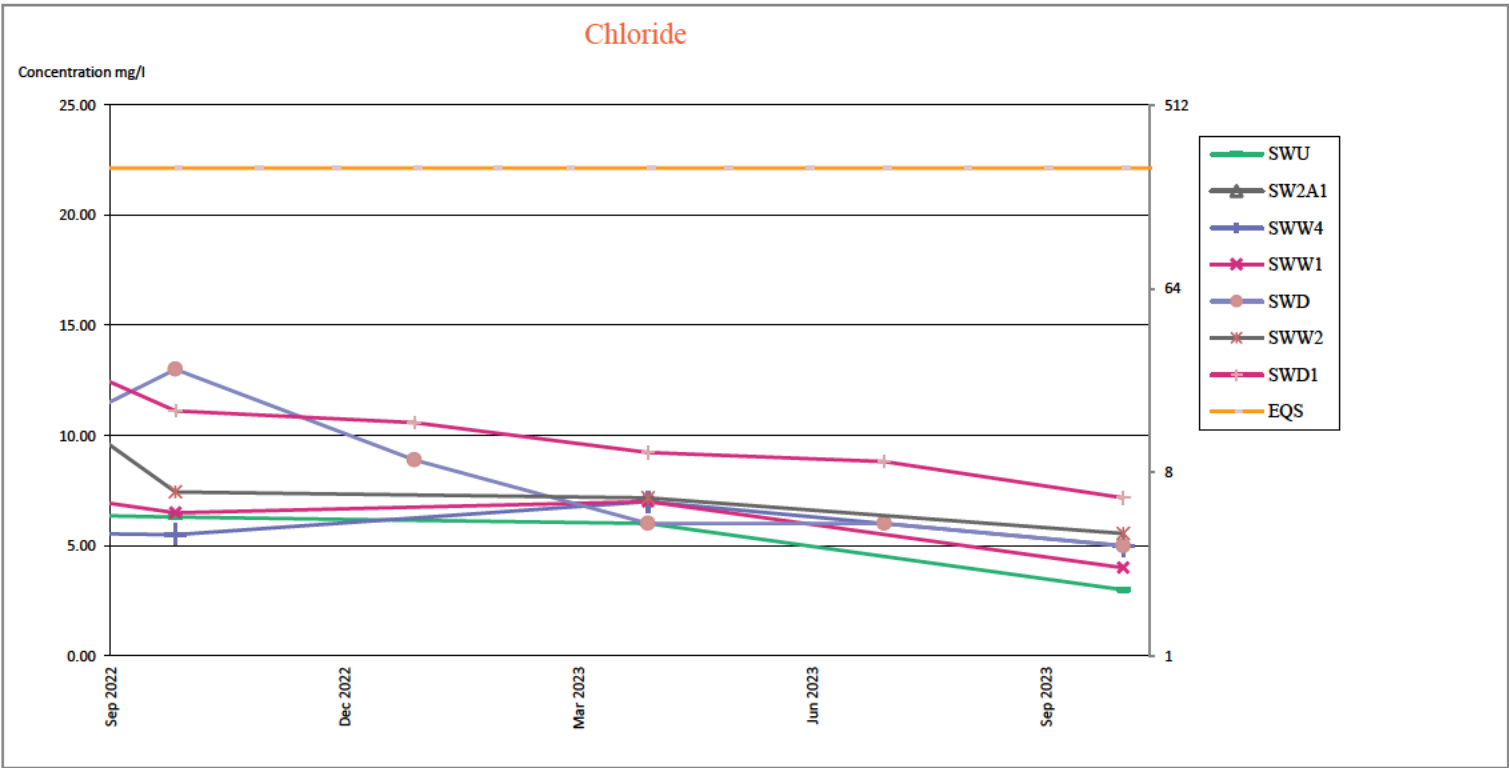
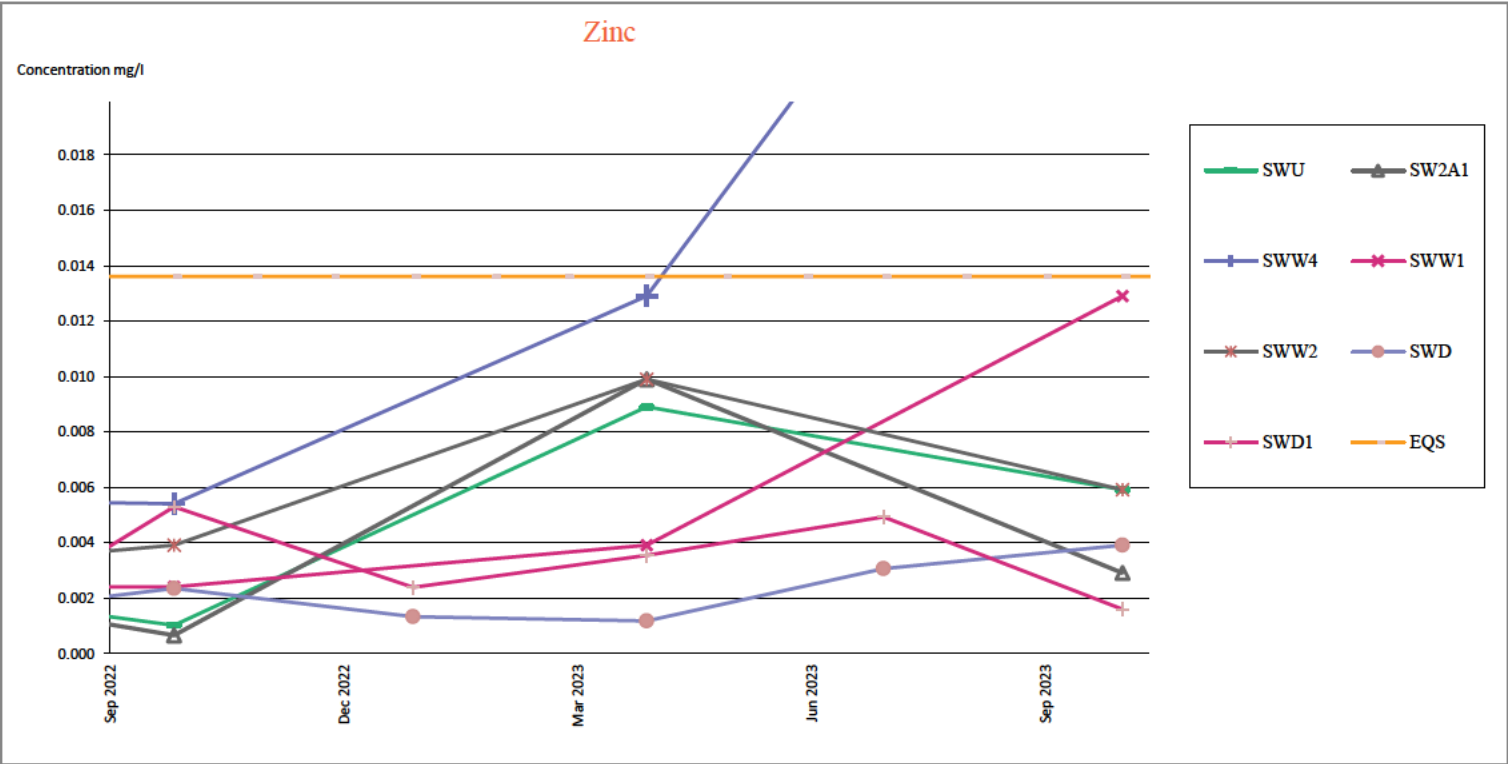
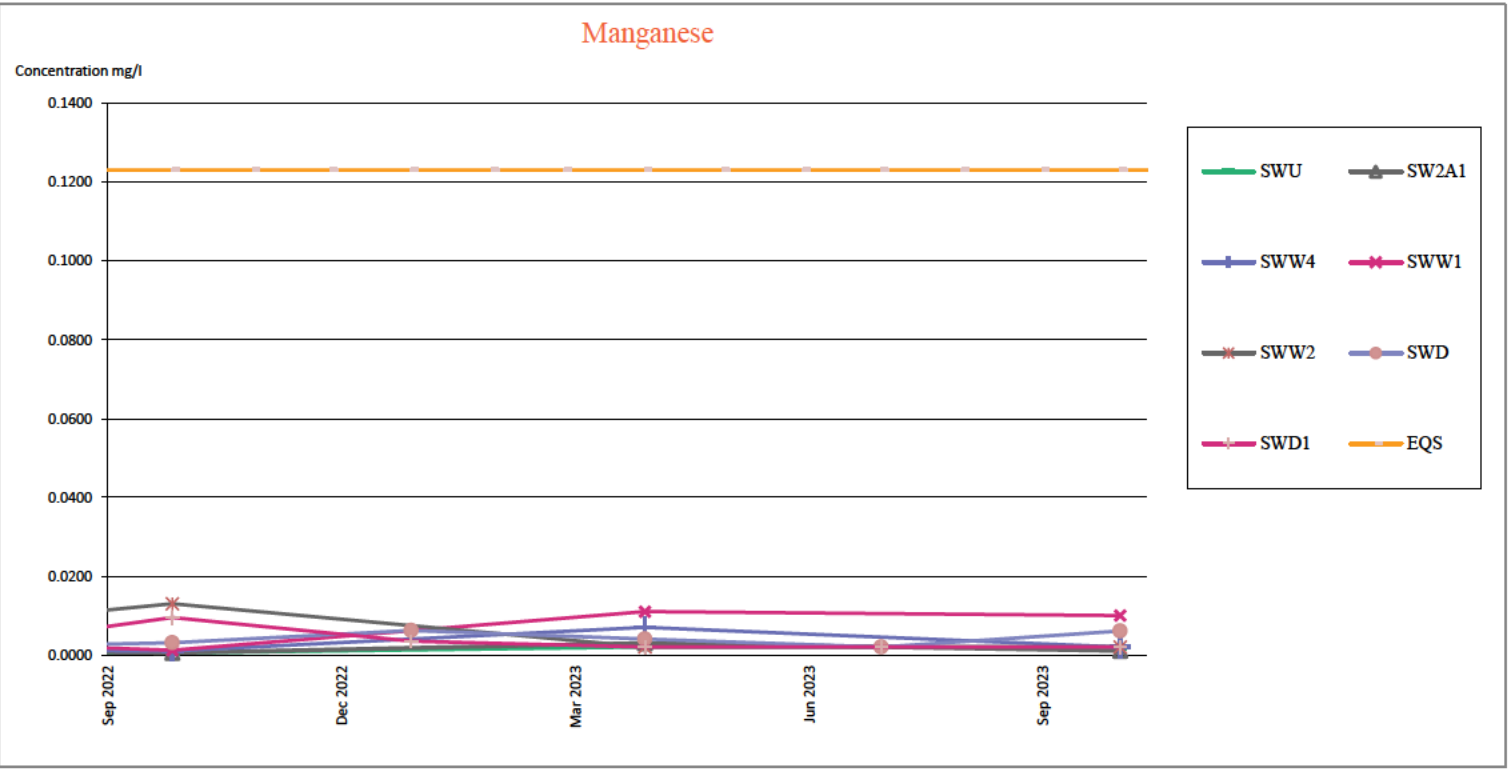


Figure A4
Surface water monitoring graphs

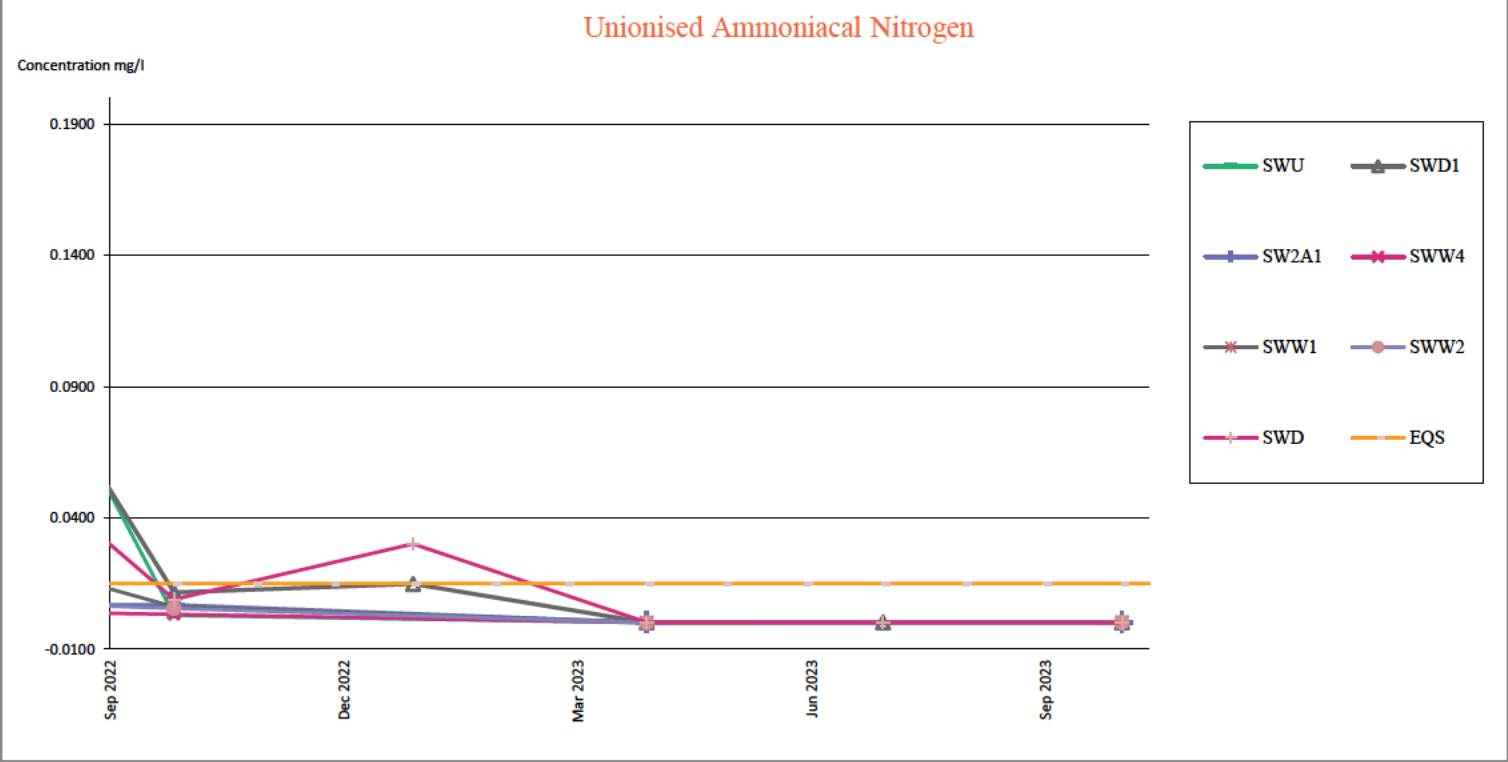
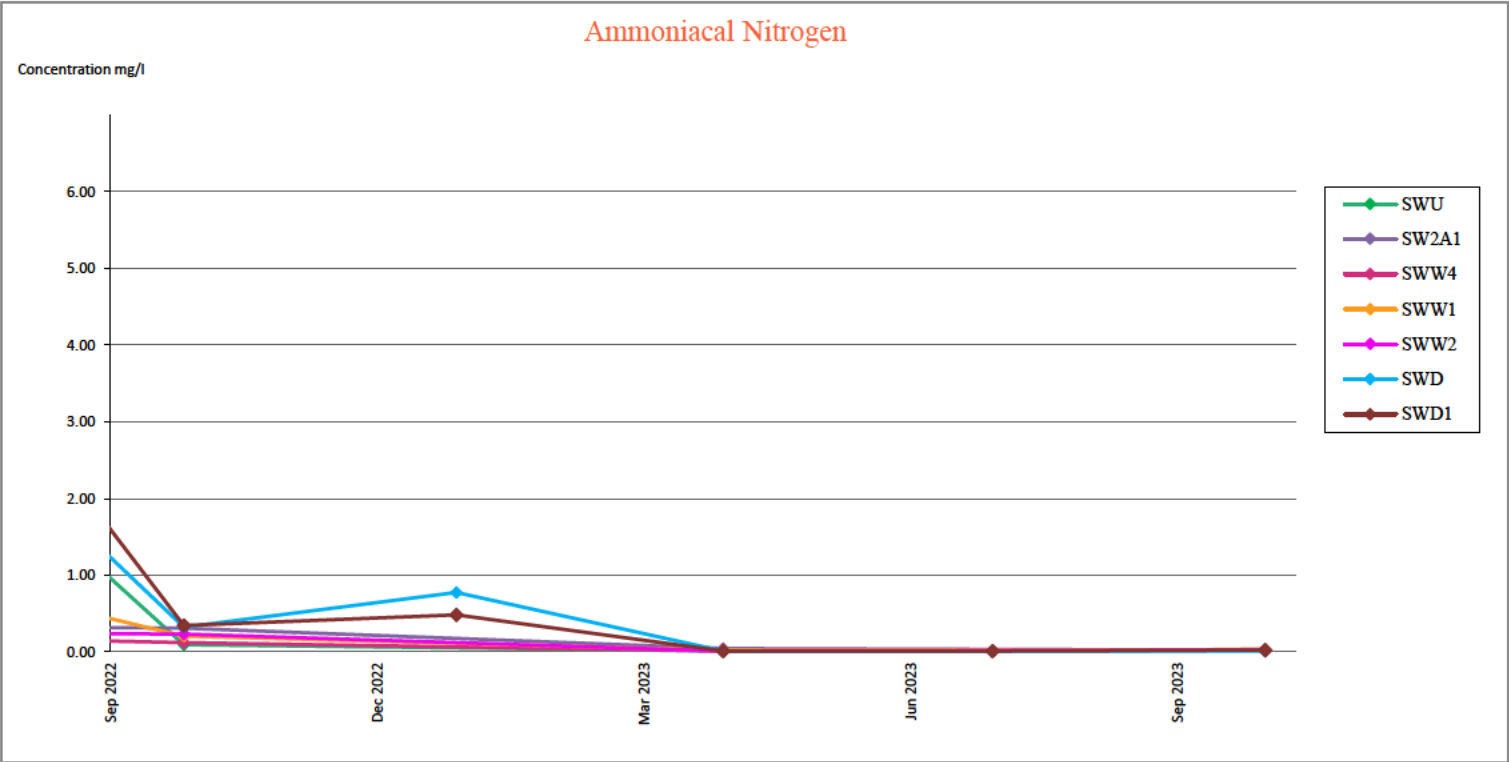


Figure A5
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

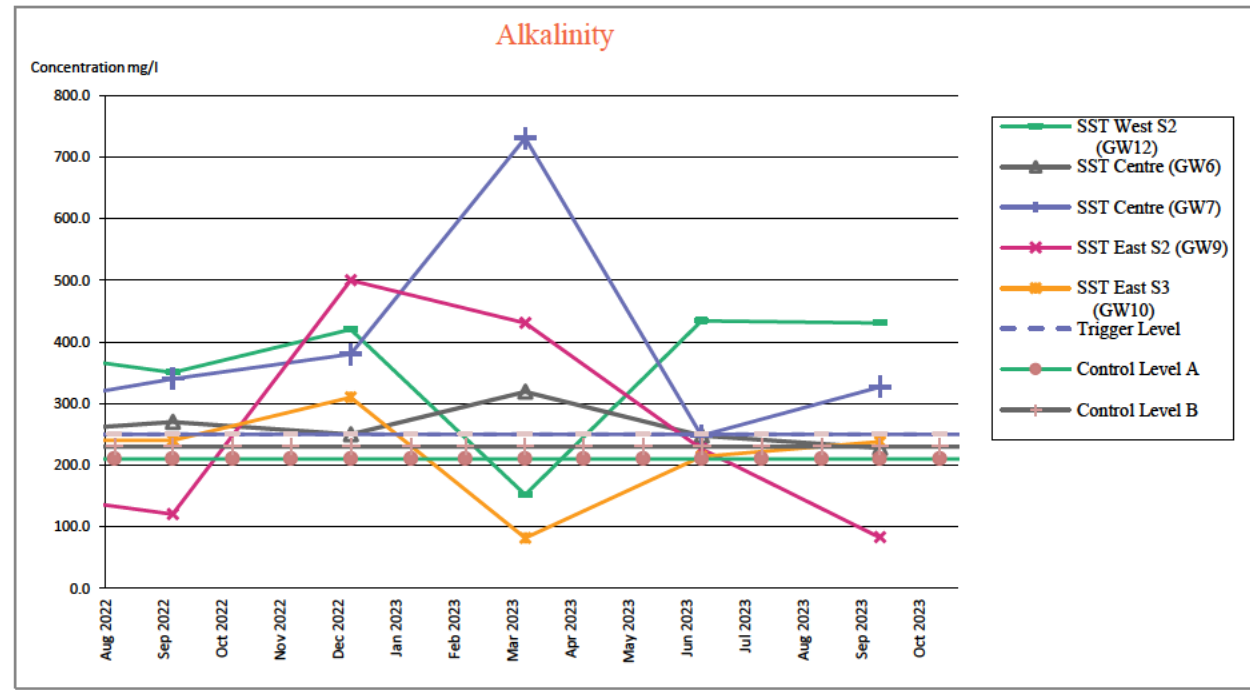
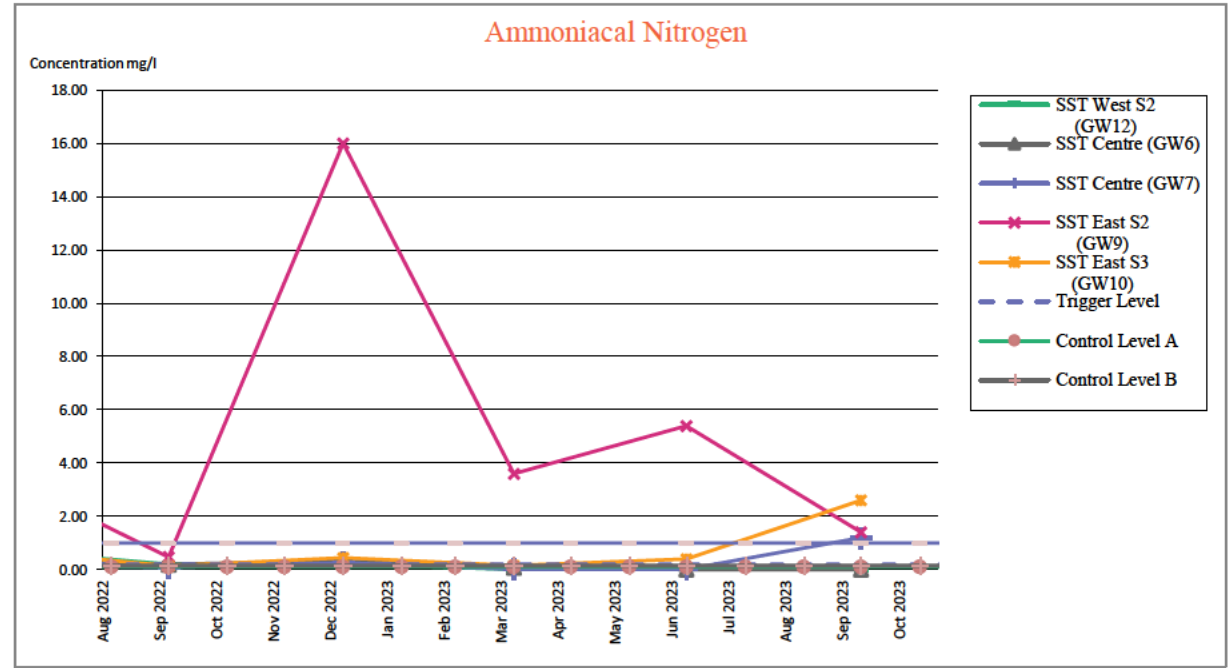
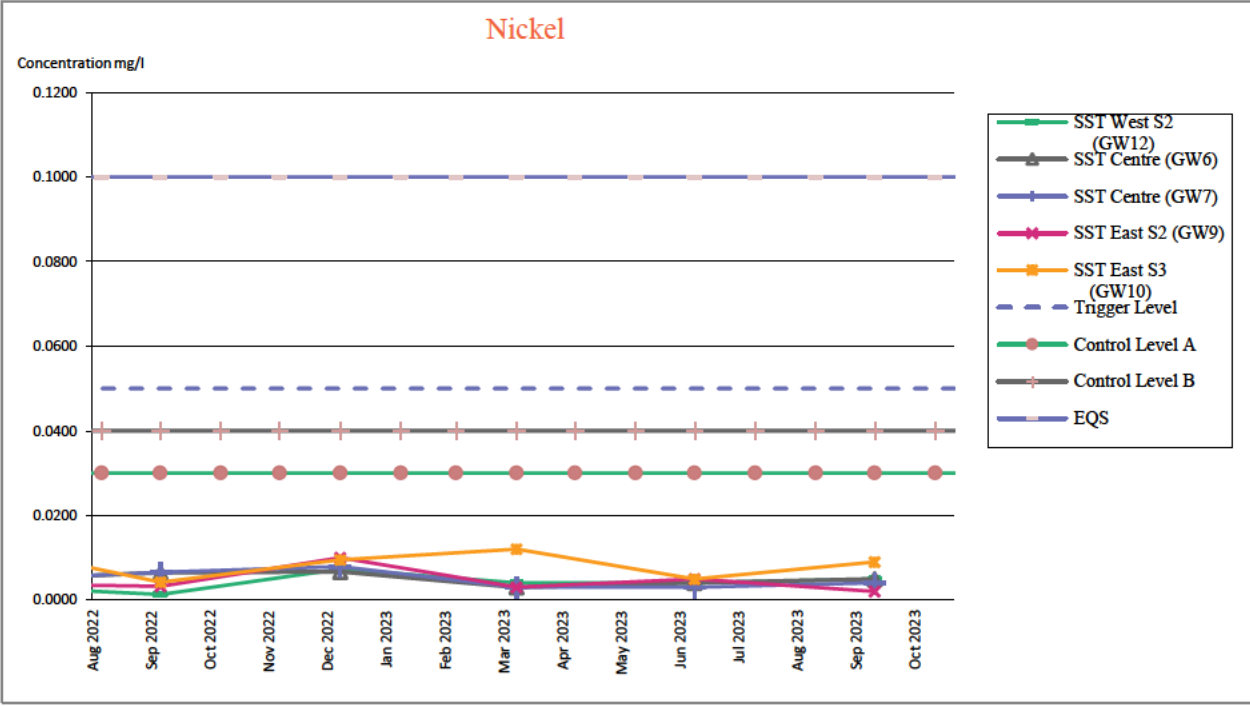
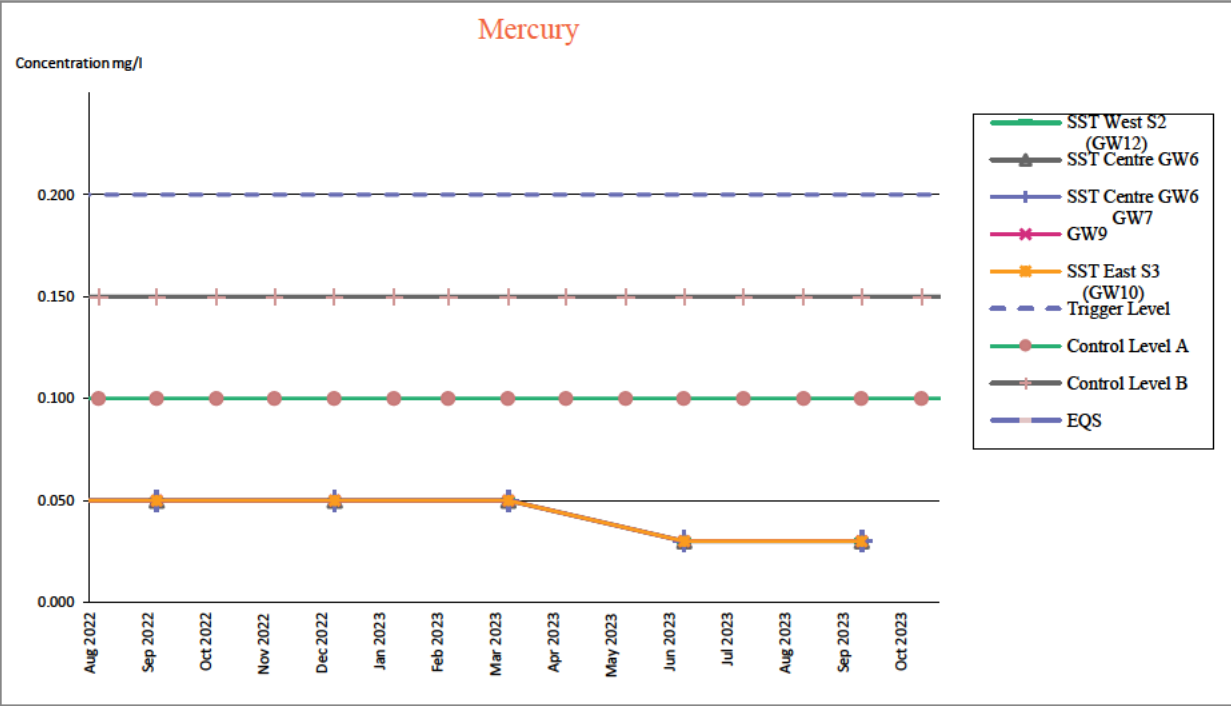


Figure A5
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

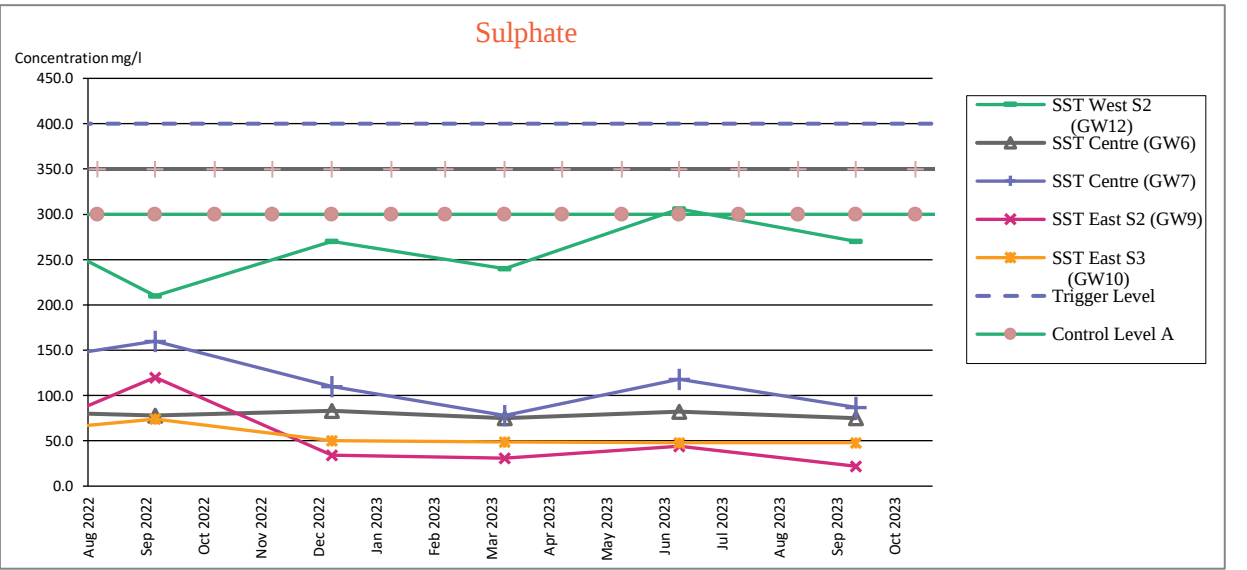
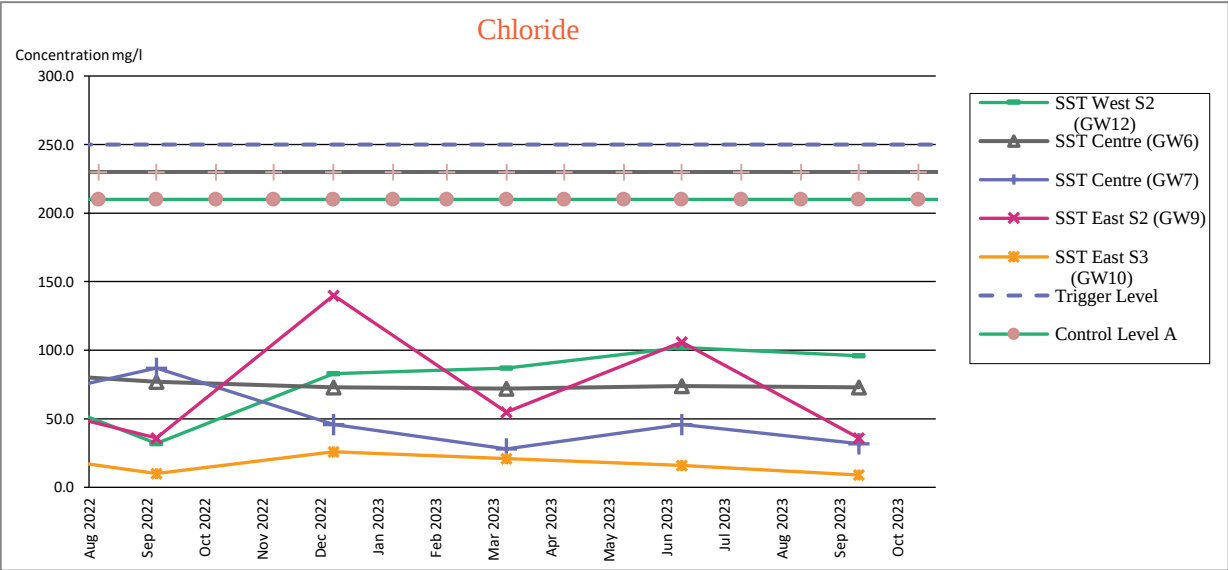
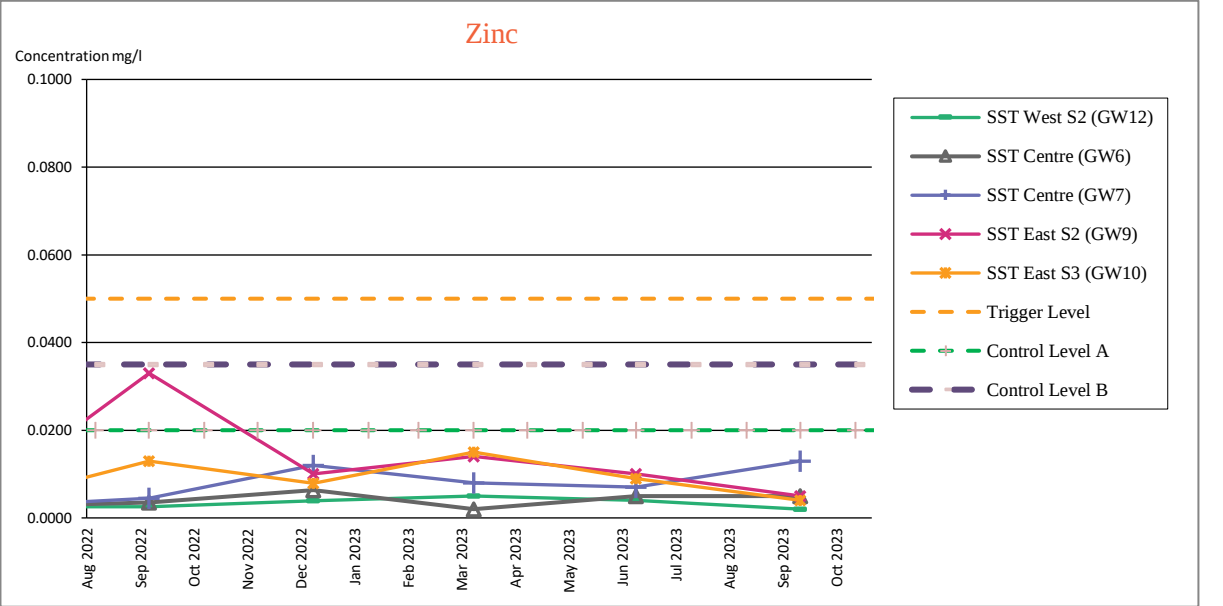
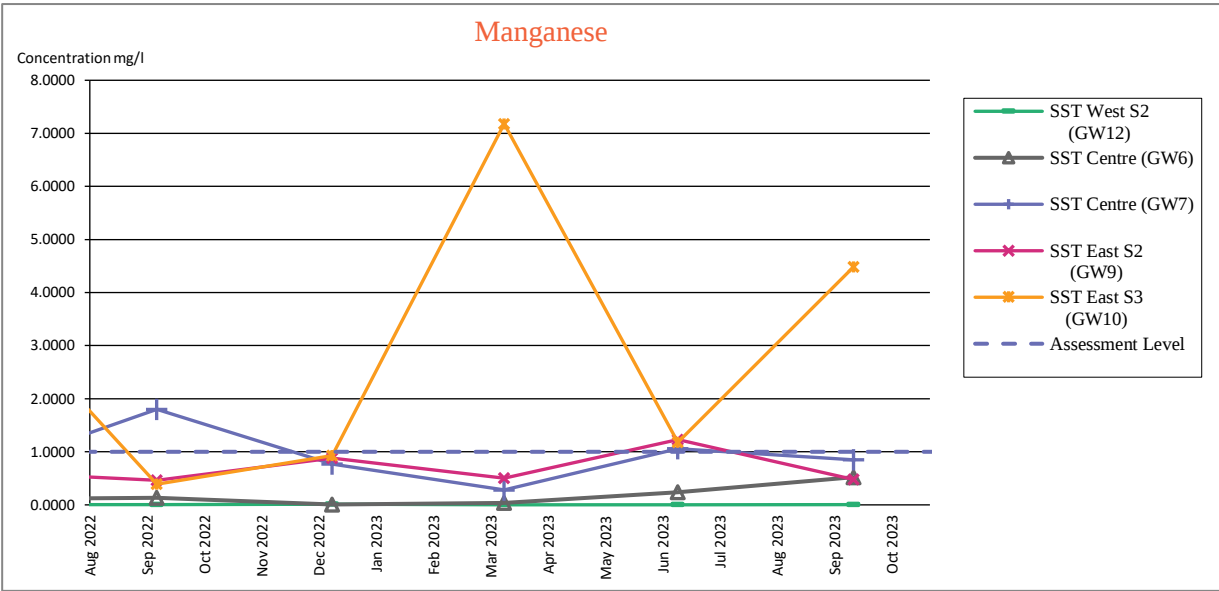


Figure A5
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs

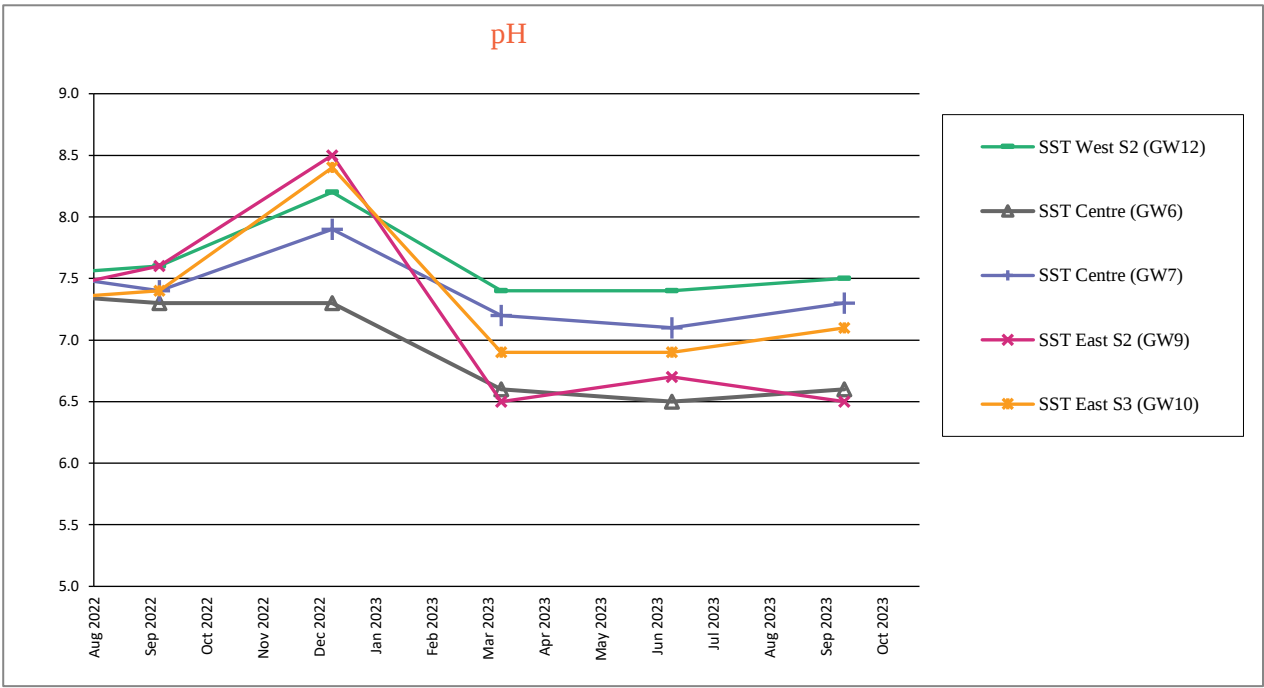


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

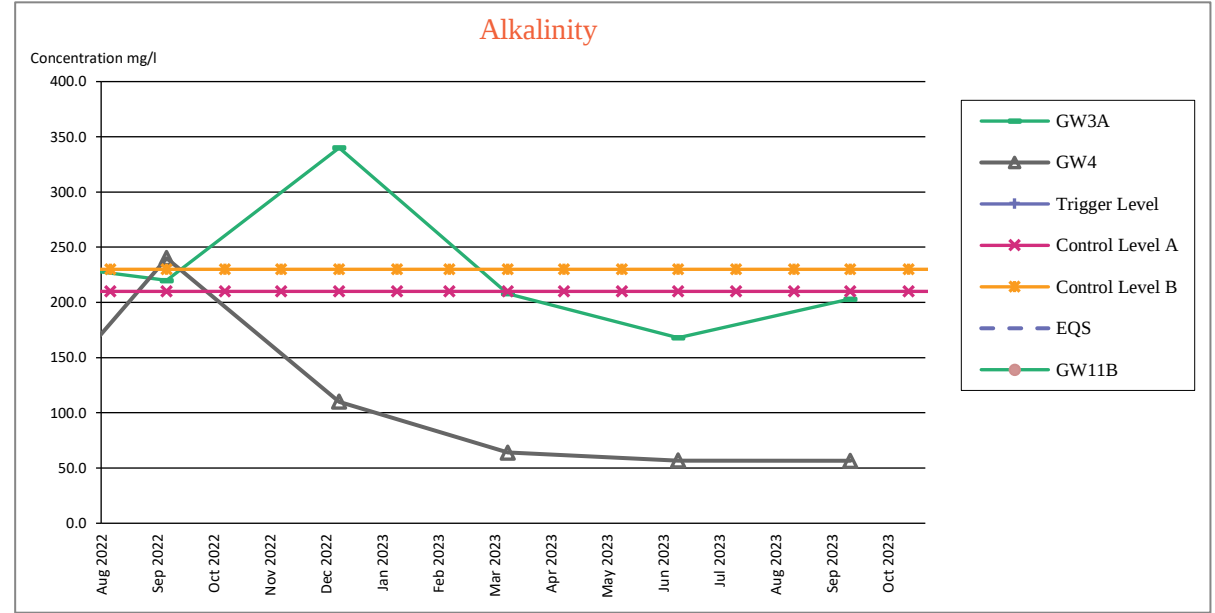
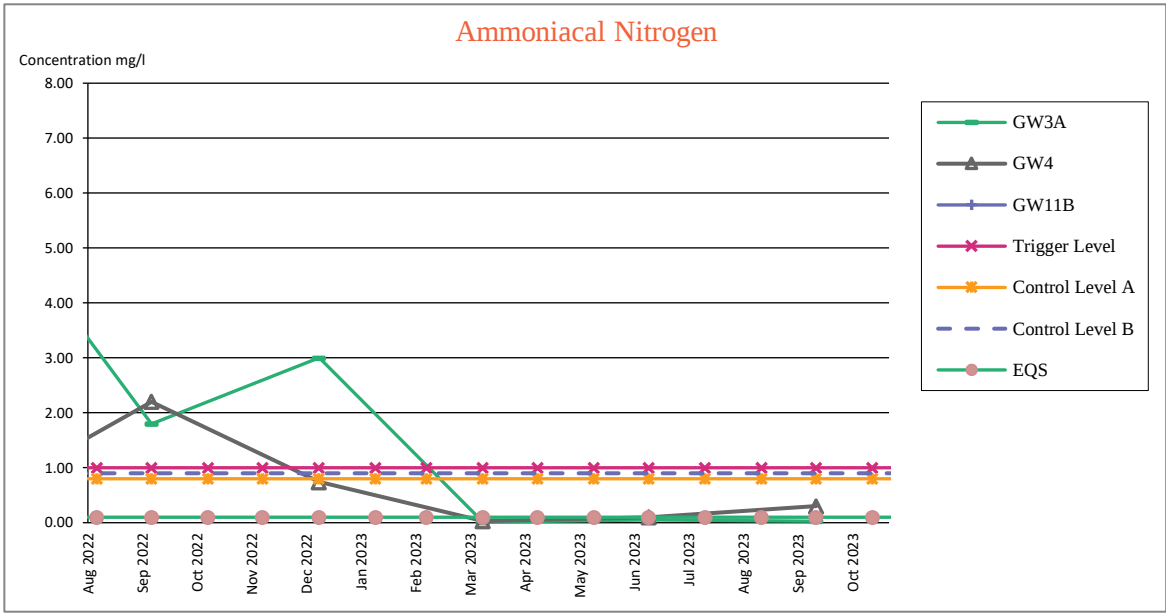
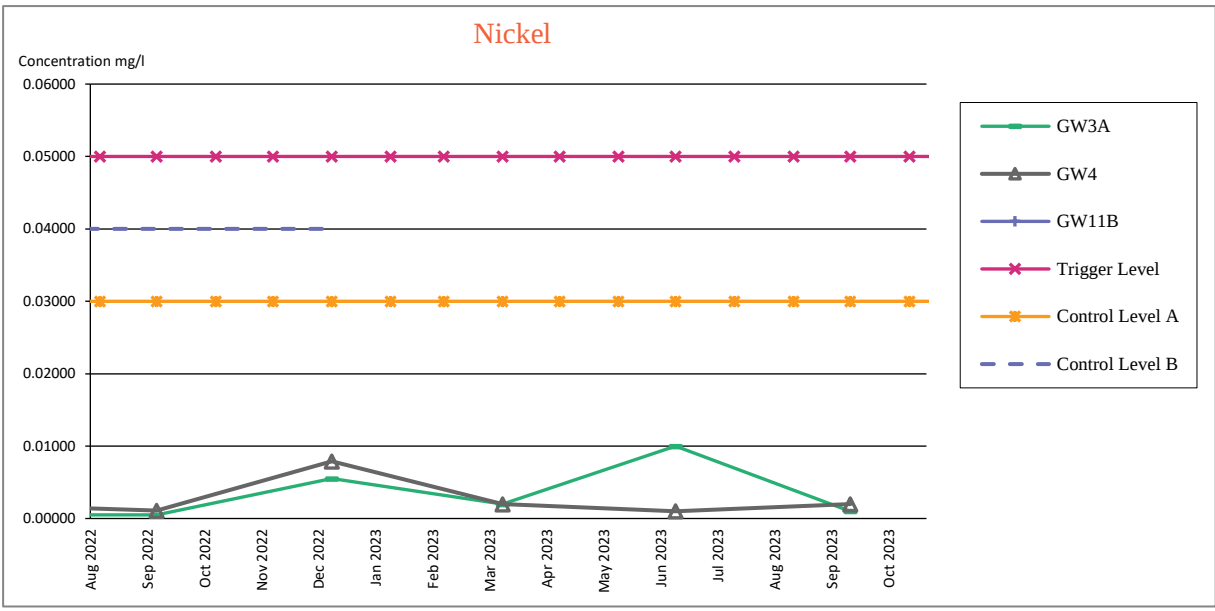
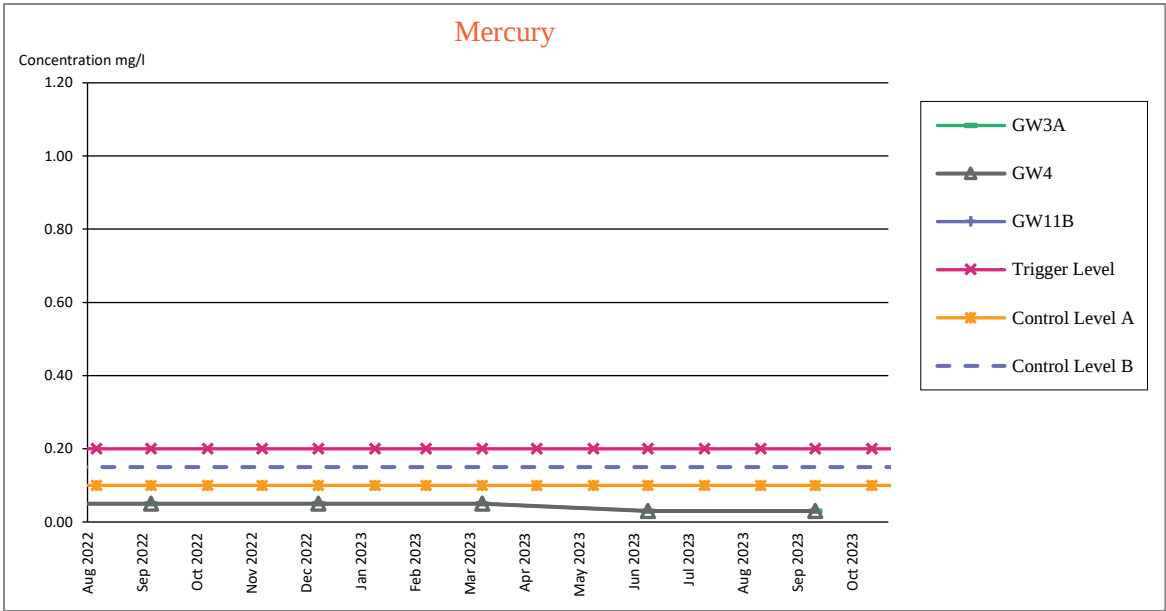


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

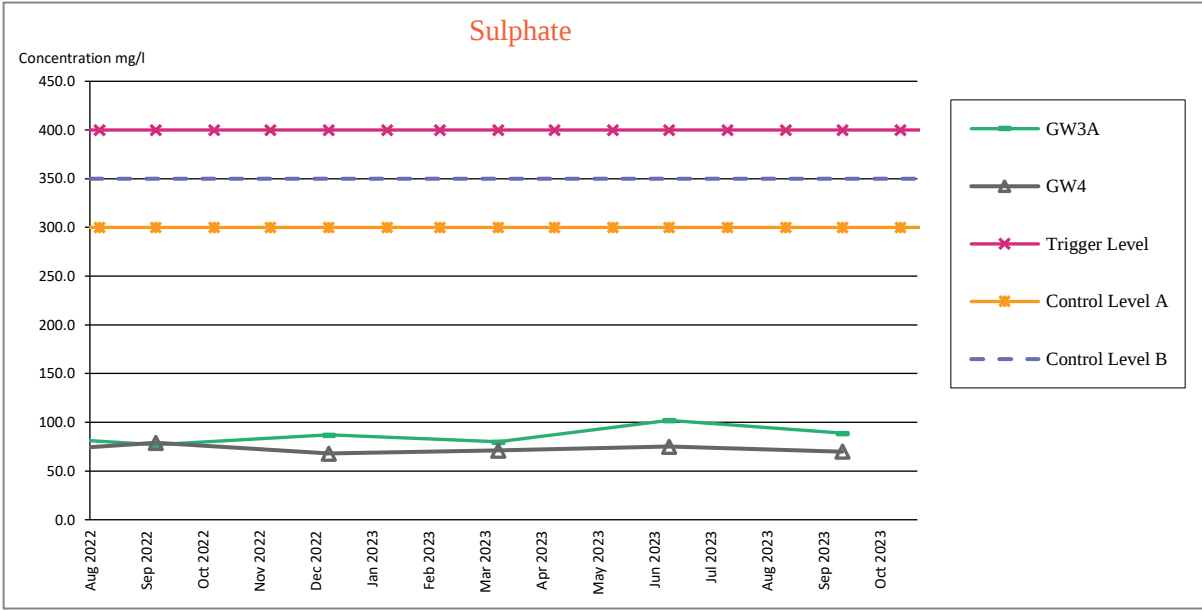
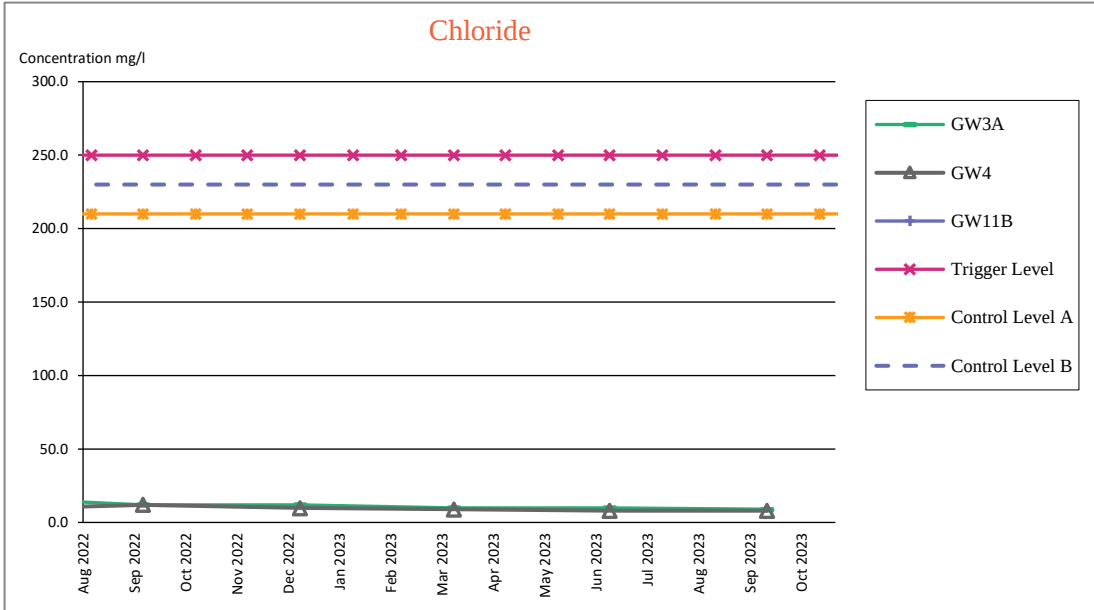
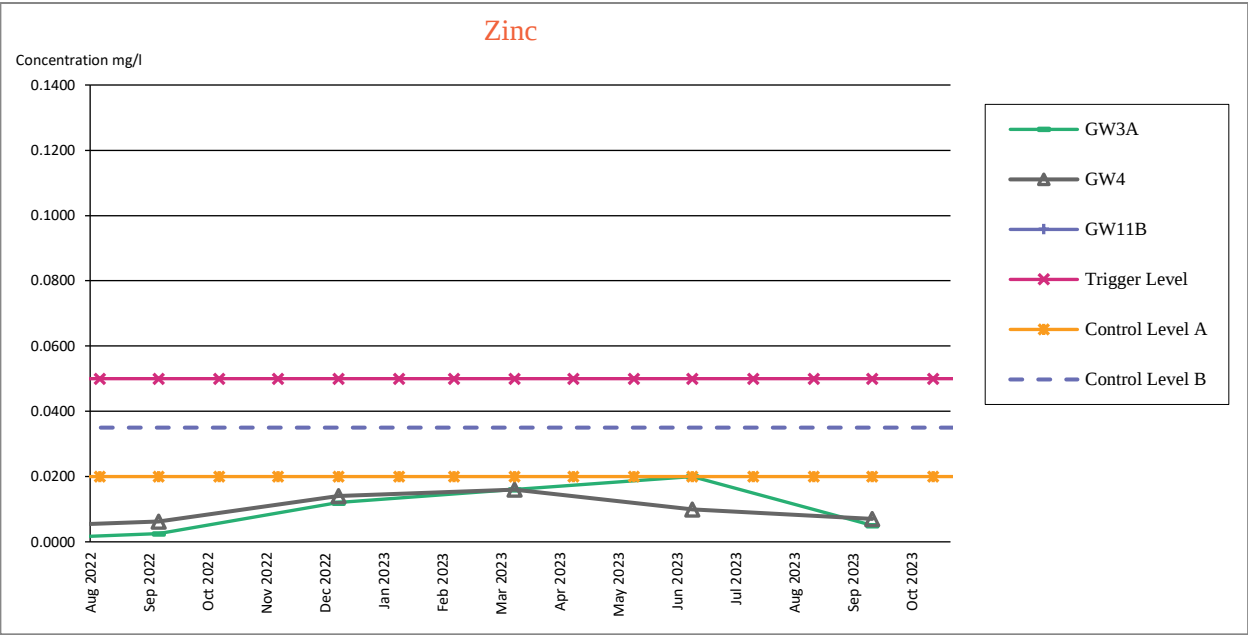
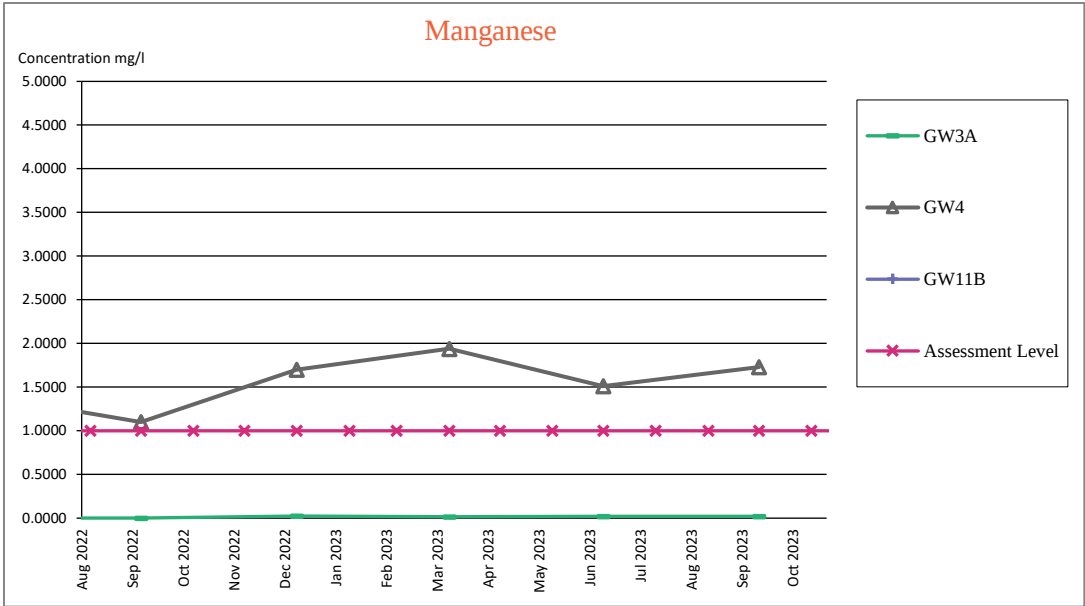


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

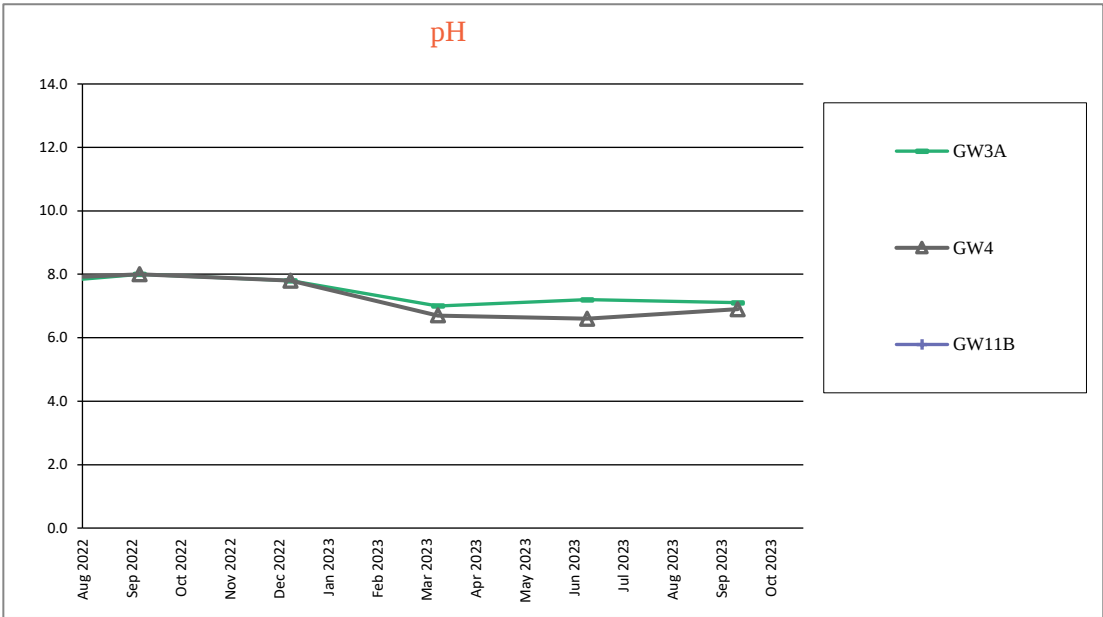
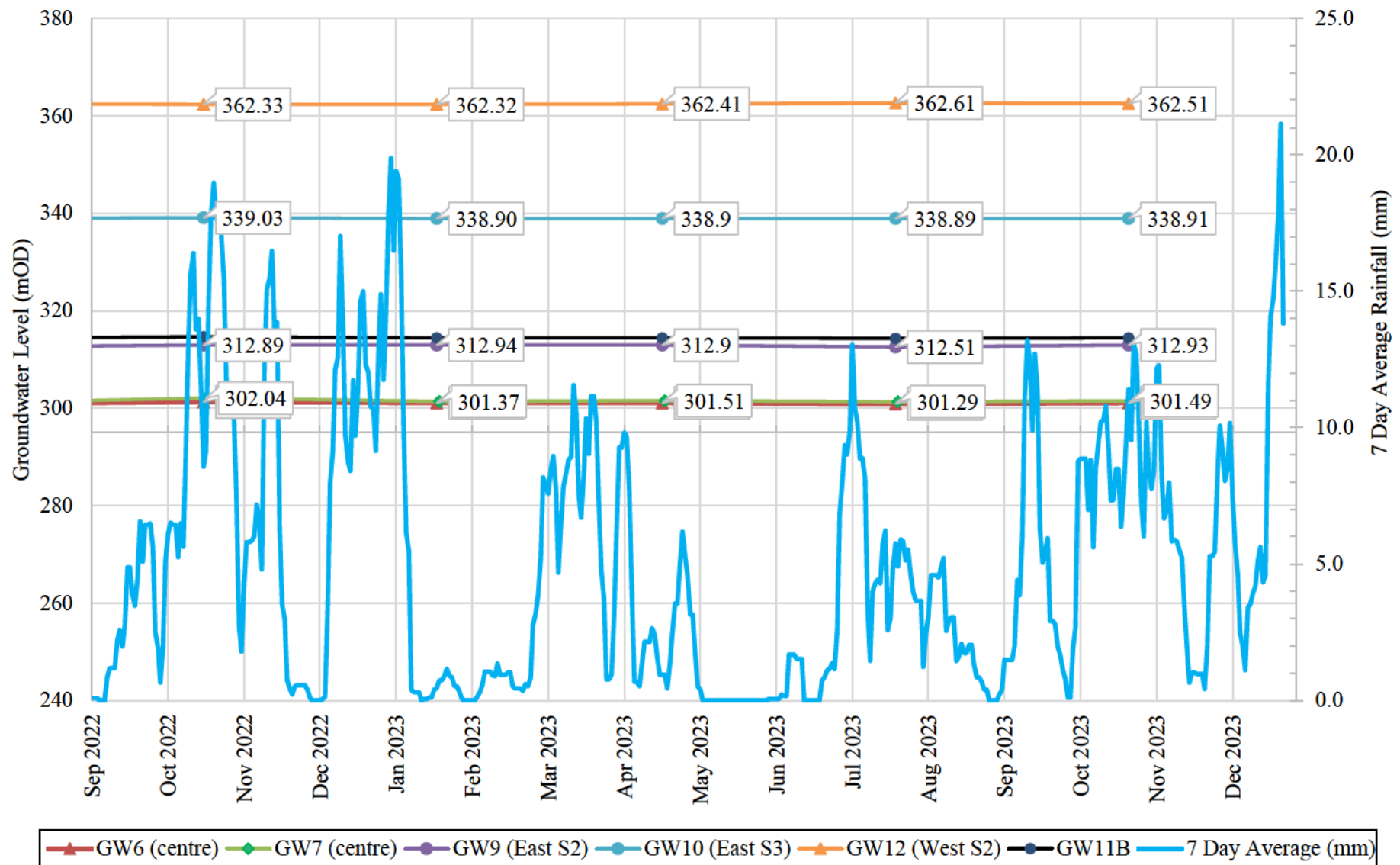
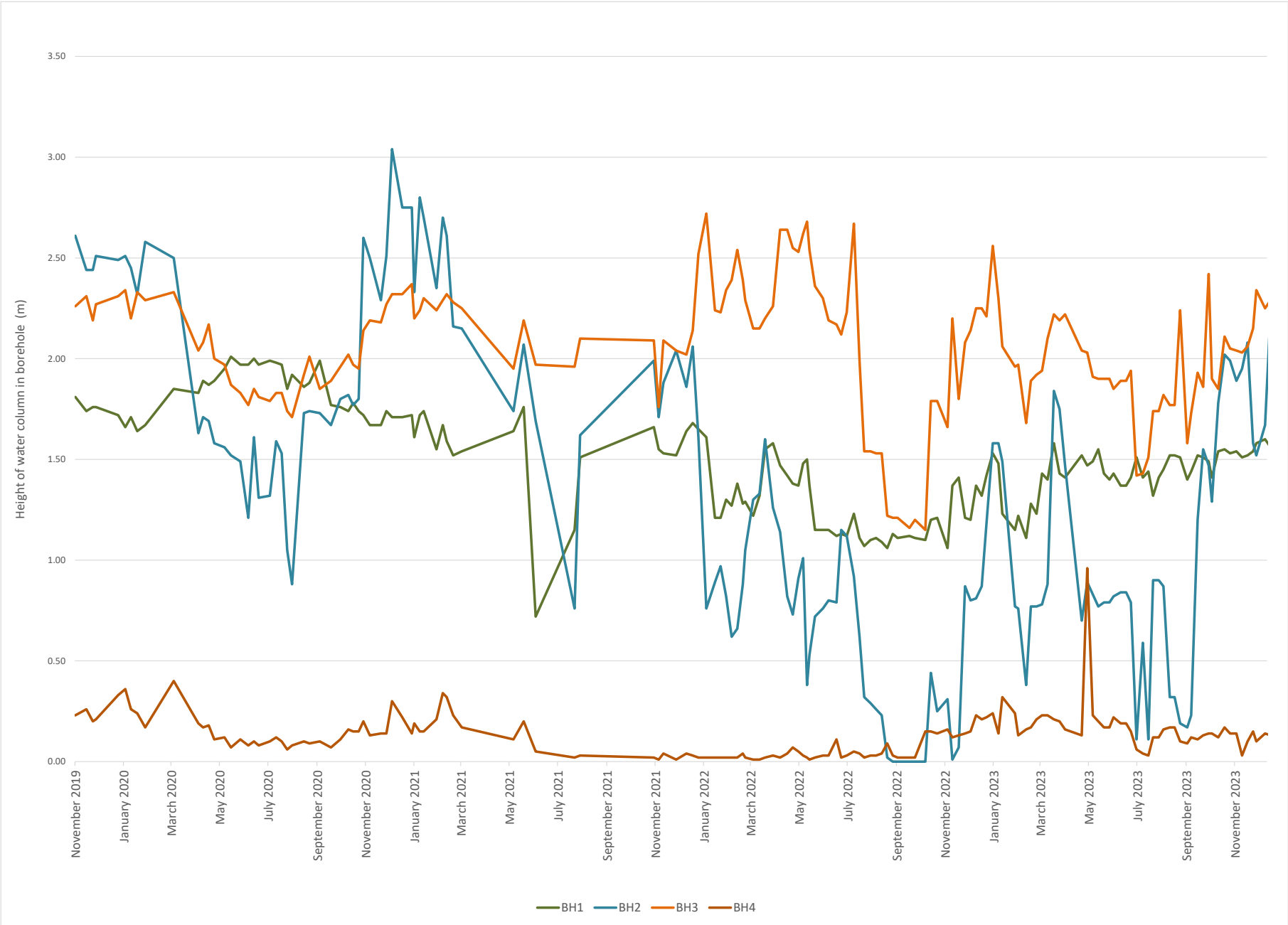


Figure A7
Groundwater monitoring levels downstream of compliance wells



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



Appendix B: Monitoring Results - Tables

LOCATION	Units	L1A	L1B	LC1A	LC2A	LC4A	LC5A	Maximum concentration (mg/l)	Monthly Average (mg/l)	Acceptable Maximum Concentration (AMC) (mg/l)	LP3A	LP4
Date Sampled								17-10-2023				
Manganese in filtrate as Mn	mg/l	N/S	0.488	N/S	0.077	0.693	N/S	0.693	0.42	--	0.002	0.05
Mercury, filt trace as Hg	mg/l	N/S	< 0.00003	N/S	< 0.0003	< 0.00003	N/S	< 0.0003	0.00012	0.00056	< 0.00003	< 0.00003
Nickel in filtrate as Ni	mg/l	N/S	0.009	N/S	0.0890	0.0060	N/S	0.089	0.03	0.0681	0.005	0.006
Zinc, ultra-low filtered as Zn	mg/l	N/S	0.01	N/S	0.024	0.006	N/S	0.024	0.01	1.38	0.009	0.022
pH	pH Units	N/S	7.7	N/S	8.4	7.3	N/S	8.4	7.80	--	7.9	7.9
Conductivity- Electrical 20C	uS/cm	N/S	2170	N/S	11400	4040	N/S	11400	5870	--	1650	1930
Alkalinity as CaCO ₃	mg/l	N/S	554	N/S	4670	2060	N/S	4670	2428	--	417	570
Ammoniacal Nitrogen as N	mg/l	N/S	0.02	N/S	742	224	N/S	742	322	526	0.03	4.2
Chloride as Cl	mg/l	N/S	157	N/S	779	150	N/S	779	362	1408	120	123
Sulphate as SO ₄	mg/l	N/S	346	N/S	506	7	N/S	506	286	999	235	226
Redox Potential ^(see note 4)	mV	N/S	251.4	N/S	128.6	- 100.2	N/S	251.4	160	--	245.3	230.1
Total Suspended Solids	mg/l	N/S	13	N/S	1320	2710	N/S	2710	1348	--	21	< 5
Solids, Total Dissolved 180 deg C	mg/l	N/S	1540	N/S	5120	1650	N/S	5120	2770	--	1120	1310
Dissolved Oxygen, Fixed*	mg/l	N/S	9.5	N/S	4.1	1.7	N/S	9.5	-	--	10.4	9.4
TOC (filtered)	mg/l	N/S	20.1	N/S	340	47.3	N/S	340	135.8	--	11.8	13.1

Notes

1. < denotes 'less than'.
2. L1A,L1B, LC1A, LC2A,LC4A, LC5A: 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. LC5A is a replacement for LC5 well.
6. N/S denotes 'not sampled'.

Exceedance of AMC (per well)	
Exceedance of AMC (monthly average)	

Table B2
Leachate Head Levels

		Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
LC1A	Elevation of base of landfill mAOD	357.62			357.62			357.62			357.62		
	Elevation at top of casing mAOD	398.85			398.85			398.85			398.85		
	Depth to leachate from top of casing (m)	40.30			40.29			40.29			40.20		
	Leachate elevation (mAOD)	358.55			358.56			358.56			358.65		
	Calculated leachate head (m)	0.93			0.94			0.94			1.03		
LC2A	Elevation of base of landfill mAOD	362.49			362.49			362.49			362.49		
	Elevation at top of casing mAOD	401.12			401.12			401.12			401.12		
	Depth to leachate from top of casing (m)	35.20			35.60			35.63			35.70		
	Leachate elevation (mAOD)	365.92			365.52			365.49			365.42		
	Calculated leachate head (m)	3.43			3.03			3.00			2.93		
LC4A	Elevation of base of landfill mAOD	372.27			372.27			372.27			372.27		
	Elevation at top of casing mAOD	401.14			401.14			401.14			401.14		
	Depth to leachate from top of casing (m)	26.81			26.80			26.84			26.80		
	Leachate elevation (mAOD)	374.33			374.34			374.30			374.34		
	Calculated leachate head (m)	2.06			2.07			2.03			2.07		
LC5A	Elevation of base of landfill mAOD	350.14			350.14			350.14			350.14		
	Elevation at top of casing mAOD	380.75			380.75			380.75			380.75		
	Depth to leachate from top of casing (m)	DAMAGED			DAMAGED			DAMAGED			DAMAGED		
	Leachate elevation (mAOD)												
	Calculated leachate head (m)												
L1	Casing height (mAOD)	357.00			357.00			357.00			357.00		
	Leachate (mbgl)	DRY			DRY			DRY			DRY		
	Leachate (m AOD)	-			-			-			-		
	Base of landfill (m AOD)	336.80			336.80			336.80			336.80		
	Depth of well from top of casing (m)	21.03			21.03			21.03			21.03		
	Base of well (m AOD)	335.97			335.97			335.97			335.97		
	Calculated leachate head (m)												
L1A*	Casing height (mAOD)	355.79			355.79			355.79			355.79		
	Leachate (mbgl)	DRY			DRY			DRY			DRY		
	Leachate (m AOD)	-			-			-			-		
	Base of landfill (m AOD)	316.64			316.64			316.64			316.64		
	Depth of well from top of casing (m)	20.89			20.90			20.93			21.03		
	Base of well (m AOD)	334.90			334.89			334.86			334.76		
	Calculated leachate head (m)												
L1B*	Casing height (mAOD)	354.80			354.80			354.80			354.80		
	Leachate (mbgl)	25.77			25.57			26.33			25.71		
	Leachate (m AOD)	329.03			329.23			328.47			329.09		
	Base of landfill (m AOD)	319.60			319.60			319.60			319.60		
	Depth of well from top of casing (m)	34.84			34.80			34.80			34.80		
	Base of well (m AOD)	319.96			320.00			320.00			320.00		
	Calculated leachate head (m)	9.43			9.63			8.87			9.49		

2023	Quarterly Leachate Head Averages (m)
January	2.14
February	
March	
April	2.01
May	
June	
July	1.99
August	
September	
October	2.01
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.
 - LC5A top of casing is 1050mm above GL.

* Well not included in monthly average.

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 Soilds	Dissolved Oxygen, fixed	TOC, filtered	Redox Potential	Alkalinity as CaCO3	Calcium
				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
Freshwater EQS**				1	0.123		0.004		0.0137				0.015**		250	400						
January	Upstream of Landfill	SWU SW2AI SWW4	Six-monthly										Not sampled this quarter									
	NW Ditch System	SWW1 SWW2	Six-monthly										Not sampled this quarter									
	Downstream of Landfill	SWD SWD1	Quarterly	< 0.05 0.05	0.0062 0.0035	0.0035 0.0052	0.0018 0.0023	0.006 0.011	0.0014 0.0025	8.4 8.3	380 400	0.77 0.48	0.030 0.015	8.1 7.9	8.90 14.00	84.0 99.0	< 5 5	9.7 9.9	2.8 3.0	-83.00 -78.00	140 120	52 45
April	Upstream of Landfill	SWU SW2AI SWW4	Six-monthly	< 0.05 < 0.05 < 0.05	< 0.002 0.003 0.007	< 0.001 0.001 0.001	0.00016 0.00017 0.00017	0.009 0.010 0.013	0.002 0.003 0.003	7.3 7.5 7.6	<100 877 881	< 0.01 0.04 0.01	0.00003 0.00024 0.00007	8.40 10.2 9.6	6.00 7.0 7.00	17.0 411.0 411.0	< 5 10 5	11.4 10.1 10.7	<0.40 8.7 9.93	302.80 232.30 9.93	17 86 97	7 146 139
	NW Ditch System	SWW1 SWW2	Six-monthly	< 0.05 < 0.05	0.011 0.002	< 0.001 0.001	0.00024 0.00020	0.004 0.010	0.001 0.002	7.8 7.4	424.0 177.0	0.02 0.01	0.00024 0.00004	10.4 8.9	7.00 6.00	125.0 45.0	< 5 5	11.0 10.4	1.3 0.40	242.90 280.00	103 44	49 19
	Downstream of Landfill	SWD SWD1	Quarterly	< 0.05 < 0.05	0.0040 0.0020	< 0.0010 0.0020	0.00026 0.00044	0.006 0.017	0.0013 0.0036	7.9 7.7	328 324	< 0.01 0.01	0.00014 0.00009	9.1 8.9	6.00 10.00	76.0 81.0	7 5	11.0 11.6	1.0 1.3	247.80 259.70	91 75	48 41
July	Upstream of Landfill	SWU SW2AI SWW4	Six-monthly										Not sampled this quarter									
	NW Ditch System	SWW1 SWW2	Six-monthly										Not sampled this quarter									
	Downstream of Landfill	SWD SWD1	Quarterly	< 0.03 < 0.03	0.002 < 0.002	< 0.001 0.002	0.0005 0.0009	0.005 0.009	0.003 0.005	7.9 7.9	400 420	< 0.01 0.01	0.00020 0.00020	12.3 12.3	6 9	94 96	< 5 5	11.9 12.9	1.8 2.3	238.20 332.10	109 106	54 55
October	Upstream of Landfill	SWU SW2AI SWW4	Six-monthly	< 0.03 < 0.05 < 0.03	< 0.002 0.00051 0.002	0.001 0.0005 0.001	0.0002 0.0001 0.0003	0.006 0.0029 0.036	0.001 0.001 0.003	7.4 8 7.6	100 640 787	0.02 0.31 0.03	0.0001 0.0068 0.0002	9.7 12.6 9.4	3 6.9 5	13 190 320	< 5 29 5	11.5 8.6 11.1	0.4 6.1 7.12	355.2 4.9 295.5	13.7 140 61.7	6 110 111
	NW Ditch System	SWW1 SWW2	Six-monthly	< 0.03 < 0.03	< 0.01 0.002	0.001 0.001	0.0010 0.0002	0.013 0.006	0.003 0.001	7.7 7.5	369 188	0.03 0.02	0.0003 0.0001	10.9 9.4	4 4	90 39	< 5 5	12 11.7	0.74 0.4	299.9 328.3	83.3 39.3	41 21
	Downstream of Landfill	SWD SWD1	Quarterly	< 0.03 < 0.03	0.006 0.002	< 0.001 0.002	0.0004 0.0007	0.004 0.007	0.001 0.001	7.5 7.5	253 252	< 0.01 0.02	0.0001 0.0001	10.6 9.5	5 6	52 52	< 5 5	10.6 10.3	1.03 1.55	301.2 316.8	61 55.4	32 29
Minimum					< 0.0005	< 0.0005	< 0.0001	< 0.0029	< 0.0008	7.3	100	< <	0.0000	7.9	3.0	13.0	5.0	8.6	0.4	-83.0	13.7000	6.0000
Maximum					< 0.0110	< 0.0052	< 0.0023	< 0.0360	< 0.0050	8.4	881	< <	0.0300	12.6	14	411	29	12.9	9	355	140	146
Count						18	18	18	18	18	17		18	18	18	18	18	18	15	18	18	18

Notes
1.The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis
2.N/S - Not analysed
3.Unionised ammoniacal nitrogen based on measured
4.Environmental Quality Standard EQS 1 for freshwater is derived to protect the most sensitive aquatic life.
5.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 ^m)		0.05	(0.05 ^m)	--	--	--	1	--	--	250	400	--	--	--
	Control Level A				(0.1 ^m)	--	0.03	(0.02 ^m)	--	--	--	0.8	--	--	210	300	--	--	--
	Control Level B				(0.15 ^m)	--	0.04	(0.035 ^m)	--	--	--	0.9	--	--	230	350	--	--	--
	Assessment Level				--	(1.0 ⁰)	--	--	--	--	--	--	--	--	--	--	--	--	--

UPSTREAM WELLS

SST East S3

GW3A	Jan-22	20/01/22	1357005	87	<	0.05	0.0085	<	0.00005	<	0.0025	8.0	680.0	240.0	7.40	0.1668	12.9	14.0	86.0	58.0	-	3.1	
	Feb-22	Quarterly																					
	Mar-22																						
	Apr-22	10/05/22	1430017	32	<	0.05	0.011	<	0.00005	<	0.0025	7.7	1100.0	260.0	5.10	0.0618	13.7	16.0	84.0	61.0	-	<	2.0
	May-22	Quarterly																					
	Jun-22																						
	Jul-22	11/08/22	1487914	50		0.05	0.0010		0.0005		0.0004	7.6	640.0	240.0	5.90	0.0646	15.4	17.0	88.0	67.0	8.0	51.0	
	Aug-22	Quarterly																					
	Sep-22																						
	Oct-22	26/10/22	1536795	-44	<	0.050	0.0027	<	0.0005	<	0.0025	8.0	720.0	220	1.80	0.0463	14.7	12.0	77.0	74.0	8.5	2.5	
	Nov-22	Quarterly																					
	Dec-22																						
	Jan-23	21/02/23	1597147	-150	<	0.050	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	<	0.050	0.016		0.002		0.016	7	556	208	0.01	0.000024	13.4	10	80	84	8.7	1.37	
	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	0.000195	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	<	0.03	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																						
	Dec-23																						

GW4	Jan-22	20/01/22	1357006	39	<	0.05	1.50		0.0021		0.0034	8.0	320.0	91.0	4.30	0.0745	9.3	11.0	72.0	15.0	-	<	2.0
	Feb-22	Quarterly																					
	Mar-22																						
	Apr-22	10/05/22	1430018	34	<	0.050	1.4		0.0025		0.0140	7.9	290.0	140.0	0.86	0.0121	9.5	13.0	69.0	14.0	-	<	2.0
	May-22	Quarterly																					
	Jun-22																						
	Jul-22	11/08/22	1487920	66		0.05	1.4000		0.0019		0.0042	7.8	320.0	59.0	0.48	0.0059	10.9	9.1	67.0	16.0	8.0	16.0	
	Aug-22	Quarterly																					
	Sep-22																						
	Oct-22	26/10/22	1536796	-24	<	0.050	1.1000		0.0011		0.0063	8.0	310.0	240	2.20	0.0422	10.7	12.0	79.0	19.0	8.6	2.7	
	Nov-22	Quarterly																					
	Dec-22																						
	Jan-23	21/02/23	1597148	-140	<	0.050	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		0.002		0.016	6.7	285	64	0.03	0.000028	10.0	9	71	19	9.5	1.52	
	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	0.000074	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																						

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 ^m)		0.05	(0.05 ^m)	--	--	--	1	--	--	250	400	--	--	--
Control Level A					(0.1 ^m)	--	0.03	(0.02 ^m)	--	--	--	0.8	--	--	210	300	--	--	--
Control Level B					(0.15 ^m)	--	0.04	(0.035 ^m)	--	--	--	0.9	--	--	230	350	--	--	--
Assessment Level					--	(1.0 ⁰)	--	--	--	--	--	--	--	--	--	--	--	--	--
DOWNSTREAM WELLS / COMPLIANCE WELLS																			
SST West S2																			
GW12	Jan-22	20/01/22	1357011	62	<	0.050	0.0100	0.0047	0.0030	8.5	1600.0	470.0	0.26	0.0265	18.8	99.0	300.0	130.0	- < 2.0
	Feb-22		Quarterly																
	Mar-22																		
	Apr-22	10/05/22	1430023	70	<	0.050	0.032	0.0041	< 0.0025	7.6	1600.0	420.0	0.34	0.0044	17.6	97.0	320.0	130.0	- 7.1
	May-22		Quarterly																
	Jun-22																		
	Jul-22	11/08/22	1487925	56	<	0.05	0.0081	0.0033	< 0.0025	7.5	1500.0	390.0	0.75	0.0076	17.5	82.0	310.0	110.0	7.8 100.0
	Aug-22		Quarterly																
	Sep-22																		
	Oct-22	26/10/22	1536801	8.4	<	0.050	0.0037	0.0013	< 0.0025	7.6	1100.0	350	0.20	0.0025	17.4	32.0	210.0	130.0	8.5 6.5
	Nov-22		Quarterly																
	Dec-22																		
	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	0.004	0.0050	7.4	1650	152	0.01	0.0001	19.2	87	240.0	151	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																		
SST Centre																			
GW6	Jan-22	20/02/22	1357007	62	<	0.05	0.1300	0.0051	0.0120	7.5	850.0	300.0	3.00	0.0193	11.3	81.0	82.0	33.0	- 3.9
	Feb-22		Quarterly																
	Mar-22																		
	Apr-22	10/05/22	1430019	62	<	0.050	0.061	0.0036	0.0036	7.3	850.0	290.0	0.27	0.0012	12.0	87.0	89.0	46.0	- 3.3
	May-22		Quarterly																
	Jun-22																		
	Jul-22	11/08/22	1487921	61	<	0.050	0.1100	0.0046	< 0.0025	7.4	780.0	250.0	0.30	0.0016	12.2	85.0	83.0	41.0	8.0 59.0
	Aug-22		Quarterly																
	Sep-22																		
	Oct-22	26/10/22	1536797	-13	<	0.050	0.1300	0.0065	0.0035	7.3	890.0	270	0.19	0.0009	12.6	77.0	78.0	52.0	8.6 4.5
	Nov-22		Quarterly																
	Dec-22																		
	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																		
GW7	Jan-22	20/01/22	1357008	54	<	0.05	1.2000	0.0041	0.0036	8.2	860.0	360.0	1.60	0.050	11.3	38.0	87.0	75.0	- 5.5
	Feb-22		Quarterly																
	Mar-22																		
	Apr-22	10/05/22	1430020	56	<	0.050	0.51	0.0030	0.0210	7.7	790.0	310.0	0.15	0.002	11.5	38.0	87.0	71.0	- 4.8
	May-22		Quarterly																
	Jun-22																		
	Jul-22	11/08/22	1487922	61	<	0.050	0.6400	0.0045	< 0.0025	7.6	900.0	290.0	0.18	0.002	11.8	58.0	130.0	78.0	8.0 74.0
	Aug-22		Quarterly																
	Sep-22																		
	Oct-22	26/10/22	1536798	-6.6	<	0.050	1.8000	0.0066	0.0045	7.4	1200.0	340	0.08	0.0004	12.4	87.0	160.0	120.0	8.6 8.9
	Nov-22		Quarterly																
	Dec-22																		
	Jan-23	21/02/23	1597150	-95	<	0.050	0.7700	0.0079	0.0120	7.9	830.0	380.0	0.26	0.0043	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	0.003	0.008	7.2	714	731	0.02	0.0001	11.6	28	78	74	8.7 4.33
	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	0.00003	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																		

Table B4
Groundwater monitoring results

Location	Month	Date	Test reference number	Redox Potential	Mestcury, 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	mg/l	mg/l	pH units	uS/cm	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Trigger Level					(0.2 ^m)			0.05	(0.05 ^m)	--	--	--	--	1	--	--	--	250	400	--	--	--	--
Control Level A					(0.1 ^m)		--	0.03	(0.02 ^m)	--	--	--	--	0.8	--	--	--	210	300	--	--	--	--
Control Level B					(0.15 ^m)		--	0.04	(0.035 ^m)	--	--	--	--	0.9	--	--	--	230	350	--	--	--	--
Assessment Level					--		(1.0 ^m)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SST East S2	GW9	Jan-22	20/01/22	1357009	66	<	0.05	1.1000	0.0055	0.0073	8.1	1200.0	240.0	9.30	0.2	11.7	120.0	39.0	50.0	-	6.1		
		Feb-22	Quarterly																				
		Mar-22																					
		Apr-22	10/05/22	1430021	68	<	0.05	0.35	0.0026	0.0073	7.2	550.0	220.0	4.70	0.016	12.4	38.0	34.0	23.0	-	2.9		
		May-22	Quarterly																				
		Jun-22																					
		Jul-22	11/08/22	1487923	67		0.05	0.6200	0.0038	0.0055	7.3	670.0	160.0	3.70	0.017	13.2	68.0	38.0	34.0	7.9	37.0		
		Aug-22	Quarterly																				
		Sep-22																					
		Oct-22	26/10/22	1536799	-5.9	<	0.050	0.4600	0.0032	0.0330	7.6	620.0	120	0.47	0.004	12.5	36.0	120.0	25.0	8.3	6.3		
		Nov-22	Quarterly																				
		Dec-22																					
	GW9	Jan-23	21/02/23	1597151	-94	<	0.050	0.8800	0.0100	0.0100	8.5	7300.0	500.0	16.00	1.000	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	<	0.050	0.505	0.003	0.014	6.5	697	431	3.6	0.003	13.4	55	31	43	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																					
SST East S3	GW10	Jan-22	20/01/22	1357010	71	<	0.05	0.8900	0.0061	0.0027	8.3	630.0	230.0	0.33	0.0123	10.6	21.0	49.0	61.0	-	5.2		
		Feb-22	Quarterly																				
		Mar-22																					
		Apr-22	10/05/22	1430022	74	<	0.05	5.5	0.0130	<	0.0025	7.4	630.0	240.0	0.52	0.0027	11.3	31.0	59.0	52.0	-	6.0	
		May-22	Quarterly																				
		Jun-22																					
		Jul-22	11/08/22	1487924	60	<	0.05	4.0000	0.0130	0.0033	7.3	580.0	240.0	0.77	0.0033	12.1	28.0	56.0	55.0	7.8	54.0		
		Aug-22	Quarterly																				
		Sep-22																					
		Oct-22	26/10/22	1536800	-0.4	<	0.050	0.3900	0.0042	0.0130	7.4	580.0	240	0.14	0.0008	12.0	10.0	74.0	84.0	8.6	5.9		
		Nov-22	Quarterly																				
		Dec-22																					
	GW10	Jan-23	21/02/23	1597152	-67	<	0.050	0.9300	0.0095	0.0079	8.4	620.0	310.0	0.44	0.02	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	0.012	0.015	6.9	627	81.8	0.16	0.00025	10.6	21	49	74	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	0.00061	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																					

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*°Tc)-pH)}), where T°C is measured water temperature.

^ Ammonia result confirmed on duplicate analysis.

CARBON DIOXIDE (% by Volume)

Gas Monitoring Results Table_Q4_2023_B5

Table B5
Landfill Gas Monitoring Results

METHANE (% by Volume)														CARBON DIOXIDE (% by Volume)													
Location	Valve	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Comments	
GMW7	Yellow Valve	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.5	0.2	0	0.2	0.6	0.3	1	0.8	0	0.2	0.3	0.2	Yellow Valve,12 depth	
	White Valve	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	0	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	0	nt	White Valve, 5m depth		
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	Trigger Levels	
	Control Levels	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	Control Levels	
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	Trigger Level Yellow	
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	Trigger Level White	
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	Control Level Yellow	
Control Level White	-	-	-	-	-	-	-	-	-	-	-	-	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	Control Level White		
GMW12	Red Valve	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.3	0.8	0.7	0.6	0.6	1	2.2	1.9	0.8	1.8	0.6	0.6	Red Valve, 26.3m depth	
	Yellow Valve	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.3	0.4	0	0.4	0	1.9	2.4	2.7	0	1.1	0.9	1.4	Yellow Valve,15m depth	
	White Valve	0	0	0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	1.4	0.8	0.5	0.1	0.7	0.8	2.2	1.5	0.9	0.1	0	0.7	White Valve, 5m depth	
	Trigger Level Red	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	Trigger Level Red
	Trigger Level Yellow	1	1	1	1	1	1	1	1	1	1	1	1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	Trigger Level Yellow	
	Trigger Level White	1	1	1	1	1	1	1	1	1	1	1	1	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	Trigger Level White
	Control Level Red	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	4	4	4	4	4	4	4	4	4	4	4	4	4	Control Level Red
Control Level Yellow	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	Control Level Yellow	
Control Level White	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	5	5	5	5	5	5	5	5	5	5	Control Level White	
GMW13	Red Valve	0	0	nt	0	0	0	nt	0.1	0.1	0	0.1	0.1	1	1.1	nt	1.2	1.1	1.3	nt	1.1	0	1.2	1.4	1.3	Red Valve, 26.3m depth	
	Yellow Valve	0	0.1	nt	0.1	0	0	nt	0.1	0.1	0	0.1	0.1	2.9	4.1	nt	4.3	4.8	4.5	nt	6.3	4.7	4.2	3.2	4.7	Yellow Valve,15m depth	
	White Valve	0	0	nt	0	0	0	nt	0.1	0.1	0.1	0.1	0.1	1.6	3.6	nt	2.9	4.8	2.3	nt	2.7	0	0	1.1	1.5	White Valve, 5m depth	
	Trigger Level Red	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	Trigger Level Red	
	Trigger Level Yellow	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	6	6	6	6	6	6	6	6	6	6	6	6	Trigger Level Yellow	
	Trigger Level White	1	1	1	1	1	1	1	1	1	1	1	1	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	Trigger Level White	
	Control Level Red	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	Control Level Red	
Control Level Yellow	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	Control Level Yellow		
Control Level White	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	Control Level White	
GMW14/14A	Red Valve	0	0	3.2	0	0	nt	nt	0.1	0.1	0	0.1	0.1	4.4	3.6	14.5	1.3	0	nt	nt	0.4	3.6	4	1.2	2.8	Red Valve, 26.3m depth	
	Yellow Valve	0	0	2.5	0	nt	nt	0.1	0.1	0.1	0	0.1	0.1	2.3	3.6	17.5	0.3	nt	nt	0.1	0	0.4	1.2	0.1	1.7	Yellow Valve,15m depth	
	White Valve	0	0	4.8	0	nt	nt	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.2	12.9	0.5	nt	nt	2.4	0.3	4.4	0.1	0	0	White Valve, 5m depth	
	Trigger Level Red	1	1	1	1	1	1	1	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	Trigger Level Red	
	Trigger Level Yellow	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	Trigger Level Yellow	
	Trigger Level White	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	Trigger Level White
	Control Level Red	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1	Control Level Red	
Control Level Yellow	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	Control Level Yellow		
Control Level White	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	Control Level White	
GMW1**	Red Valve	1.5	0	0	0	nt	nt	0.1	0.3	0.3	0.2	0.3	0.1	1	1.3	1.6	1.5	nt	nt	1.7	1.8	1.7	1.7	0.9	1.7	Red Valve, 23.5m depth	
	Yellow Valve	0	0.3	20.4	1.2	nt	nt	22.2	25.5	nt	6.1	2.2	0.9	0.6	1	3.3	1.6	nt	nt	10.5	10.4	nt	2.6	1.7	2.3	Yellow Valve,14.7m depth	
	White Valve	0.2	0.2	0	0.4	nt	nt	1.4	1.7	0.3	0.3	0.4	0.2	0.3	0.6	0	1.5	nt	nt	1.6	1.9	1.7	1.2	1.7	1	White Valve, 6.5m depth	
GMW8*	Yellow Valve	4.7	6.2	5.9	7	3.2	0.2	2.4	2.3	5.2	6.8	7.7	9.9	10.4	6.9	6.8	6.4	3.2	1.3	2.6	2.7	4.6	6.4	6.1	5.9	Yellow Valve,17.5m depth	
	White Valve	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	5.7	4.1	4.4	3.7	4	3.6	3.7	3.9	4.2	5.2	4.8	4.7	White Valve, 5.7m depth	
GMW9*	Red Valve	0	0	0	0	0	0	0.1	0.1	0.1	1.5	0.1	0.1	0.9	2	1.5	0.6	1.1	1.1	1.4	0.3	0	0.7	1.5	1.7	Red Valve, 27m depth	
	Yellow Valve	17.6	22.2	20.7	27.8	26.1	23.1	21.3	24.4	28.2	29.6	35.5	31.7	6	6.6	9.4	8.5	9.4	11.3	11.7	11.9	11.8	12.9	12	10.2	Yellow Valve,15m depth	
	White Valve	0	0	0	nt	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0	0.1	0.1	nt	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	White Valve, 8.5m depth	
GMW10*	Red Valve	0.4	0	0	0	2.8	2.8	4.4	3.8	0.3	30	33.1	26.6	3.7	4.4	1.8	3	3.8	1.2	2.5	3	8.6	7.1	5.9	4.4	Red Valve, 19.5m depth	
	Yellow Valve	18.2	17.2	43.7	40.3	39.9	11.9	48	45.6	12.4	48	47.7	42.1	2.9	2.3	6.4	5.1	5.1	1.8	8.3	7.6	10.3	6.6	6	5.3	Yellow Valve,15m depth	
	White Valve	0	0	0	0.2	0.9	1.1	0.5	0.4	45.6	0.1	0.6	0.3	2.8	6	5.6	5.6	8.5	8.3	6.8	8.5	7	3.7	1.3	2.5	White Valve, 8m depth	
GMW17**	Red Valve	0	0	1.4	0	nt	0	0.1	0.1	0.1	0	0.1	0	2.3	1.5	15.6	1.4	nt	1.3	1.3	1.3	1.2	1.4	1.6	1.5	Red Valve, 26.3m depth	
	Yellow Valve	0	0	4.7	0	0	0	0.1	0.1	0.1	0	0.1	0.1	3.9	4.9	14.5	4.6	1.4	3.2	2.7	5.5	5.3	6.4	6.2	6.6	Yellow Valve,15m depth	
	White Valve	0	0	2.4	0	0	0	0.1	0.1	0.1	0	0.1	0	1.7	3.7	19.1	2.3	4.9	3.4	3.2	3.6	3.7	1.4	4.5	4.4	White Valve, 5m depth	
GMW18**	Yellow Valve	0	0	4.7	nt	0	0	0.1	0.1	0.1	0	0.1	0.1	0	0.2	19.4	nt	2.8	1	0	1.3	2.3	2.2	0.1	0.1	Yellow Valve,12 depth	
	White Valve	0	0	4.7	0	0	0	0.																			

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