Silent Valley Waste Services Limited

Silent Valley Landfill

2021 Third Quarter Monitoring Report

Issue | 29 October 2021

Job number 115825-00

Ove Arup & Partners Ltd
1 West Regent Street
Glasgow G2 1RW
United Kingdom
www.arup.com

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Appendices

1 Introduction

This 2021 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 2021 in accordance with the Silent Valley Environmental Permit (Permit no. MP3835SV [1]) and the Aftercare Phase Environmental and Infrastructure Monitoring Program [5]. The annual report will include a full assessment of the year's results.

The data has been collected as referenced in Schedule 3 of the Consolidated Permit [1]. This report refers to the 2019 Annual Monitoring Report [2] and the 2020 Annual 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 Discussion of Monitoring Results

2.1 Rainfall

Measured rainfall data is illustrated in **Appendix A**, **Figures A1** to **A3**.

Based on the available data, July recorded the highest monthly rainfall of the quarter (136.3mm) and the highest daily rainfall total (27.4mm on 30th July). September recorded the lowest monthly rainfall of the quarter (84.9mm), with 8 consecutive days of no rain (1st September – 8th September). August recorded a monthly rainfall of 86.4mm, which is almost 100mm lower than last year's total which was the wettest August on record.

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 majority of the sample concentrations are compliant. However well LC5A is currently damaged.

Well LC2A continues to exceed the AMC well concentration for Zinc for the third quarterly of 2021 and remains elevated from the third quarter of 2020. The concentration has however declined from that of the last quarter.

Well LC2A recorded an elevated Ammoniacal Nitrogen concentration. However, the average Ammoniacal Nitrogen concentration has declined over the past year and historically has been shown to fluctuate. The concentration recorded for LC2A is lower than the previous quarter.

Well LC2A exceeded the AMC for Nickel, this has fluctuated 2021 but decreased slightly the last quarter. This is the third quarter in which Nickel has exceeded the AMC and therefore, it is recommended this is investigated further.

Well LC4A Zinc concentrations have declined under the AMC exceedance level for this quarter.

In accordance with the Aftercare Phase Environmental and Infrastructure Monitoring Program report [4], the contingency plan is to be implemented after three consecutive exceedances have been recorded.

The installation within LC5A has failed and therefore works are ongoing to replace this well in the near future.

2.2.2 Leachate Level Monitoring

Leachate 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].

2.3 Surface Water Quality

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, including locations SW1 to SW10 located downstream of the landfill, 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. They are not monitored this quarter.

2.3.2 Downstream Surface Water

SWD and SWD1

Results show the concentration of zinc exceeded the freshwater trigger level in SWD. The calculated bioavailable concentration of zinc was compliant. Contaminant bioavailability is a more accurate risk-based approach under the Water Framework Directive (WFD) therefore SWD remains compliant. SWD1 also remains compliant.

SW1 to SW10

Sampling in these locations ceased in May 2020. The surface water results for the monitoring points located downstream of the landfill indicate no significant environmental impact on the Nant Merddog.

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

Well GW3A and GW4

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

In GW3A the mercury concentration continues to remain higher than the trigger level; this has decreased slightly from last quarter, although has fluctuated over the past year. Mercury concentrations in GW3A have been continually recorded above the trigger level since April 2018. Based on previous results these are temporary fluctuations associated with the environment outside of the influence of the landfill.

In GW3A the concentration of zinc has decreased from last quarter and is now recorded below the trigger level of 0.05mg/l.

Manganese has continually been recorded above the assessment level in GW4 with continued fluctuations over the years whilst showing no recognisable trend. Manganese has exceeded the assessment level again this quarter. These 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.

In GW4 the concentration of zinc has decreased from last quarter and is now compliant.

2.4.1.2 Downstream Groundwater wells

The results from the compliance wells indicate that generally the pumping system at the toe of the landfill is continuing to successfully control the potential egress of leachate from the landfill. No issues associated with pump failure within the cut-off system have been recorded so far during 2020 and 2021.

Well GW10

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

GW10 is compliant with the exception of Manganese, which exceeded the assessment level of 1.0mg/l with a concentration of 1.35mg/l for the second quarter in a row.

Well GW9

GW9 has been installed in the sandstone strata classified as S2-East.

GW9 continues to be non-compliant for ammoniacal nitrogen in relation to the Trigger Level of 1mg/l. The recorded value of 7.9mg/l is higher than last quarter, but this contaminant has been shown to fluctuate.

In GW9 zinc has decreased from last quarter and is now recorded below the trigger level of 0.05mg/l.

Well GW12

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

Zinc concentrations have dropped to below trigger levels from last quarter to 0.005mg/l with the trigger level remaining 0.05mg/l.

Wells GW6 and GW7

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

The manganese concentration in GW7 has been recorded as 1.05mg/l which is almost at the assessment level of 1.0mg/l, it had been lower than the assessment level for the last two quarters. Generally, manganese has followed a downwards trend over the past year. 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.

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**. Water levels have remained relatively consistent this quarter with the first two quarters of 2021 and the majority of 2020.

The 2020 Annual Monitoring Report [3] noted that GW7 had recorded a 5.4m drop in groundwater level during the 2020 fourth quarter. Following a review of the existing data, levels recorded throughout the three quarters of 2021, show consistencies with other readings in 2020, there is confidence that this result indicates an error in the data.

2.5 Landfill Gas

2.5.1 Landfill Gas Quality Monitoring

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

Methane

Methane concentrations continue to be recorded below the respective Control and Trigger Levels (where available) in all monitoring locations. One exception being the Yellow Valve at GMW3 in September where levels exceeded the control level of 0.5%. This has been the first exceedance for 2021 for Methane.

Carbon Dioxide

There was a significant increase in exceedances above the Control and Trigger level concentrations this quarter. Exceeding wells include; GMW2, GMW3, GMW4, GMW6, GMW12, GMW13 and GMW14/GMW14A. Further detail below;

- GMW2 (Red Valve) June, July and August. Concentrations exceeded the Control level concentration of 1%.
- GMW3 (Yellow Valve) July and August. Concentrations exceeded the Trigger level of 2.67%.
- GMW4 (Red Valve) August. Concentrations exceeded Control level of 1% .
- GMW6 (Red Valve) in June, July and August. A sustained concentration increase was visible from the start of 2021 with the first exceedance in June.

The trend has continued to increase this quarter with concentrations continuing to exceed the 4.3% Trigger level. These concentrations will need to be reviewed and actioned next quarter, if further exceedances are reported.

- GMW12 (Yellow Valve) August and September. Concentrations have fluctuated throughout 2021 but have been on a gradual increase from the last quarter with concentrations exceeding the Control level of 2.4%.
- GMW13 (Yellow Valve) July. Control level Concentrations were exceeded in July this quarter however resumed back to complaint for the rest of the quarter.
- GMW14/GMW14A (Red Valve and Yellow Valve) Consecutive concentration exceedances were recorded in 2020. Generally, concentrations had been increasing however they were compliant during the second quarter. However, in this third quarter concentrations have risen again above Control and Trigger levels.

  Red Valve has fluctuated in concentrations over 2020 and 2021 with no clear trend. Two concentrations exceeded the Control level of 1% for July and September.

  Yellow Valve has exceeded the Trigger level concentrations of 5.4% for August and September. These concentrations have increased from the compliant values from the last quarter.

As stated by Golder Associates [10] 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.

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.

Leachate monitoring results indicate that well LC2A exceeded the AMC for Nickel for the third quarter of 2021 and last quarter of 2020. It is therefore recommended that a review should be completed on this data set and recommendations set out within a technical note.

LC2A has also shown repetitive signs of increase above AMC levels for Zinc in the past two quarters and Ammoniacal Nitrogen concentrations. These levels should be monitored closely in the next quarter to decide if action is necessary.

There has been a notable increase of carbon dioxide exceedances in GMW2, 3, 6 and 12 following a trend of increase throughout the last quarter and 2021. These levels will need to be reviewed and actioned next quarter if further exceedances are reported.

Based on the 2020 Annual monitoring report [3], the following is still being investigated further.

- The continually high levels of ammoniacal nitrogen concentration within the leachate samples, and the 2.32m reduction in leachate head monitoring within LC5A. Considering well LC5A has been damaged, the leachate data will be reviewed following the installation of a new well. The continuing high levels of ammoniacal nitrogen recorded in the leachate within LC2A should also be investigated with further potential remedial work during the re-installation of LC5A.
- The ongoing carbon dioxide gas exceedances in GMW14/14A. In the first quarter it was recommended that a technical note be prepared, including a review of the conceptual site model and gas results. Results from this quarter indicate GMW14/14A no longer exceeds both the control or trigger levels, however, the technical note is currently work in progress and will review the latest results as part of the assessment.

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, 2020 Annual Monitoring Report, 30th January 2021.

[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.

[8] Environment Agency, Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water, report reference LFTGN02, June 2014.

[9] Arup, Silent Valley Landfill, Hydrogeological Risk Assessment (Supplementary Revision May 2009), document reference 09/7543, June 2009.

[10] Golder Associates, Establishment of Trigger Levels at Silent Valley landfill site, letter report dated 21 December 2006.

[11] Environment Agency, Guidance on the management of landfill gas, document reference LFTGN03, June 2014.

[12] The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

[13] Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG), “Metal Bioavailability Assessment Tool (M-BAT),” 2014.

Appendix A

Monitoring Results - Graphs

Figure A1
Daily rainfall totals and sampling events (September 2014 - September 2021)

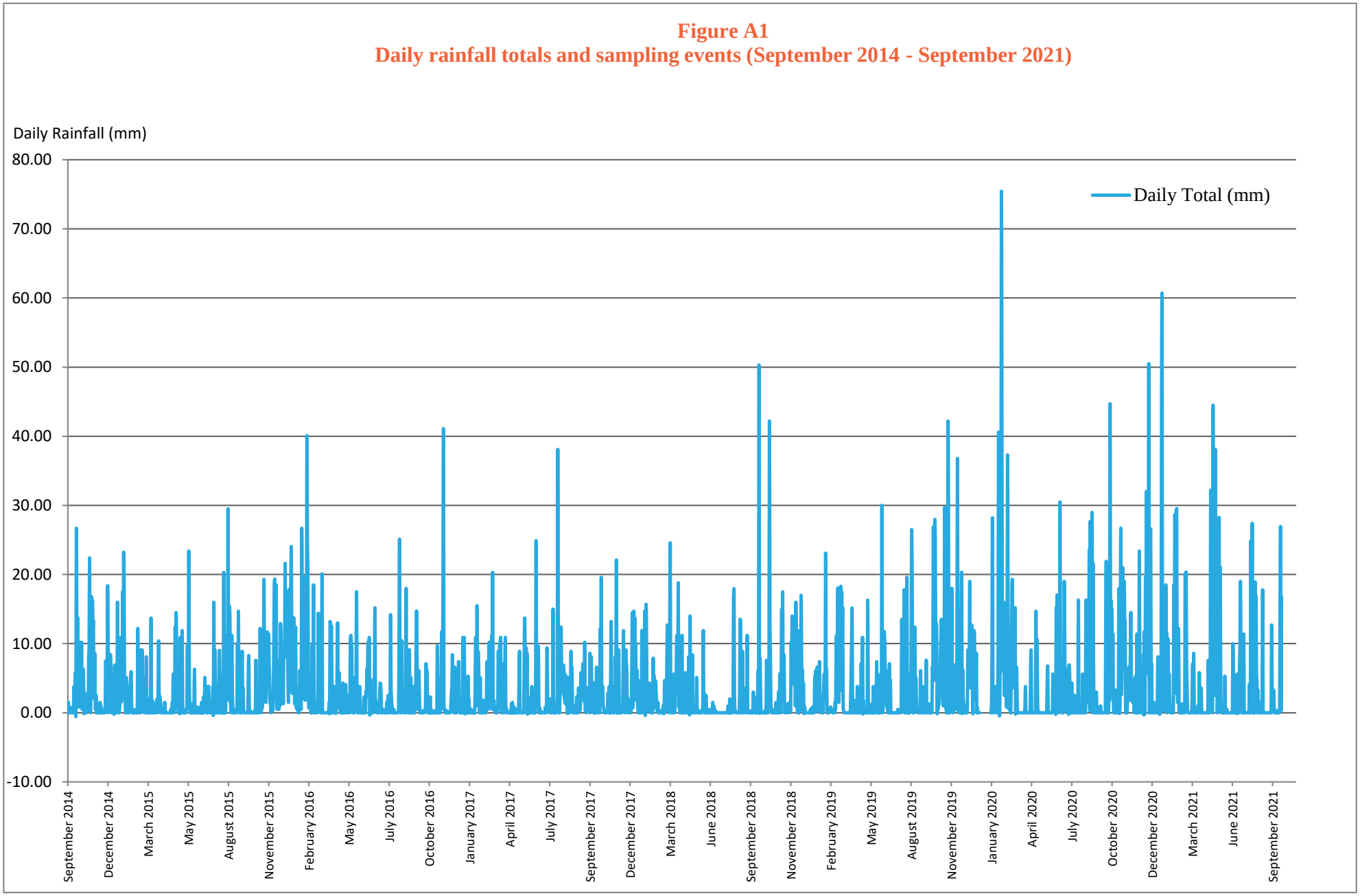


Figure A2
Monthly rainfall totals (September 2014 - September 2021)

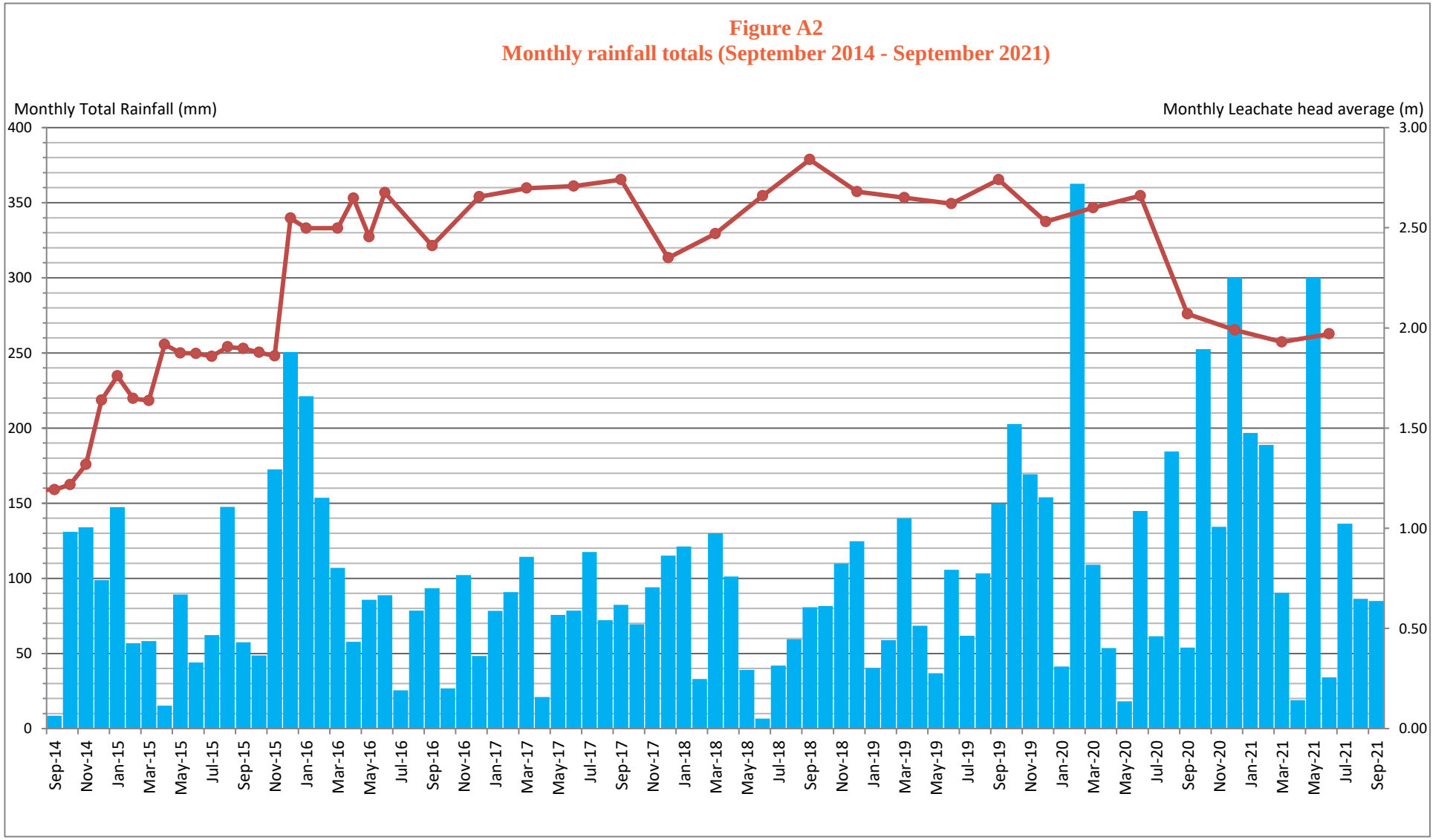


Figure A3
Monthly total rainfall (September 2014 - September 2021)

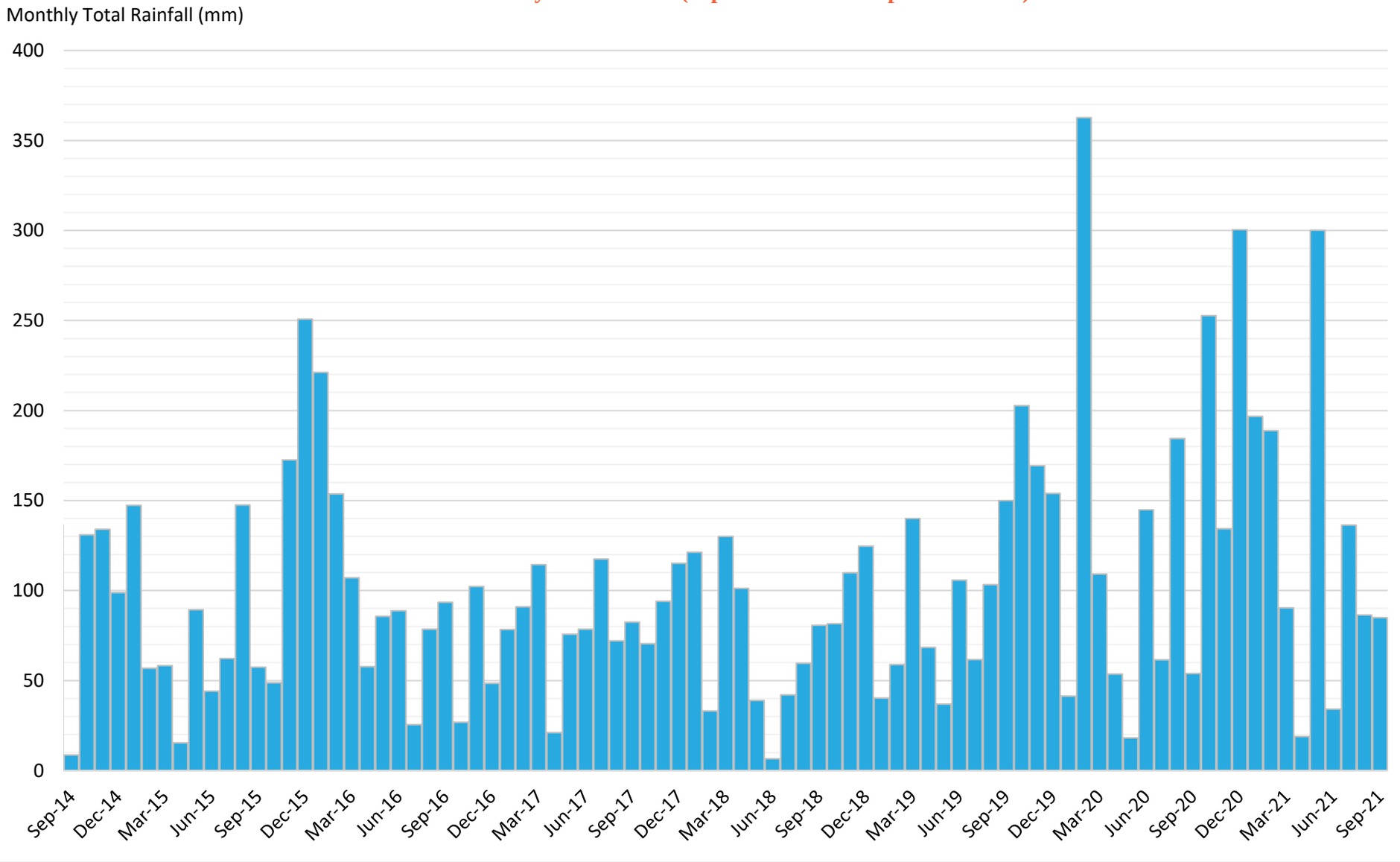
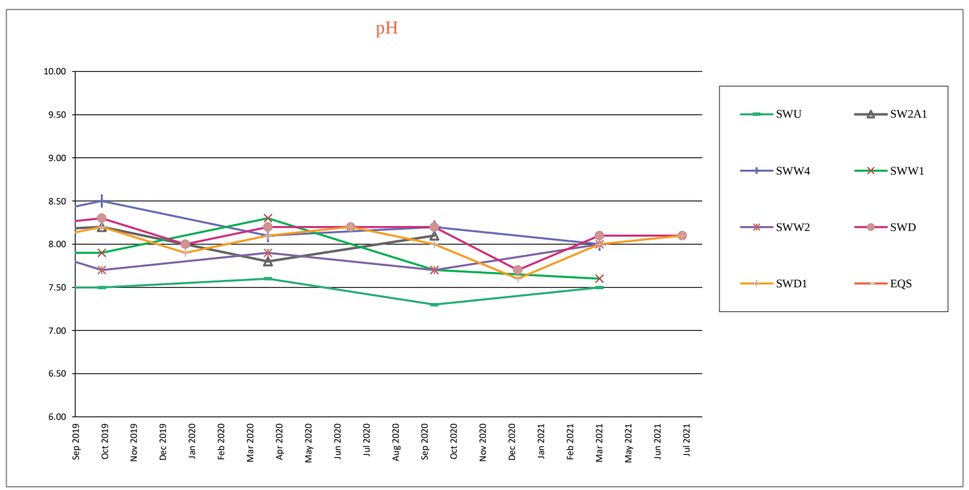
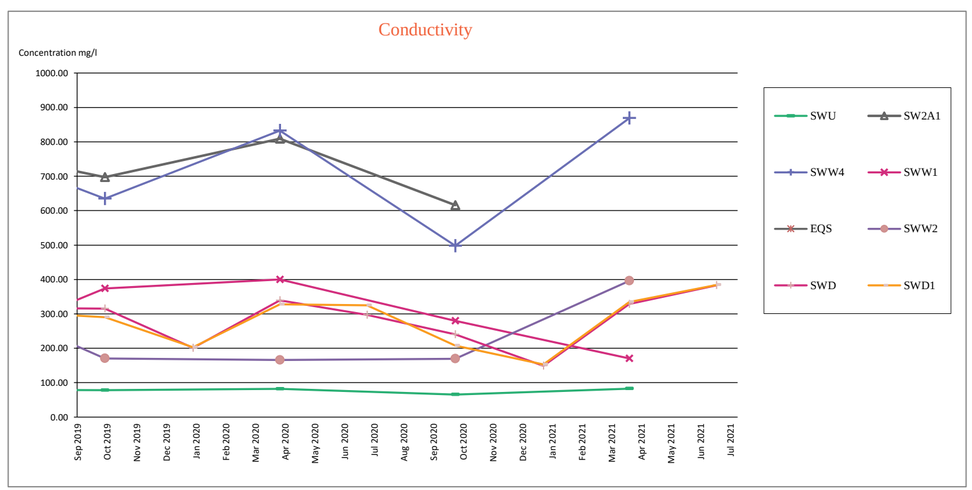
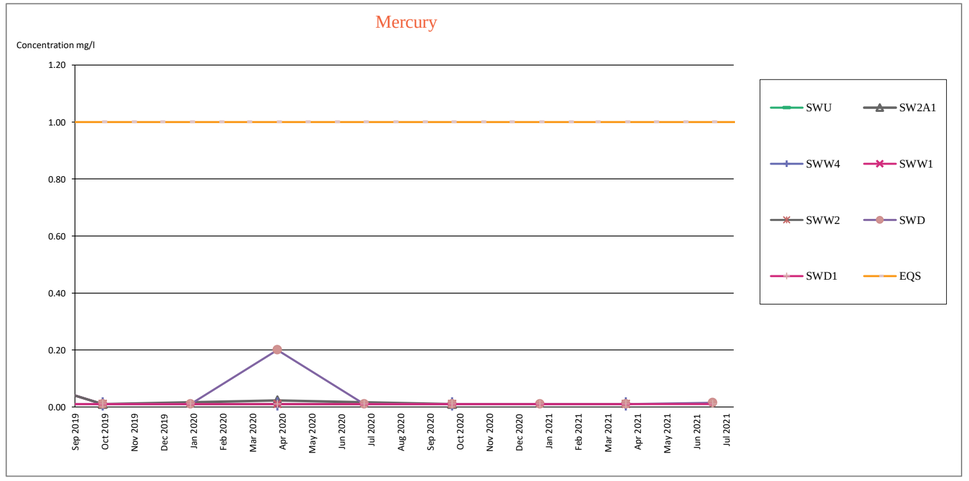


Figure A4
Surface water monitoring graphs







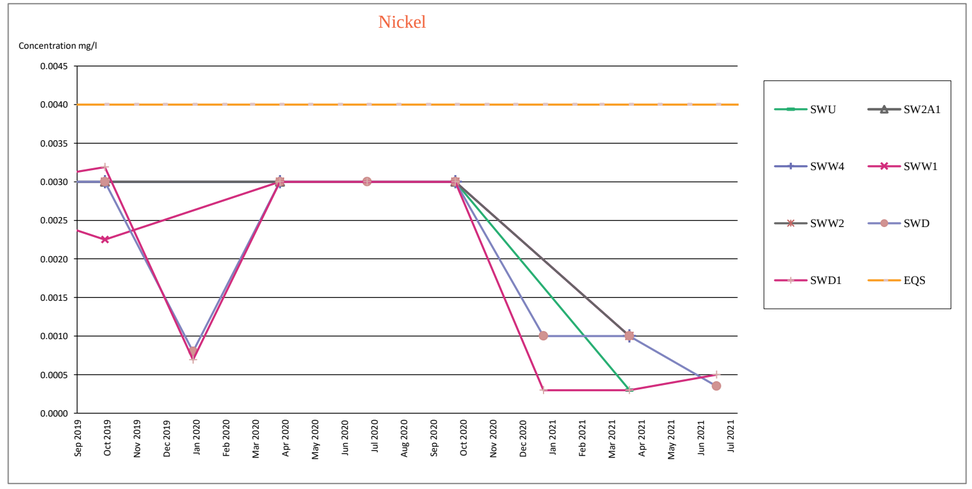


Figure A4
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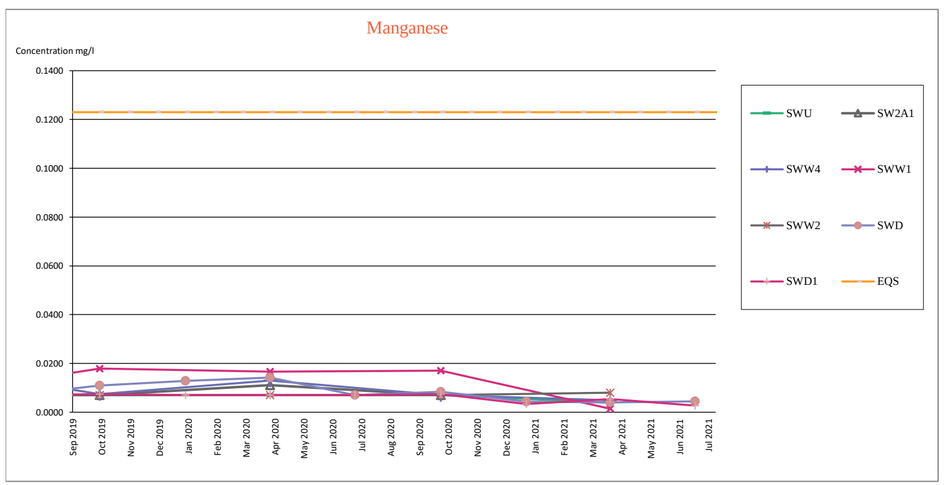

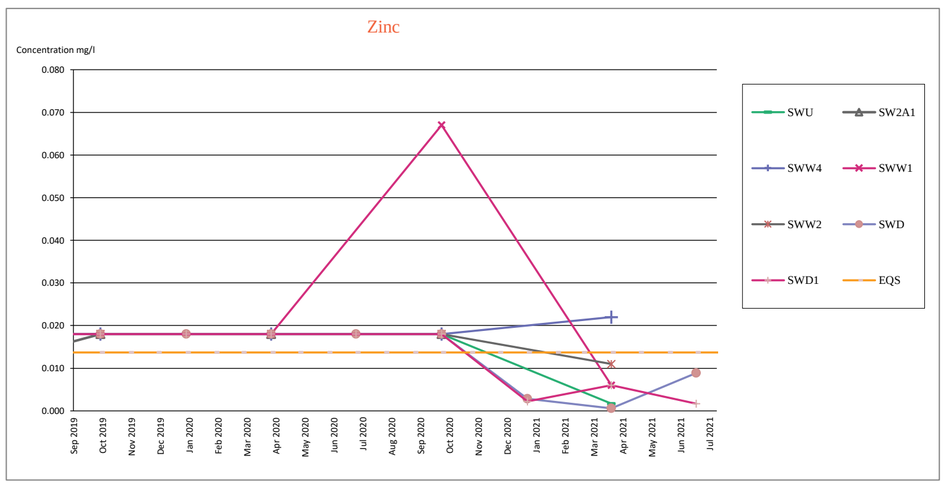

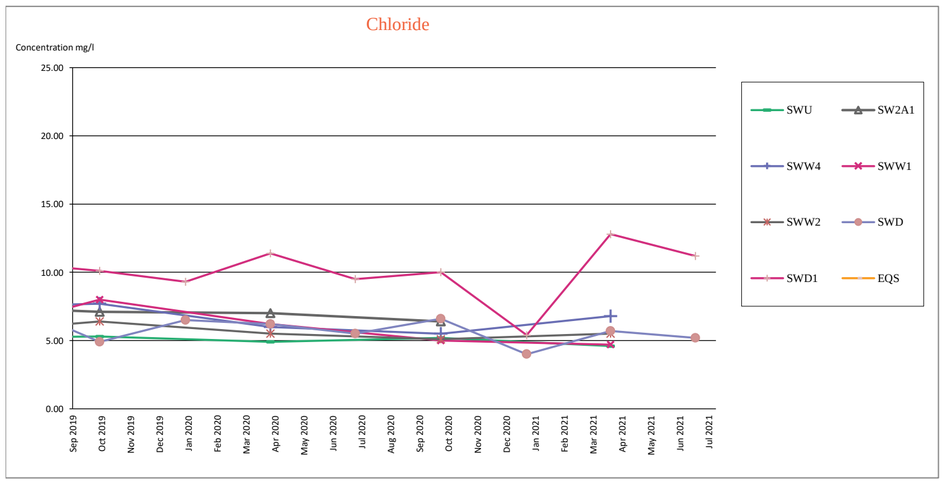

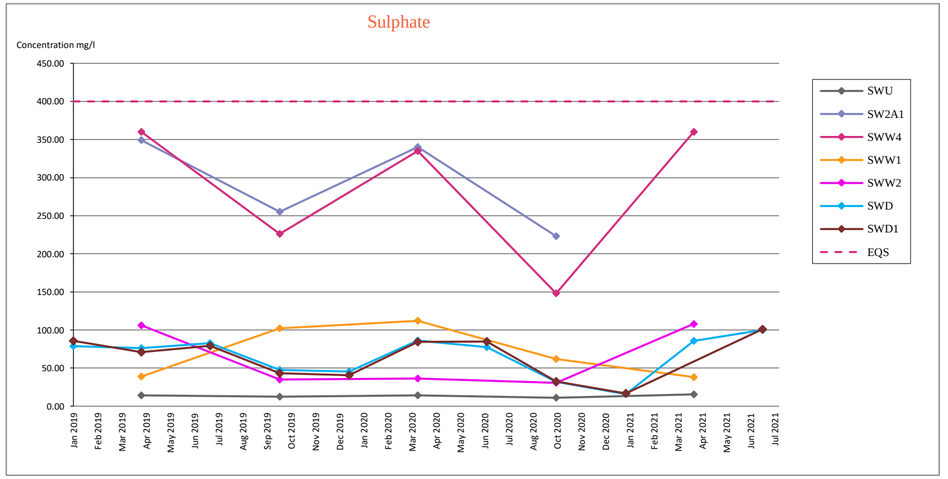

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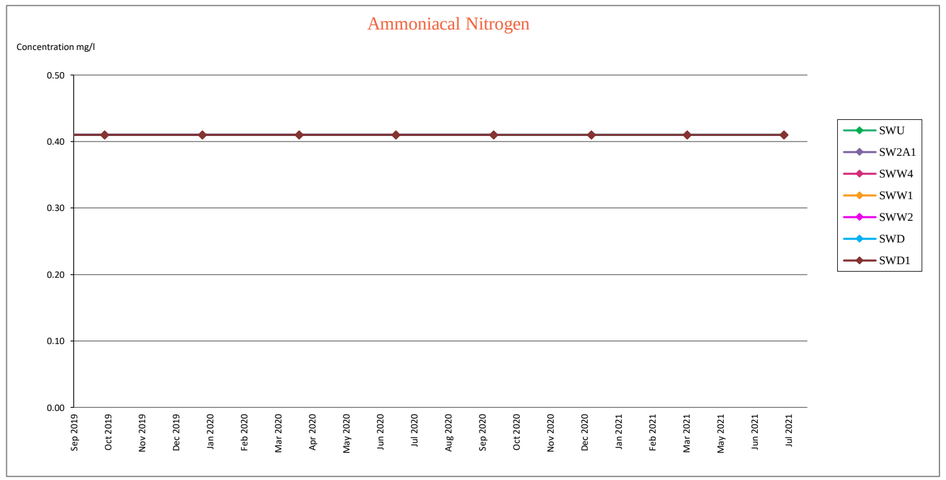


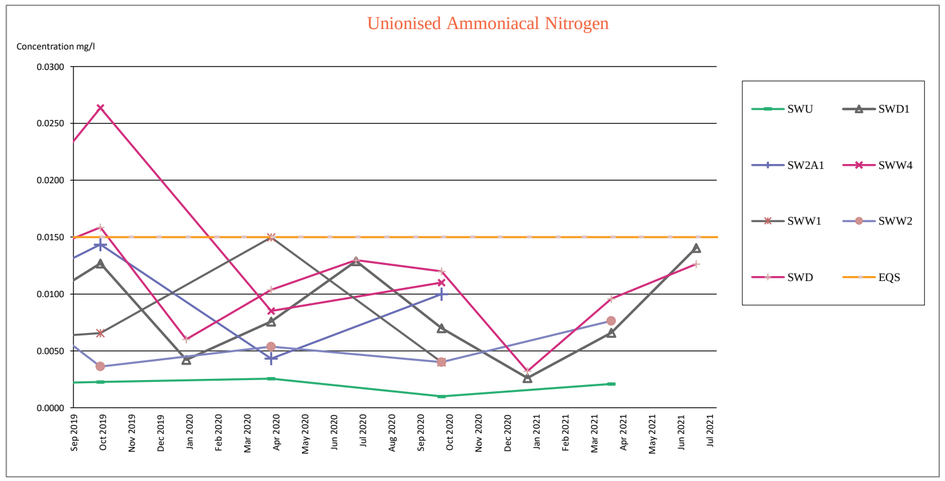
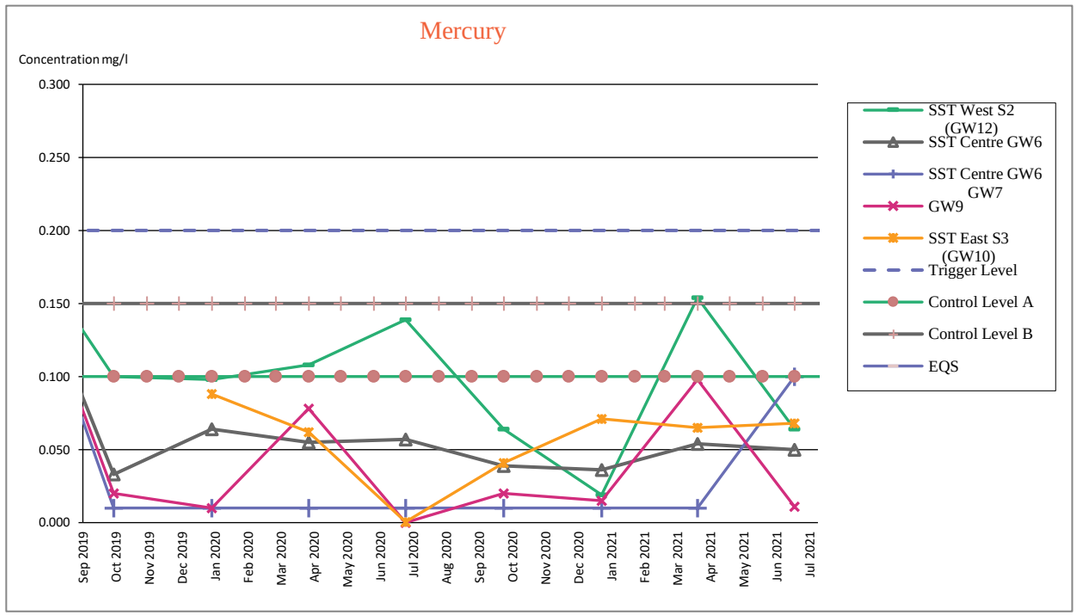
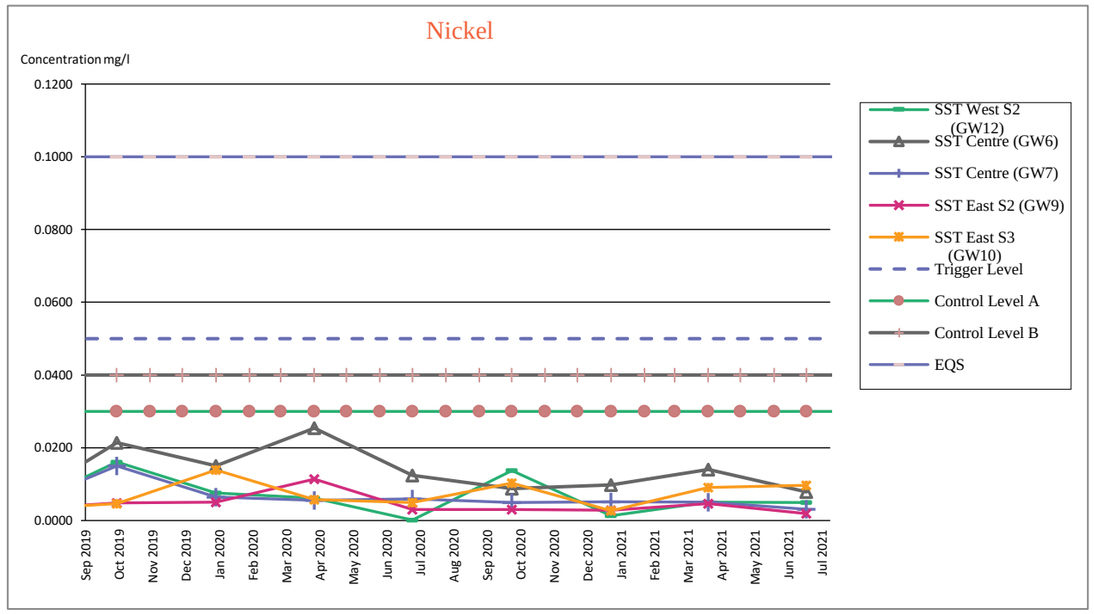
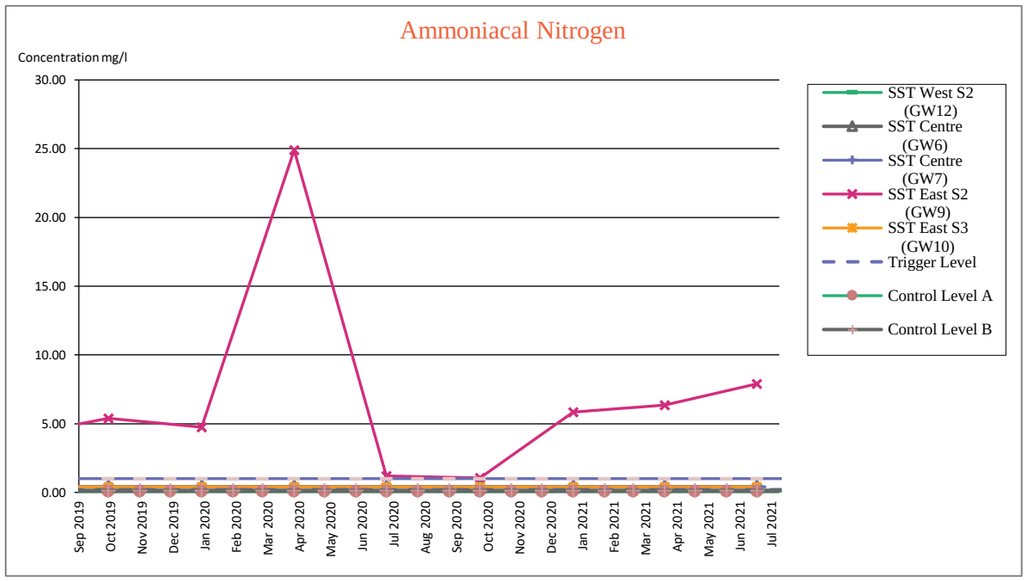


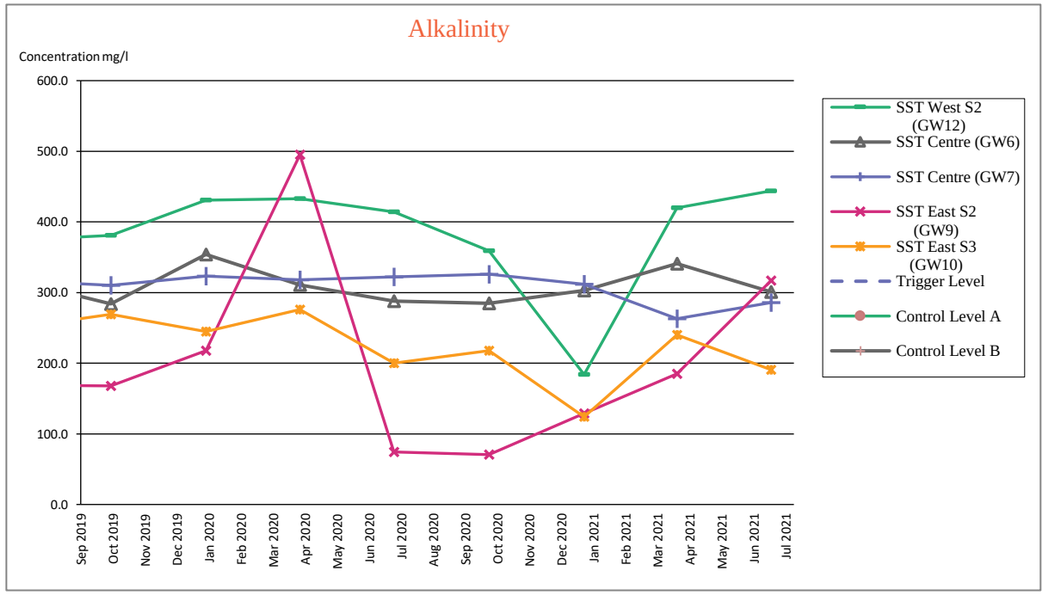
Figure A5
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs









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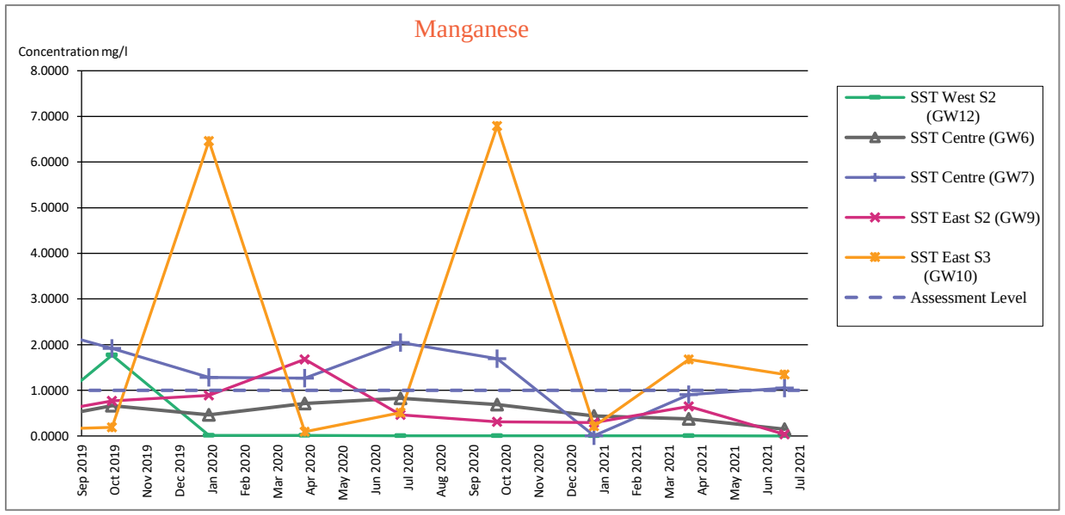
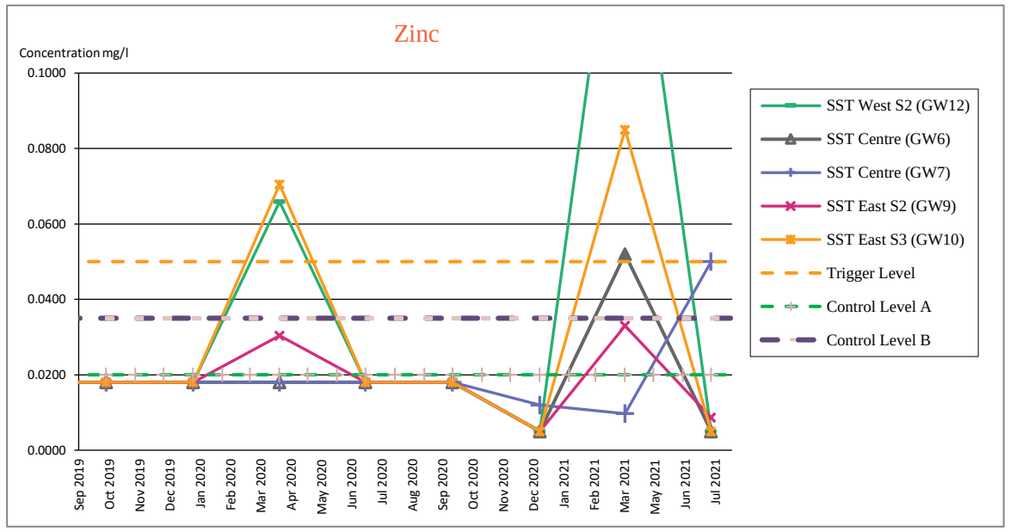
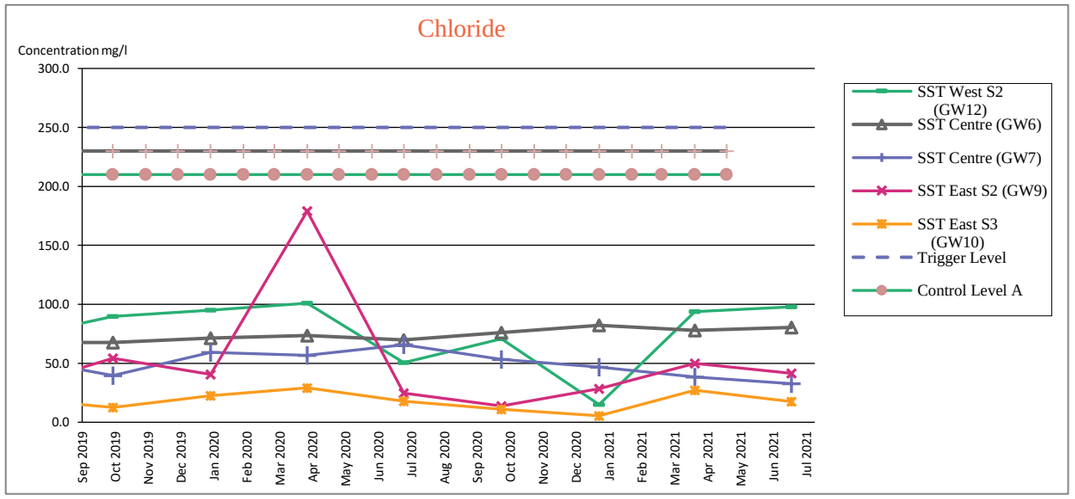
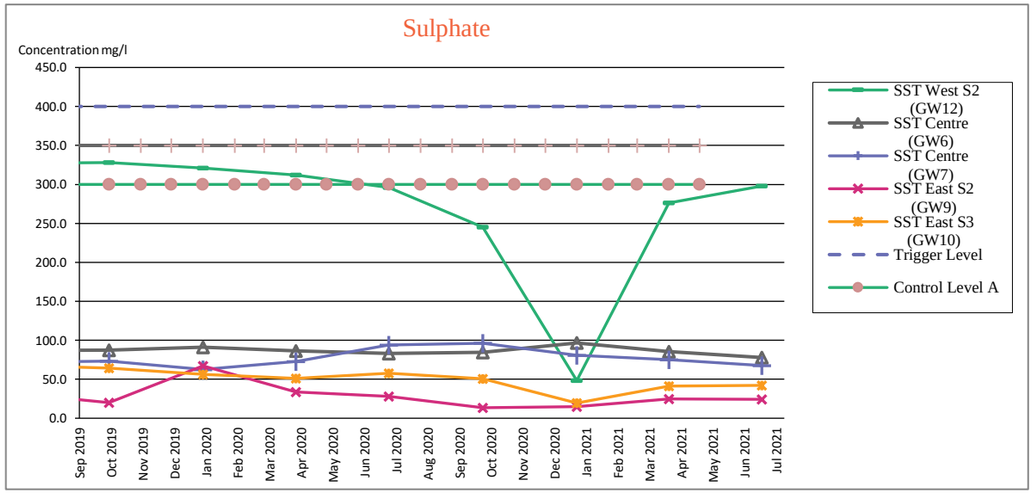








Compliance wells graphs

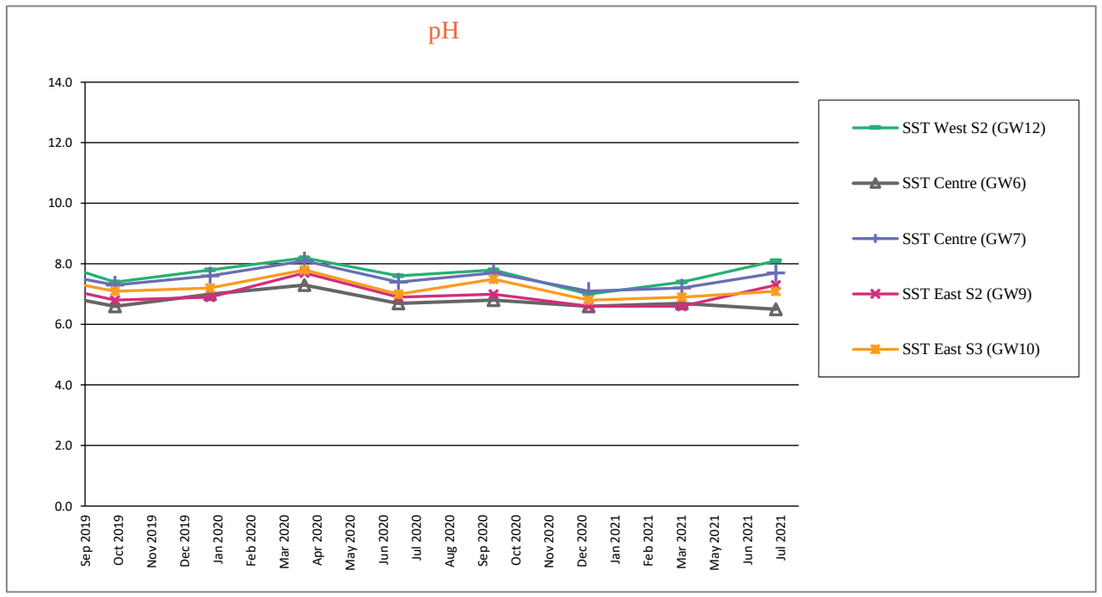
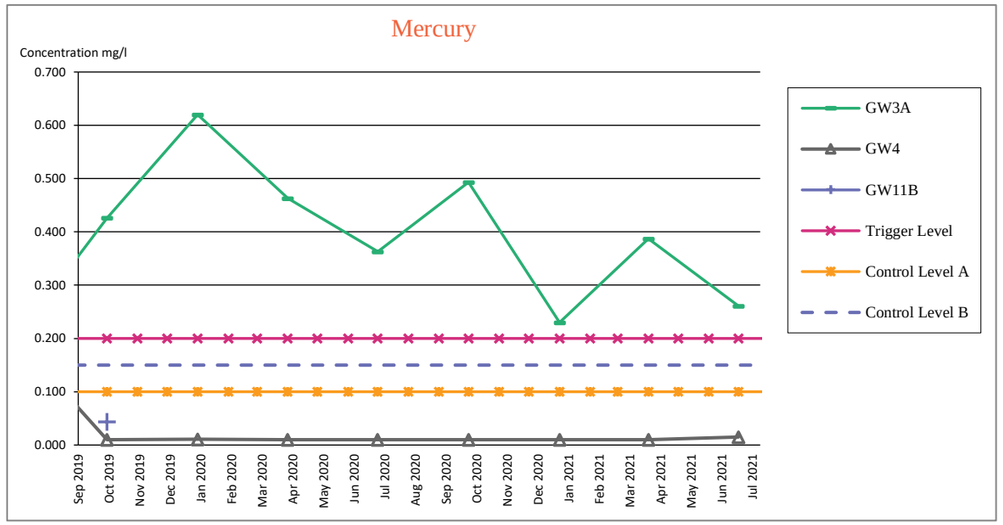
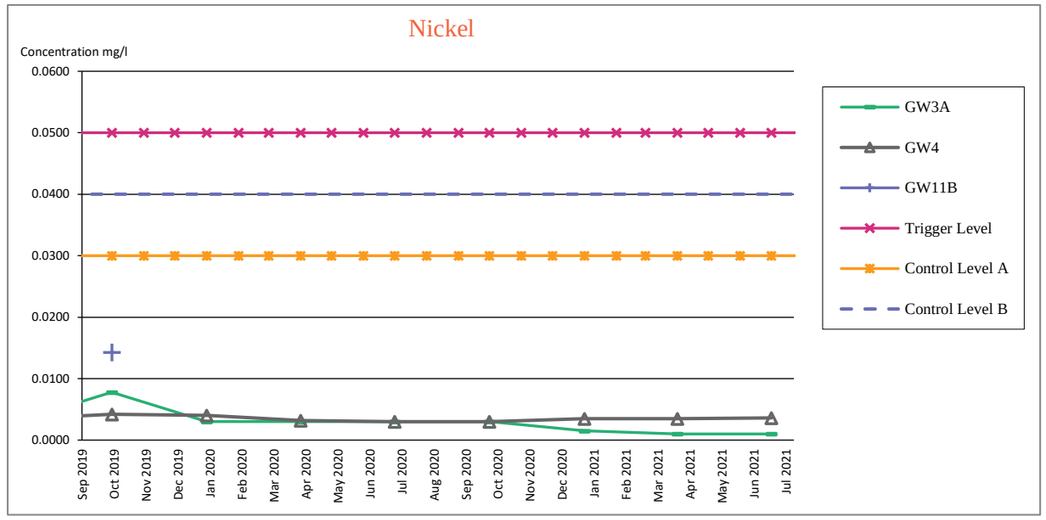
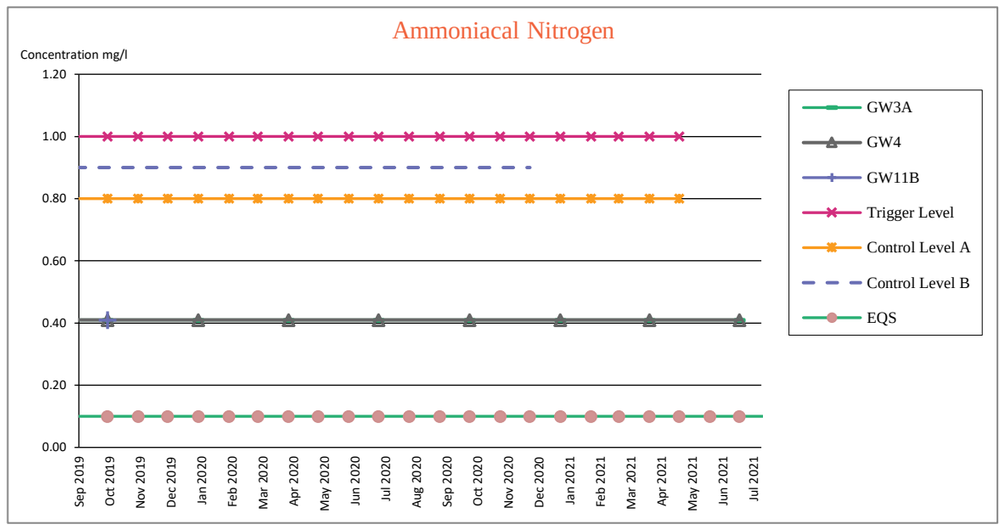


Figure A6
Groundwater quality monitoring results - Upstream wells graphs







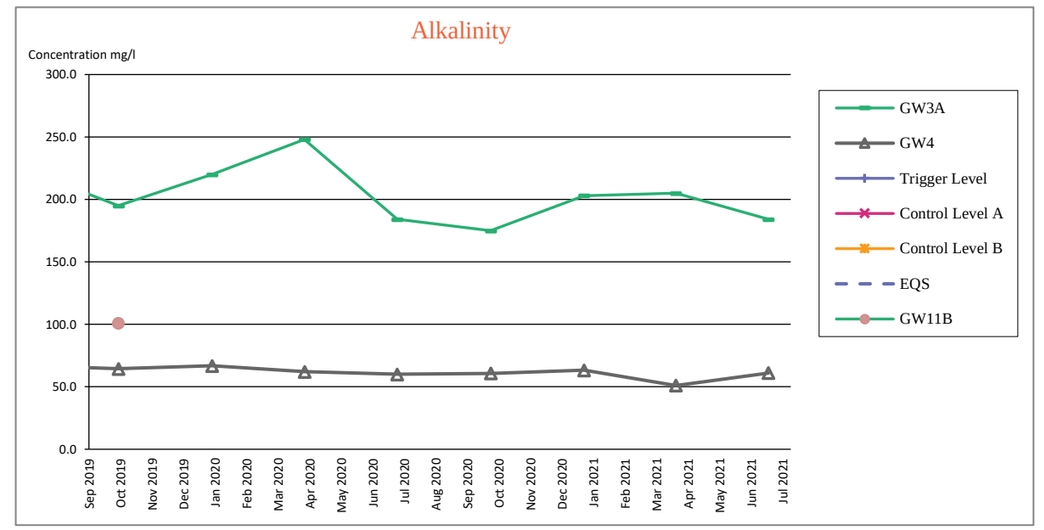
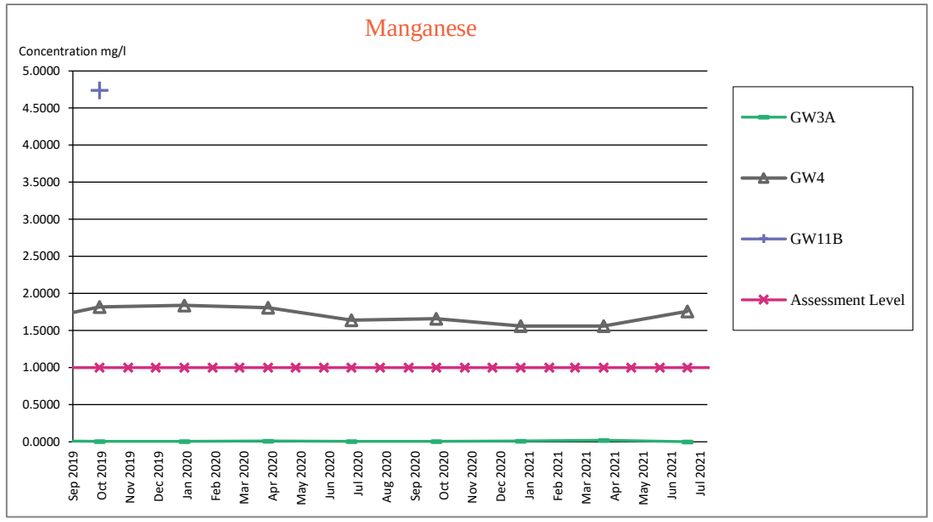
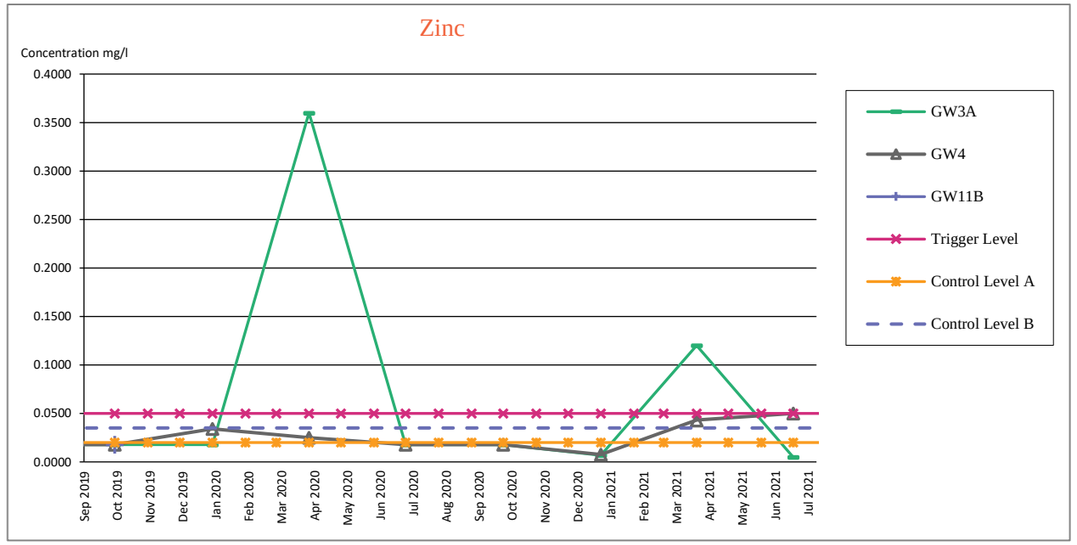
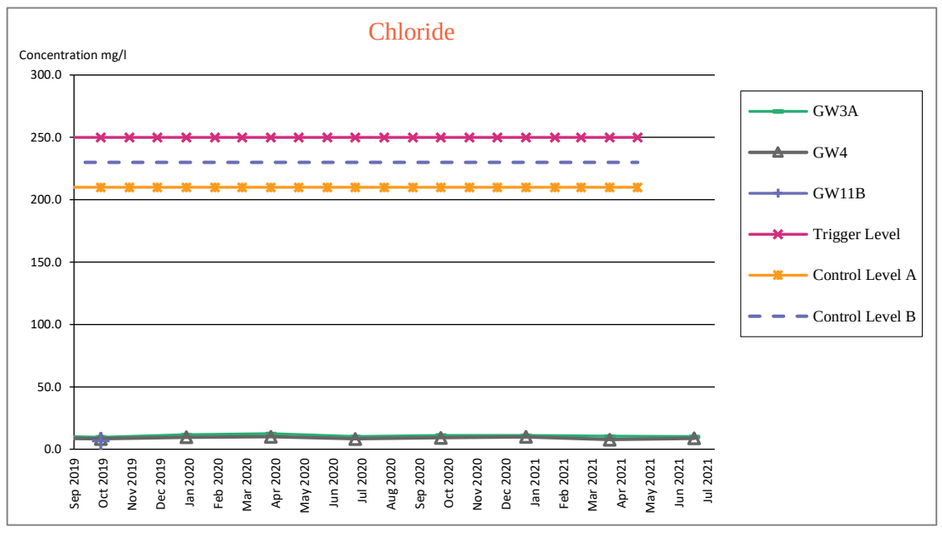


Figure A6
Groundwater quality monitoring results - Upstream wells graphs







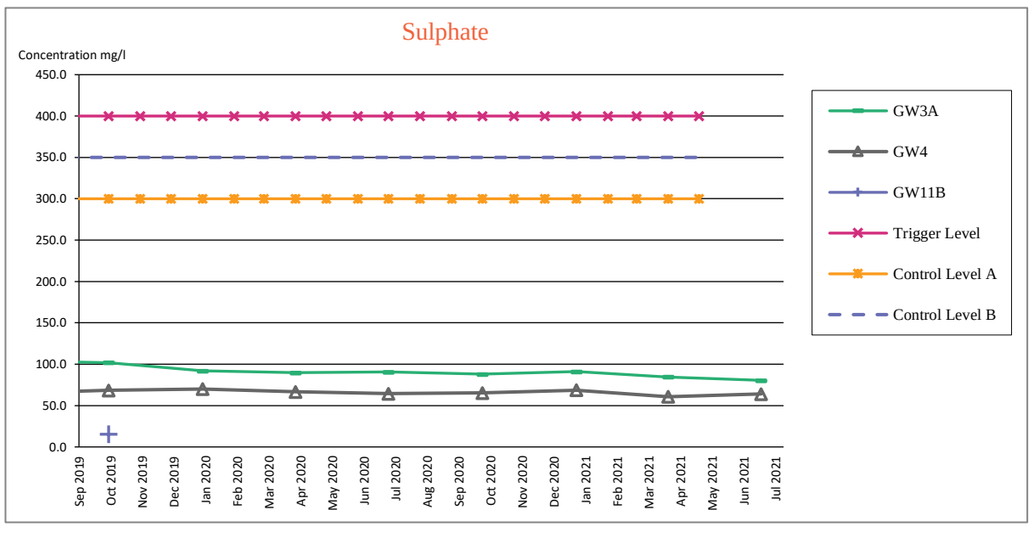


Figure A6
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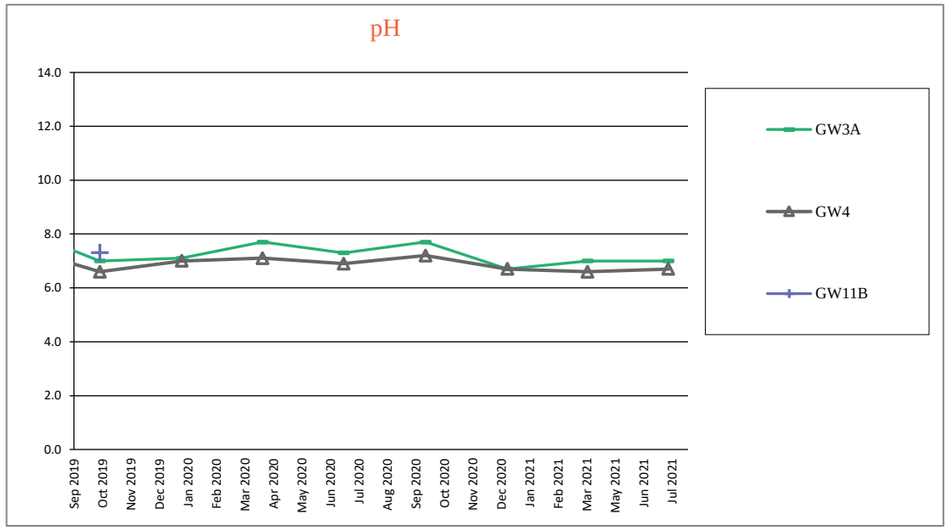
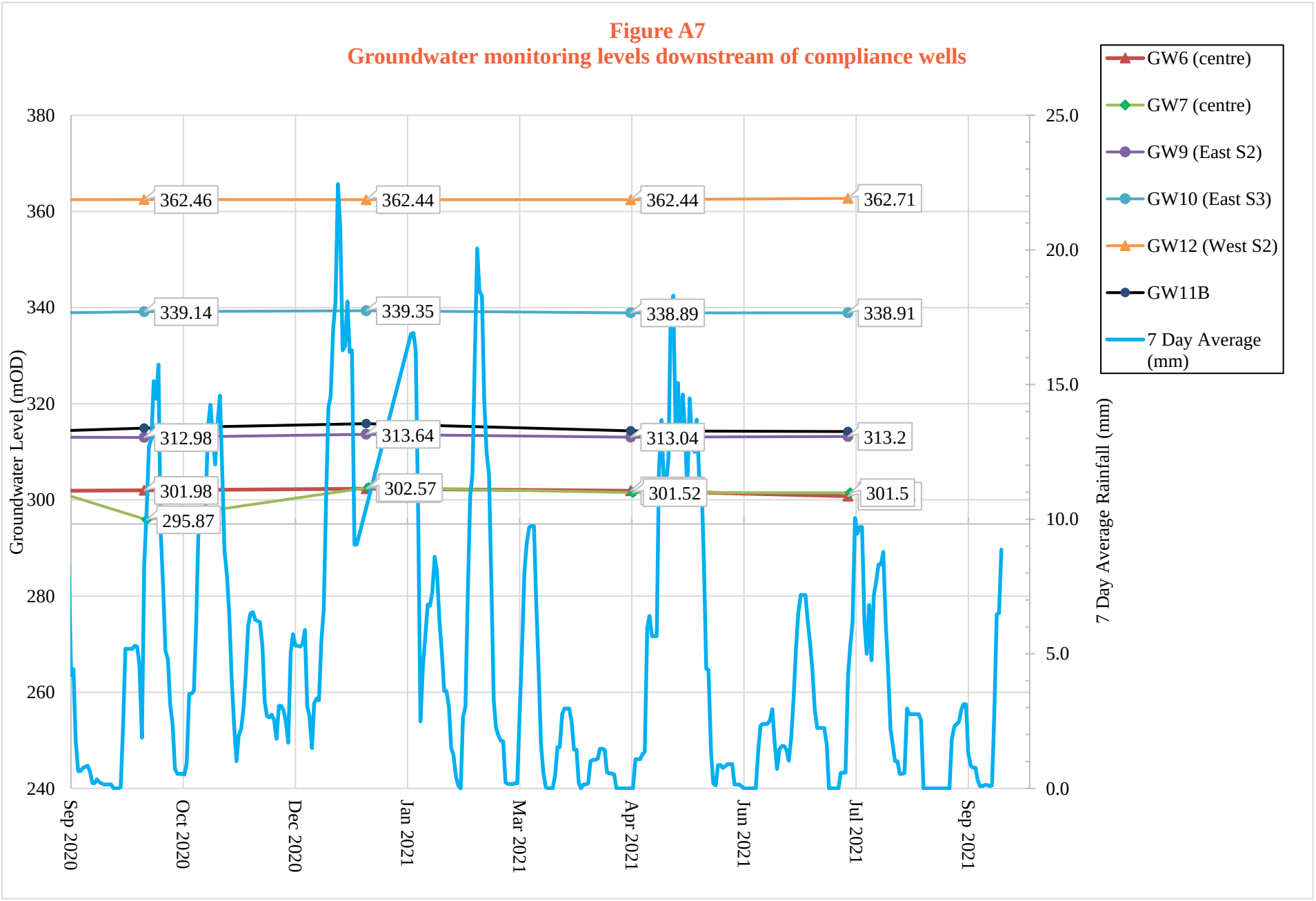


Figure A7
Groundwater monitoring levels downstream of compliance wells



Appendix B

Monitoring Results - Tables

Table B1
Leachate Monitoring Results

July 2021 LOCATION	Units	L1A	L1B	LC1A	LC2A	LC4A	LC5A	Maximum concentration (mg/l)	Average concentration (mg/l)	Acceptable Maximum Concentration (AMC) (mg/l)	LP3A	LP4
Date Sampled	-											
Manganese in filtrate as Mn	mg/l	N/S	0.101	N/S	0.115	0.79	N/S	0.79	0.34	--	0.0019	0.162
Mercury, filt trace as Hg	mg/l	N/S	0.000010	N/S	< 0.00001	< 0.00001	N/S	0.000015	0.00001	0.00056	0.000015	0.000011
Nickel in filtrate as Ni	mg/l	N/S	0.0084	N/S	0.094	0.0085	N/S	0.094	0.04	0.0681	0.0069	0.0064
Zinc, ultra-low filtered as Zn	mg/l	N/S	0.036	N/S	2.55	1.36	N/S	2.55	1.32	1.380	0.03	0.032
pH	pH Units	N/S	8.1	N/S	8.2	7.6	N/S	8.2	7.97	--	8.2	8
Conductivity- Electrical 20C	uS/cm	N/S	1800	N/S	11200	4130	N/S	11200	5710.00	--	1710	1840
Alkalinity as CaCO3	mg/l	N/S	474	N/S	5750	2350	N/S	5750	2858.00	--	484	749
Ammoniacal Nitrogen as N	mg/l	N/S	< 0.41	N/S	725	241	N/S	725	322.14	526	< 0.41	24.3
Chloride as Cl	mg/l	N/S	140	N/S	968	204	N/S	968	437.33	1408	142	136
Sulphate as SO4	mg/l	N/S	334	N/S	753	26.7	N/S	753	371.23	999	256	163
Redox Potential (see note 4)	mV	N/S	-369	N/S	-310	-303	N/S	-369	-327.33	--	-315	-319
Total Suspended Solids	mg/l	N/S	22	N/S	4490	1970	N/S	4490	2160.67	--	11	14
Solids, Total Dissolved 180 deg C	mg/l	N/S	1400	N/S	5380	1800	N/S	5380	2860.00	--	1260	1210
Dissolved Oxygen, Fixed	mg/l	N/S	4.9	N/S	< 0.5	< 0.5	N/S	6.2	1.97	--	6.2	3.6
TOC (filtered)	mg/l	N/S	14.8	N/S	268	54.8	N/S	268	112.53	--	15.4	17.8

Exceedance of AMC for well concentration
Exceedance of AMC for Average Concentration

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. NS denotes 'not sampled.

No monthly average leachate levels above Maximum Acceptable Concentration (MAC)

Table B2
Leachate Head Levels

		Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
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)	40.39			40.39			40.36					
	Leachate elevation (mAOD)	358.46			358.46			358.49					
	Calculated leachate head (m)	0.84			0.84			0.87					
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			35.73			35.63					
	Leachate elevation (mAOD)	365.58			365.39			365.49					
	Calculated leachate head (m)	3.09			2.90			3.00					
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)	26.84			26.82			26.83					
	Leachate elevation (mAOD)	374.30			374.32			374.31					
	Calculated leachate head (m)	2.03			2.05			2.04					
LC5A	Elevation of base of landfill mAOD	350.14			350.14			350.14					
	Elevation at top of casing mAOD	380.75			380.75			380.75					
	Depth to leachate from top of casing (m)	DAMAGED			DAMAGED			DAMAGED					
	Leachate elevation (mAOD)												
	Calculated leachate head (m)												
L1	Casing height (mAOD)	357.00			357.00			357.00					
	Leachate (mbgl)				21.06								
	Leachate (m AOD)	-			335.94								
	Base of landfill (m AOD)	336.80			336.80			336.80					
	Depth of well from top of casing (m)	21.03			21.06			21.07					
	Base of well (m AOD)	335.97			335.94			335.93					
	Calculated leachate head (m)				-0.86								
L1A*	Casing height (mAOD)	355.79			355.79			355.79					
	Leachate (mbgl)				20.90								
	Leachate (m AOD)				334.89								
	Base of landfill (m AOD)	316.64			316.64			316.64					
	Depth of well from top of casing (m)	20.91			20.91			20.91					
	Base of well (m AOD)	334.88			334.88			334.88					
	Calculated leachate head (m)				18.25								
L1B*	Casing height (mAOD)	354.80			354.80			354.80					
	Leachate (mbgl)	26.75			25.28			29.49					
	Leachate (m AOD)	328.05			329.52			325.31					
	Base of landfill (m AOD)	319.60			319.60			319.60					
	Depth of well from top of casing (m)	34.86			34.86			34.86					
	Base of well (m AOD)	319.94			319.94			319.94					
	Calculated leachate head (m)	8.45			9.92			5.71					

2021	Quarterly Leachate Head Averages (m)
January	1.99
February	
March	
April	1.93
May	
June	
July	1.97
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

1. LC1A top of casing is 1710mm above ground level.

2. LC2A top of casing is 820mm above GL.

3. LC4A top of casing is 1040mm above GL.

4. 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	ºC	mg/l	mg/l	mg/l	mg/l	mg/l	mV	mg/l	mg/l
	Freshwater EQS**			1	0.123	0.004	0.004	0.0137	0.0137				0.015**		250	400						
July	Upstream of Landfill	SWU	Six Monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SW2AI		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW4		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	NW Ditch System	SWW1	Six-monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW2		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	Downstream of Landfill	SWD	20/07/2021	0.015	0.000	< 0.001	0.000	0.037	0.009	8.1	383	< 0.410	0.013	14.100	11.0	100.0	5.0	9.2	2.6	-343.0	113.0	46.0
		SWD1	20/07/2021	< 0.010	0.003	0.001	0.001	< 0.007	< 0.002	8.1	384	< 0.410	0.014	15.600	5.0	101.0	3.0	8.7	2.6	-353.0	94.2	47.0
August	Upstream of Landfill	SWU	Six-monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SW2AI		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW4		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	NW Ditch System	SWW1	Six-monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW2		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	Downstream of Landfill	SWD	Quarterly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWD1		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
September	Upstream of Landfill	SWU	Six-monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SW2AI		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW4		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	NW Ditch System	SWW1	Six-monthly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWW2		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	Downstream of Landfill	SWD	Quarterly	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
		SWD1		N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
	Minimum			< 0.0100	< 0.0005	< 0.0010	< 0.0004	< 0.0070	< 0.0017	8.1000	383.0000	< <	0.0126	14.1000	5.0000	100.0000	3.0000	8.7000	2.6000	-353.0000	94.2000	46.0000
	Maximum			< 0.0150	< 0.0027	< 0.0014	< 0.0010	< 0.0370	< 0.0089	8.1000	384.0000	< <	0.0141	15.6000	11.0000	101.0000	5.0000	9.2000	2.6000	-343.0000	113.0000	47.0000

Exceedance of EQS
Upstream of Nant Merddog
Downstream of Nant Merddog

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)

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[a])**		**0.05**	**(0.05[f])**	--	--	--	**1**	--	--	**250**	**400**	--	--	--
	Control Level A				**(0.1[aa])**	--	**0.03**	**(0.02[aa])**	--	--	--	**0.8**	--	--	**210**	**300**	--	--	--
	Control Level B				**(0.15[aa])**	--	**0.04**	**(0.035[aa])**	--	--	--	**0.9**	--	--	**230**	**350**	--	--	--
	Assessment Level				--	**(1.0[f])**	--	--	--	--			--	--	--	--	--	--	--
UPSTREAM WELLS																			
SST East S3																			
GW3A	Jan-20	21/01/20	18977407	15	0.620	< 0.0070	< 0.0030	< 0.0180	7.1	496.0	220.0	< 0.41			11.6	92.0	72.5	9.1	1.4
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	157	0.463	0.0089	< 0.0030	0.3600	7.7	560.0	248.0	< 0.41	0.0048	13.2	12.5	89.6		8.0	1.6
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513248	119	0.36	< 0.0070	< 0.0030	< 0.0180	7.3	473.0	184.0	< 0.41	0.0020	13.5	10.2	90.6	68.6	11.2	1.8
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827617	-39	0.493	< 0.0070	< 0.003	< 0.0180	7.7	467.0	175	< 0.41	0.0050	13.2	11.2	87.9	62.0	10.2	0.9
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	21/01/21	20069616	108	0.230	0.0089	0.0015	0.0067	6.7	519.0	203.0	< 0.41	0.0005	13.1	11.1	91.2	79.0	8.7	2.1
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384851	-26	0.387	0.019	< 0.0010	0.1200	7.0	514.0	205.0	< 0.41	0.0010	13.4	10.4	84.6	N/S	7.1	1.5
	May-21		Quarterly																
	Jun-21																		
	Jul-21	20/07/21	20670057	-318	0.26	0.0014	< 0.0010	< 0.0050	7.0	481.0	184.0	< 0.41	0.0010	13.8	10.2	80.5	60.0	8.0	1.7
	Aug-21		Quarterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
GW4	Jan-20	21/01/20	18977408	9	0.011	1.8400	0.0040	0.0340	7.0	258.0	66.8	< 0.41			9.7	70.0	16.6	2.3	0.7
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	152	< 0.01	1.8100	0.0032	0.0251	7.1	261.0	62.0	< 0.41	0.0010	10.0	10.1	66.8		2.0	0.8
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513249	102	< 0.01	1.6400	< 0.0030	< 0.0180	6.9	255.0	60.0	< 0.41	0.0006	9.8	8.4	64.4	68.6	1.9	15.5
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827618	-36	< 0.01	1.6600	< 0.0030	< 0.0180	7.2	254.0	60.8	< 0.41	0.0010	9.5	9.2	65.2	16.3	2.0	< 0.7
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	20/01/21	20069616	103	< 0.01	1.5600	0.0035	0.0076	6.7	268.0	63.2	< 0.41	0.0004	9.1	10.0	68.7	19.0	10.2	8.7
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384852	-92	< 0.01	1.5600	0.0035	0.0430	6.6	243.0	51.0	< 0.41	0.0003	10.0	7.8	60.7	N/S	1.7	< 0.7
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670058	-361	0.02	1.7600	0.0036	< 0.0500	6.7	257.0	61.0	< 0.41	0.0005	12.3	8.8	64.0	18.0	1.3	< 0.7
	Aug-21		Quaterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
GW11B	Jan-20	Not sampled																	
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	Not sampled																	
	May-20		Quarterly																
	Jun-20																		
	Jul-20	Not sampled																	
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	Not sampled																	
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	Not sampled																	
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	Not sampled																	
	May-21		Quarterly																
	Jun-21																		
	Jul-21	Not sampled																	
	Aug-21		Quarterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
DOWNSTREAM WELLS / COMPLIANCE WELLS																			
SST West S2																			
GW12	Jan-20	21/01/20	18977414	40	0.098	0.0102	0.0076	< 0.0180	7.8	1660.0	431.0	< 0.41			95.0	321.0	151.0	4.0	11.8
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	183	0.11	0.0130	0.0062	0.0659	8.2	1660.0	433.0	< 0.41	0.0254	20.8	101.0	312.0		4.8	9.3
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20		133	0.14	< 0.0070	0.0001	< 0.0180	7.6	1360.0	414.0	< 0.41	0.0059	19.1	50.6	296.0	129.0	6.2	6.0
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827623	-20	0.06	< 0.0070	0.0137	< 0.0180	7.8	1340.0	359.0	< 0.41	0.0100	19.8	70.9	245	122	6.6	7.7
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	20/01/21	20069623	137	0.019	0.0081	0.0013	< 0.0050	7.0	454.0	184.0	< 0.41	0.0016	20.1	15.0	48.3	55.0	8.8	2.4
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384858	-173	0.15	0.0015	0.0051	0.1700	7.4	1530.0	420.0	< 0.41	0.0038	19.3	93.8	276.0	N/S	6.0	10.9
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670064	-271	0.06	0.0009	0.0050	< 0.0050	8.1	1620.0	444.0	< 0.41	0.0190	19.8	97.8	298.0	146.0	5.7	9.2
	Aug-21		Quaterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		

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[a])**		**0.05**	**(0.05[f])**	--	--	--	**1**	--	--	**250**	**400**	--	--	--
	Control Level A				**(0.1[ee])**	--	**0.03**	**(0.02[ee])**	--	--	--	**0.8**	--	--	**210**	**300**	--	--	--
	Control Level B				**(0.15[ee])**	--	**0.04**	**(0.035[ee])**	--	--	--	**0.9**	--	--	**230**	**350**	--	--	--
	Assessment Level				--	**(1.0[f])**	--	--	--	--			--	--	--	--	--	--	--
SST Centre																			
GW6	Jan-20	21/01/20	18977409	30	0.064	0.4630	0.0150	< 0.0180	7.0	854.0	354.0	< 0.41			71.3	91.2	61.0	3.5	7.1
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	170	0.06	0.7120	0.0254	< 0.0180	7.3	869.0	311.0	< 0.41	0.0018	12.0	73.7	86.6		3.5	4.2
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513250	116	0.06	0.8270	0.0124	< 0.0180	6.7	786.0	288.0	< 0.41	0.0005	12.4	69.7	83.3	54.9	3.1	3.9
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827619	-26	0.04	0.6860	0.0088	< 0.0180	6.8	838.0	285.0	< 0.41	0.0010	12.2	76	84.8	48.3	2.4	4.1
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	20/01/21	20069618	137	0.036	0.4410	0.0098	< 0.0050	6.6	901.0	303.0	< 0.41	0.0004	12.0	82.2	96.6	54.0	4.1	4.8
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384853	-94	0.05	0.3740	0.0140	0.0520	6.7	935.0	341.0	< 0.41	0.0004	11.8	77.9	85.5	N/S	3.2	4.7
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670059	-318	0.05	0.1480	0.0079	< 0.0050	6.5	879.0	301.0	< 0.41	0.0003	12.8	80.4	77.9	57.0	2.5	5.1
	Aug-21		Quaterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
GW7	Jan-20	21/01/20	18977410	44	< 0.01	1.2800	0.0065	< 0.0180	7.6	900.0	323.0	< 0.41			59.2	62.6	84.7	4.3	6.4
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	175	< 0.01	1.2700	0.0056	< 0.0180	8.1	888.0	318.0	< 0.41	0.0104	11.4	56.7	72.6		4.9	6.2
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513251	124	< 0.01	2.0500	0.0060	< 0.0180	7.4	968.0	322.0	< 0.41	0.0021	11.6	65.7	94.2	88.3	3.7	6.5
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827620	-26	< 0.01	1.6900	0.0050	< 0.0180	7.7	927.0	326.0	< 0.41	0.0040	12.0	53.4	96.2	83.8	3.5	5.0
	Nov-20		Quarterly																
	Dec-20																		
GW9	Jan-21	20/01/21	20069619	111	< 0.010	0.0071	0.0052	0.0120	7.1	837.0	312.0	< 0.41	0.0011	11.8	46.9	80.6	85.0	4.1	5.3
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384854	-168	< 0.010	0.9050	0.0051	0.0097	7.2	736.0	263.0	< 0.41	0.0014	11.7	38.3	75.1	N/S	4.5	4.7
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670060	-321	< 0.10	1.0500	0.0031	< 0.0500	7.7	679.0	286.0	< 0.41	0.0048	13.2	32.7	67.5	84.0	3.5	5,2
	Aug-21		Quaterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
SST East S2																			
	Jan-20	21/01/20	18977411	33	0.01	0.8880	0.0051	< 0.0180	6.9	555.0	218.0	4.75			40.7	67.2	35.5	1.8	4.9
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	186	0.08	1.6800	0.0114	0.0304	7.7	1570.0	495.0	24.90	0.2604	11.7	179.0	33.7		4.4	14.0
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513252	115	0.00	0.4630	< 0.0030	< 0.0180	6.9	368.0	74.6	1.20	0.0021	12.3	24.8	28.2	21.3	2.3	2.3
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827621	-29	0.02	0.3120	< 0.0030	< 0.0180	7.0	249.0	70.6	1.05	0.0020	12.0	13.8	13.5	15.3	2.0	2.4
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	20/01/21	20069620	110	0.015	0.2920	0.0028	0.0050	6.6	376.0	129.0	5.85	0.0049	11.7	28.5	15.1	21.0	2.9	3.7
	Feb-21		Quarterly																
	Mar-21																		
	Apr-21	27/04/21	20384855	-170	0.10	0.6490	0.0046	0.0330	6.6	664.0	185.0	6.35	0.0054	11.8	49.9	24.9	N/S	2.5	5.6
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670061	-285	0.01	0.0347	0.0019	0.0087	7.3	926.0	317.0	7.90	0.0402	14.3	41.4	24.1	71.0	3.4	8.0
	Aug-21		Quaterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		
SST East S3																			
GW10	Jan-20	21/01/20	18977412	30	0.09	6.4600	0.0139	< 0.0180	7.2	584.0	245.0	< 0.41			22.6	56.5	66.1	< 0.5	10.4
	Feb-20		Quarterly																
	Mar-20																		
	Apr-20	21/04/20	1860909	164	0.06	0.0900	0.0058	0.0705	7.8	688.0	276.0	< 0.41	0.0047	9.9	29.2	51.1		6.7	6.9
	May-20		Quarterly																
	Jun-20																		
	Jul-20	21/07/20	19513253	114	0.00	0.5150	0.0050	< 0.0180	7.0	520.0	200.0	< 0.41	0.0008	10.0	17.9	57.9	63.5	5.1	4.7
	Aug-20		Quarterly																
	Sep-20																		
	Oct-20	29/10/20	19827622	-27	0.04	6.7900	0.0103	< 0.0180	7.5	500.0	218.0	< 0.41	0.0030	11.4	10.9	50.6	68.1	1.6	5.7
	Nov-20		Quarterly																
	Dec-20																		
	Jan-21	20/01/21	20069621	104	0.07	0.2140	0.0027	< 0.0050	6.8	254.0	124.0	< 0.41	0.0006	13.1	5.5	19.5	45.0	9.2	2.3
	Feb-21																		
	Mar-21																		
	Apr-21	27/04/21	20384856	-251	0.07	1.6800	0.0091	0.085	6.9	639.0	240.0	< 0.41	0.0006	10.1	27.1	41.1	N/S	2.9	7.0
	May-21		Quarterly																
	Jun-21																		
	Jul-21	27/07/21	20670062	-310	0.07	1.3500	0.0097	< 0.0050	7.1	480.0	191.0	< 0.41	0.0012	13.4	17.5	42.3	61.0	5.4	5.3
	Aug-21		Quarterly																
	Sep-21																		
	Oct-21																		
	Nov-21																		
	Dec-21																		

Notes
* The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis{*/}

Table B5
Landfill Gas Monitoring Results

METHANE (% by Volume)

Location	Valve	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Date monitored								08/07/21	04/08/21	02/09/21			
	Red Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Yellow Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	White Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1
	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
GMW2	Trigger Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Red Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Yellow Valve	0	0	0	0	0	0.1	0.1	0.1	0.6			
	White Valve	0	0	0	0.1	0	0.1	0.1	0.1	0.1			
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1
	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
GMW3	Trigger Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Red Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Yellow Valve	0	0	0	0	0	0	0	0.1	0.1			
	White Valve	0	0	0	0	0	0	0	0.1	0.1			
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1
	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
GMW4	Trigger Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Red Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Yellow Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	White Valve	0	0	0	0	0	0.1	0.1	0.1	0.1			
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1
	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
GMW5	Trigger Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Red Valve	0	0	0	0	0	0	0	0	0.1			
	Yellow Valve	0	0	0	0	0	0	0	0	0.1			
	White Valve	0	0	0	0	0	0	0	0.1	0.1			
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1
	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
GMW6	Trigger Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Trigger Level White	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Red	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level Yellow	-	-	-	-	-	-	-	-	-	-	-	-
	Control Level White	-	-	-	-	-	-	-	-	-	-	-	-

CARBON DIOXIDE (% by Volume)

Location	Valve	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Comments
Date monitored								08/07/21	04/08/21	02/09/21				
	Red Valve	0.1	0.3	0.4	0.6	1.2	1.3	1.3	1.5	1.3				Red Valve, 25.5m depth
	Yellow Valve	0	0	0.1	0.1	0.6	0.1	0.1	0.8	0.5				Yellow Valve,14m depth
	White Valve	0.6	0	0.1	0	0	0	0	0	3				White Valve, 4m depth
	Trigger Levels	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Levels	-	-	-	-	-	-	-	-	-	-	-	-	
GMW2	Trigger Level Red	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 Yellow	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
	Trigger Level White	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
	Control Level Red	1	1	1	1	1	1	1	1	1	1	1	1	
	Control Level Yellow	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
	Control Level White	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	
	Red Valve	0.5	0.4	4.6	0.7	1.5	0.4	0.4	0.6	1.1				Red Valve, 19m depth
	Yellow Valve	0.0	0.0	0.0	0	2.6	1.6	1.6	2.8	6.8				Yellow Valve,9m depth
	White Valve	2.2	3.8	0.1	15.5	0.4	1.5	1.5	11.2	1				White Valve, 3.5m depth
	Trigger Levels	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Levels	-	-	-	-	-	-	-	-	-	-	-	-	
GMW3	Trigger Level Red	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	
	Trigger Level Yellow	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	
	Trigger Level White	24.02	24.02	24.02	24.02	24.02	24.02	24.02	24.02	24.02	24.02	24.02	24.02	
	Control Level Red	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	
	Control Level Yellow	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	
	Control Level White	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	
	Red Valve	0.1	0.1	0.3	0.2	0.9	0.5	0.5	1.1	0.2				Red Valve, 30m depth
	Yellow Valve	0	0	0	0	0.1	0.4	0.4	1	0.1				Yellow Valve,20m depth
	White Valve	0	0	0	0	0.2	0.4	0.4	1	0.1				White Valve, 5m depth
	Trigger Levels	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Levels	-	-	-	-	-	-	-	-	-	-	-	-	
GMW4	Trigger Level Red	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 Yellow	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
	Trigger Level White	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
	Control Level Red	1	1	1	1	1	1	1	1	1	1	1	1	
	Control Level Yellow	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
	Control Level White	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	
	Red Valve	5.4	5.2	5.3	5.2	5.4	5.6	5.6	5.9	6.1				Red Valve, 26.3m depth
	Yellow Valve	2.3	2.3	2.5	2.7	2.8	2.9	2.9	3.1	3.5				Yellow Valve,15m depth
	White Valve	3.4	3.2	3.8	2.9	3	2.9	2.9	3.1	3.6				White Valve, 5m depth
	Trigger Levels	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Levels	-	-	-	-	-	-	-	-	-	-	-	-	
GMW5	Trigger Level Red	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	8.48	
	Trigger Level Yellow	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
	Trigger Level White	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
	Control Level Red	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	
	Control Level Yellow	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	
	Control Level White	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
	Red Valve	3.3	3.1	3.2	3.1	3.7	4.7	4.7	5.5	5.7				Red Valve, 26.3m depth
	Yellow Valve	3.3	2.2	2.5	2.2	3.1	1.5	1.5	1.7	1.9				Yellow Valve,15m depth
	White Valve	1.6	1.7	1.8	1.5	1.3	1.1	1.1	1.6	1.7				White Valve, 5m depth
	Trigger Levels	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Levels	-	-	-	-	-	-	-	-	-	-	-	-	
GMW6	Trigger Level Red	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
	Trigger Level Yellow	5	5	5	5	5	5	5	5	5	5	5	5	
	Trigger Level White	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	
	Control Level Red	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
	Control Level Yellow	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
	Control Level White	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26	

Table B5
Landfill Gas Monitoring Results

Location	Valve	METHANE (% by Volume)												CARBON DIOXIDE (% by Volume)												Comments
		Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	
GMW7	Yellow Valve	0	0	0	0	0	0	0	0	0.1				0.2	0.2	0.6	0.8	0.6	0.6	0.6	0.9	0.6				Yellow Valve,12 depth
	White Valve	0	0	0	0	0	0	0	0	0.1				0.2	0.2	0.6	0.8	0.6	0.6	0.6	0.9	0				White Valve, 5m depth
	Trigger Levels	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	
	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	-	-	-	-	-	-	-	-	-	-	-	-	
	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 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	
	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 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	
GMW12	Red Valve	0	0	0	0	0	0	0	0.1	0.1				0.4	0.4	2.3	0.7	0.9	0	0	0	0.1				Red Valve, 26.3m depth
	Yellow Valve	0	0	0	0	0	0	0	0.1	0.1				2.8	2.7	2.8	1.2	2.1	2.4	2.4	2.6	2.9				Yellow Valve,15m depth
	White Valve	0	0	0	0	0	0	0.1	0.1	0.1				0.4	0.9	1	0.8	1.1	0.8	0.8	0.9	1				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	
	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 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	
	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	
	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	
	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	
GMW13	Red Valve	0	0	0	0	0	0.1	nt	0.1	0.1				1.4	1.5	1.1	1.3	0.9	5.6	nt	1.3	1.5				Red Valve, 26.3m depth
	Yellow Valve	0.1	0.1	0.1	0	0.1	0	0.1	0.2	0.2				4.2	4.9	4.8	5.1	5	2.5	5.6	5.3	5				Yellow Valve,15m depth
	White Valve	0	0	0	0	0	0	0	0.1	0.1				2.1	2.4	0	2.4	2.5	1.4	2.5	2.1	3.4				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 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 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	
	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 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 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	
GMW14/14A	Red Valve	0	0	0	0	0	0	0	0	0.1				1.7	3.4	3.7	0.6	0.3	0.5	1.4	0.8	1.1				Red Valve, 26.3m depth
	Yellow Valve	0	0	0	0	0	0.1	0.1	0	0.1				6	6.5	6.3	4.5	3.7	3.6	3.6	7	6.9				Yellow Valve,15m depth
	White Valve	0	0	0	0	0	0	0	0	0.1				5.1	5.5	5.3	1.9	3.9	2.2	2.2	3.4	4.3				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 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 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	
	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 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 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	
GMW1**	Red Valve	0	0.3	0.4	0.7	0	3	3	2.1	4.3				2.1	6	2.8	1.8	0	4.1	4.1	4.2	6.3				Red Valve, 23.5m depth
	Yellow Valve	2.6	0	0	23.3	6.8	16.1	16.1	16.5	15.2				1.2	0.1	0	1.6	7.3	8.8	8.8	10.1	10.7				Yellow Valve,14.7m depth
	White Valve	0	1.2	0.8	0	0	0.1	0.1	0.1	nt				0	0.9	0.6	0	0	0	0	0	nt				White Valve, 6.5m depth
GMW8*	Yellow Valve	8.6	9.4	8.9	7.3	4.1	4.7	4.7	4	4				8.3	7.6	7.7	7.8	4.7	5.1	5.1	5.1	4.6				Yellow Valve,17.5m depth
	White Valve	0	0	0	0	0	0.1	0.1	0	0.1				4	3.7	3.9	3.8	3.8	3.4	3.4	3.4	4.2				White Valve, 5.7m depth
GMW9*	Red Valve	0	0	0	0	0	0.1	0.1	0.1	0.1				1.9	1.8	1.9	1.9	1.6	1.7	1.7	1.7	1.9				Red Valve, 27m depth
	Yellow Valve	25.3	27.7	27.6	23.7	22.7	20.4	20.4	18.5	19				8.6	8.7	9.1	9.3	8.3	9.7	9.7	10.5	11.5				Yellow Valve,15m depth
	White Valve	0.1	0.1	0	0	0	0.1	0.1	0.1	0.1				0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2				White Valve, 8.5m depth
GMW10*	Red Valve	14.8	15	0.1	25.3	18.6	19.2	19.2	19.8	20.9				4.3	3.7	7.8	6.9	6.7	8.1	8.1	8.8	7.6				Red Valve, 19.5m depth
	Yellow Valve	15.6	18	0	41.4	19.7	13.2	13.2	34.2	18.8				2.6	2.3	0.1	6.7	3.2	2.7	2.7	7.3	4				Yellow Valve,15m depth
	White Valve	16.5	14.5	12.1	5.5	3.2	3	3	3.9	5.7				6.5	7.2	8.3	8.4	8.3	8.4	8.4	8.4	8.4				White Valve, 8m depth
GMW17**	Red Valve	0	0	0	0	0	0	0	0	0.1				1.4	1.5	1.3	1.3	1.1	1.2	1.2	1.3	1.3				Red Valve, 26.3m depth
	Yellow Valve	0	0	0	0	0	0	0	0	0.1				5.1	5.1	4.8	4.9	4.3	4.1	4.1	4	4.6				Yellow Valve,15m depth
	White Valve	0	0	0	0	0	0	0	0	0.1				2.5	4	3.1	5.1	4.5	4.1	4.1	3.7	1.9				White Valve, 5m depth
GMW18**	Yellow Valve	0	0	0.9	0	0	0	0	0	0.1				0	1.5	1.4	0	0.1	1.6	1.6	2.1	2.3				Yellow Valve,12 depth
	White Valve	0	0	0	0	0	0	0	0	0.1				5.1	4.9	5.4	5.2	4.8	4.9	4.9	3.8	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]).

Exceedance of Trigger
Exceedance of Control