

Silent Valley Waste Services
Limited

Silent Valley Landfill

2020 Third Quarter Monitoring
Report

Issue | 30 October 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 115825-00

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Document Verification

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Contents

	Page
1 Introduction	2
1.1 Monitoring Regime	2
2 Discussion of Monitoring Results	3
2.1 Rainfall	3
2.2 Leachate	3
2.3 Surface Water Quality	3
2.4 Groundwater	4
2.5 Landfill Gas	5
3 Conclusion	7

References

Appendices

Appendix A

Monitoring Results - Graphs

Appendix B

Monitoring Results - Tables

1 Introduction

This 2020 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 Sept 2020 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 makes reference to the 2019 Annual Monitoring Report [2] and the 2020 Second Quarter Monitoring Report [3].

1.1 Monitoring Regime

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

2 Discussion of Monitoring Results

2.1 Rainfall

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

Based on the available data, August recorded the highest monthly rainfall of the quarter and the highest daily rainfall total. These values are similar to those recorded during the same time period in previous years.

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 determinands are compliant.

Well LC5A has continued to record a high ammoniacal nitrogen concentration and will be reviewed in the context of the recent investigations into LC5A, and will be reported in the Annual Report for this year.

Well LC2A also recorded an elevated concentration. However, the average ammoniacal nitrogen concentration had declined throughout the past twelve months, although historically has been shown to fluctuate.

Wells LC2A and LC4A specifically exceeded the AMC for zinc which is an elevation since last quarter.

In accordance with the Aftercare Phase Environmental and Infrastructure Monitoring Program report (Ref. [4]), the contingency plan is to be implemented after three consecutive exceedances have been recorded. One of the options for implementing corrective measures to well LC5A was to de-silt or pump the well, however the requirement for this will be reviewed on completion of the forthcoming pumping tests proposed on LC5A.

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 (Ref [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 will be monitored in the fourth quarter.

2.3.2 Downstream Surface Water

SWD and SWD1

Results show these locations are both 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 graphical 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, albeit less than the previous quarter. Mercury concentrations in GW3A have been continually recorded above the trigger level since April 2018, although the trigger level is applied to the downstream groundwater. Based on previous results these are temporary fluctuations associated with the environment outside of the influence of the landfill.

Manganese has continually been recorded above the assessment level in GW4 with continued fluctuations throughout the years showing no recognisable trend. The elevated concentrations recorded upstream likely to be from steel works waste deposited to the north of the landfill and old mine workings in the area.

Manganese is a typical contaminant of mine drainage, which is considered to be impacting the groundwater in the locale of the landfill.

2.4.1.2 Downstream Groundwater wells

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.

Well GW10

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

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 is significantly lower than last quarter.

Well GW12

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

Mercury has been recorded slightly above the level of detection and should be closely monitored during 2020.

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 above the assessment level but a decrease from the last quarter indicates a downward trend. 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 consistent this quarter.

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.

Carbon Dioxide

Carbon dioxide concentrations were recorded below the respective Control and Trigger Levels, where available, in the majority of monitoring locations with the exception of GMW2, GMW4, GMW6, GMW12, GMW13 and GMW14/14A.

Carbon dioxide levels have been recorded above the Control and/or Trigger Levels in the following wells (valves);

Control Level

- GMW2 (red) in September only
- GMW4 (red) in July and August
- GMW12 (yellow) in July only
- GMW13 (yellow) in August only
- GMW14/14A (red) in July only

Trigger Level

- GMW2 (red) in July and August
- GMW6 (red) every month
- GMW12 (yellow) in August and September
- GMW14/14A (red) in August and September

As stated by Golder Associates (Ref. [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.

With regards to GMW2 the gas concentration was elevated at the start of the quarter and is again nearing the Trigger and Control levels.

After an elevation at the start of the quarter, GMW4 concentrations were recorded below the Trigger and Control levels in September. GMW13 concentrations were only recorded higher than the Control level in August.

In GMW14/14A consecutive exceedances have been recorded in 2020. However, the gas concentrations are reducing and nearing the Trigger and Control levels. The concentration dropped below the Trigger level in July.

These wells should be reviewed following receipt of next quarter's readings.

GMW6 has recorded elevated concentrations each month this quarter. GMW12 shows an increasing trend in concentrations above the Trigger and Control level.

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.

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 Second Quarter Monitoring Report, 30th July 2020.
- [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 (Oct 2013 - Sep 2020)

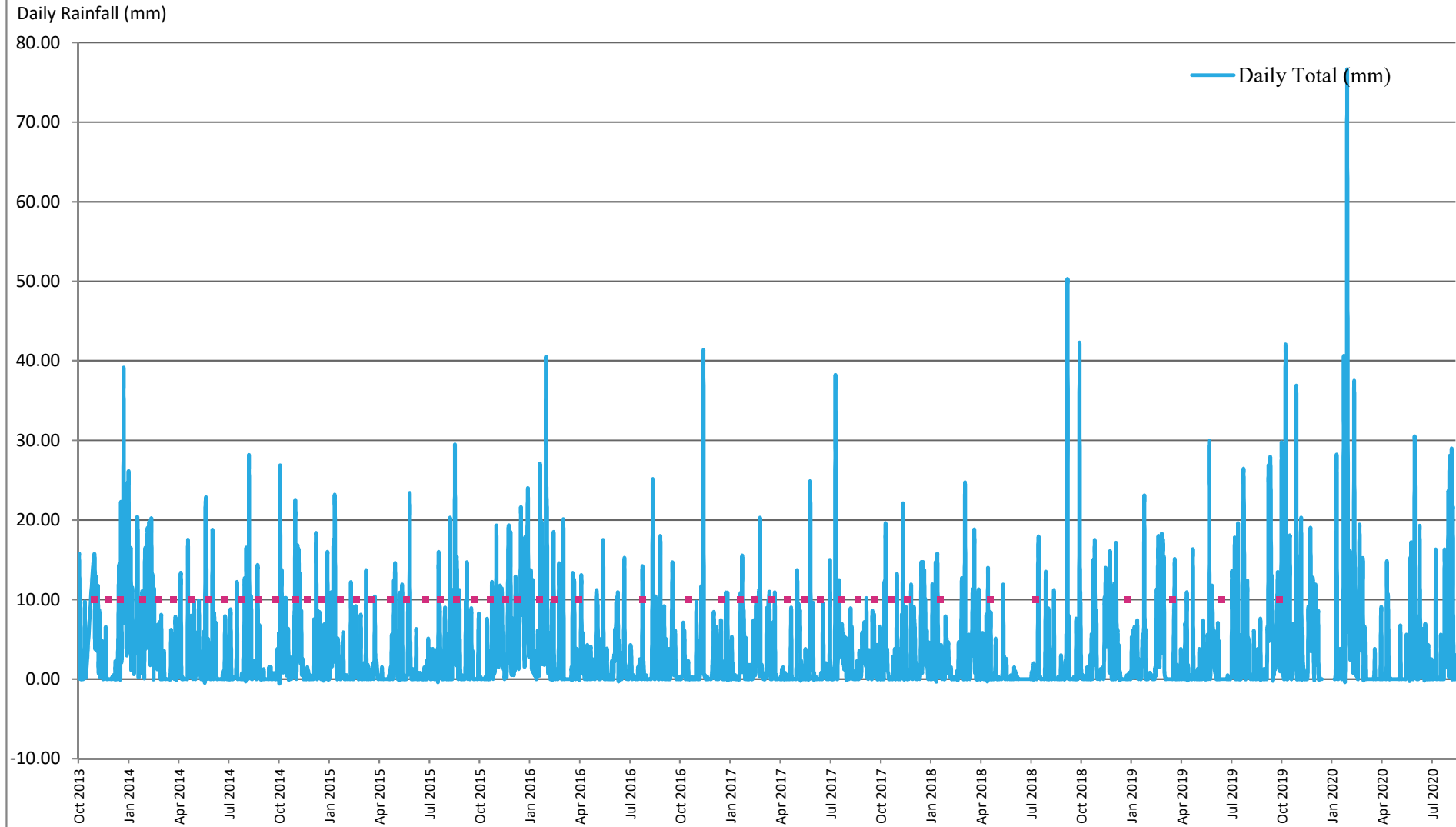


Figure A2
Monthly rainfall totals (Oct 2013 - Sept 2020)

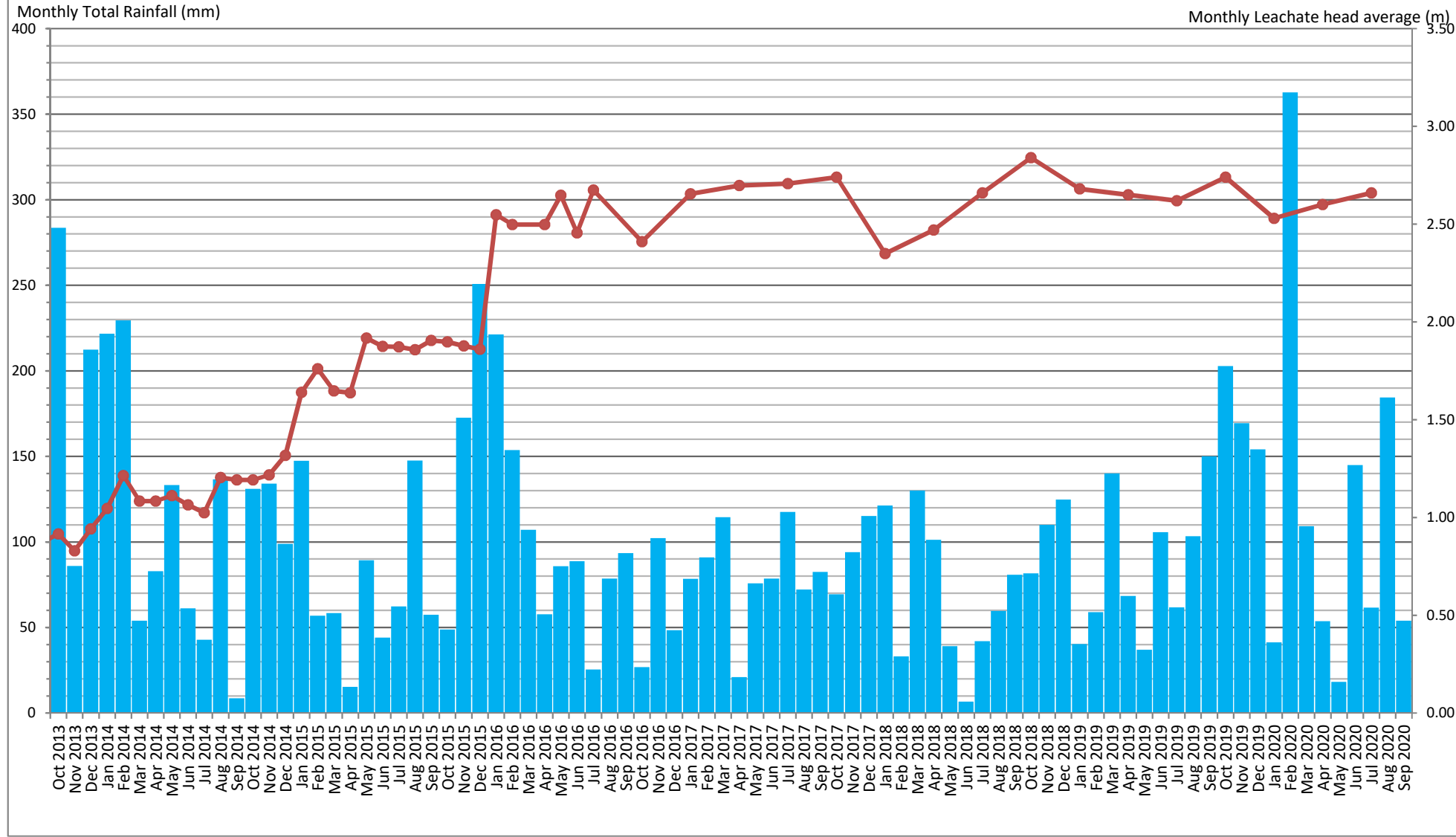


Figure A3
Monthly total rainfall (Oct 2013 - Sept 2020)

Monthly Total Rainfall (mm)

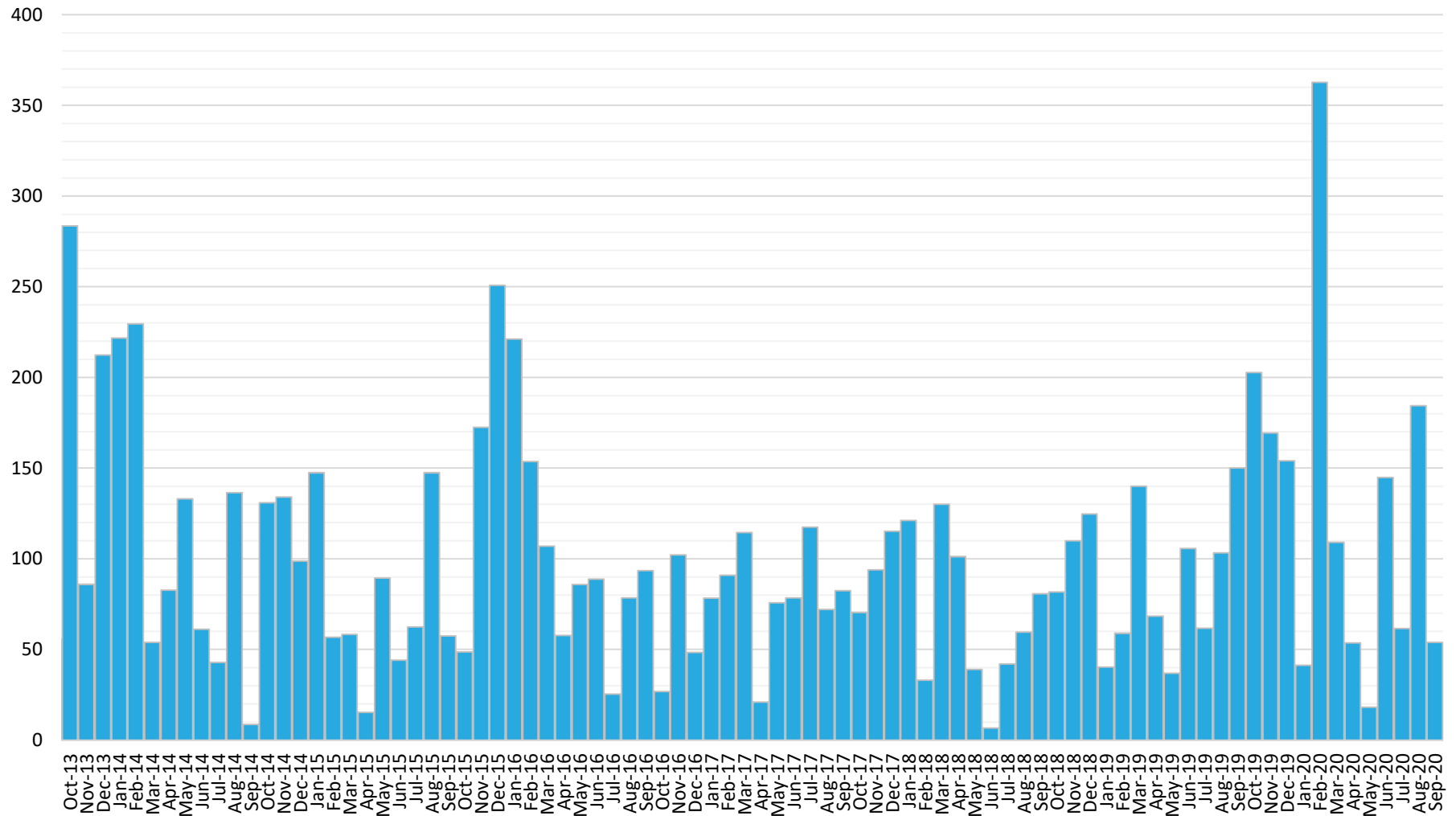


Figure A4
Surface water monitoring graphs

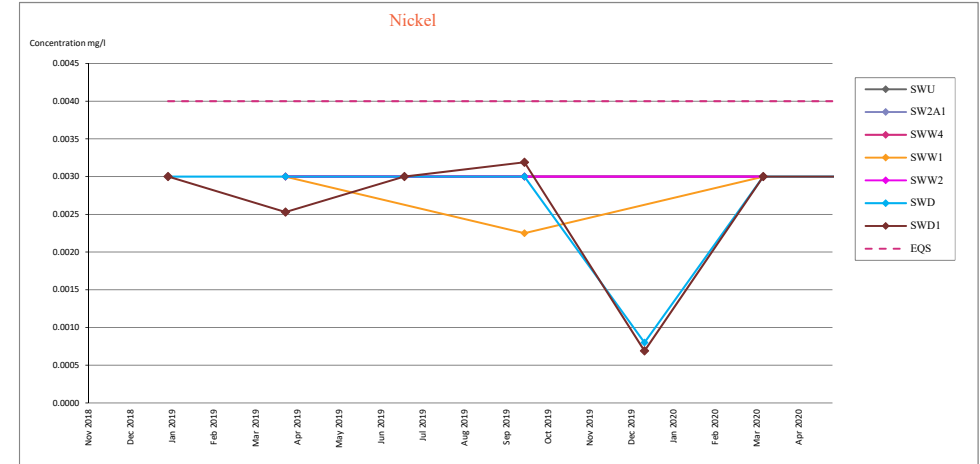
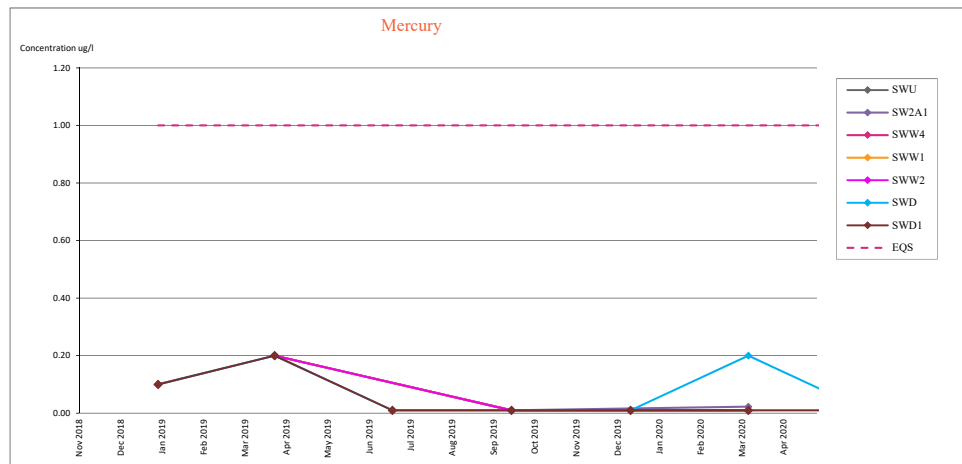
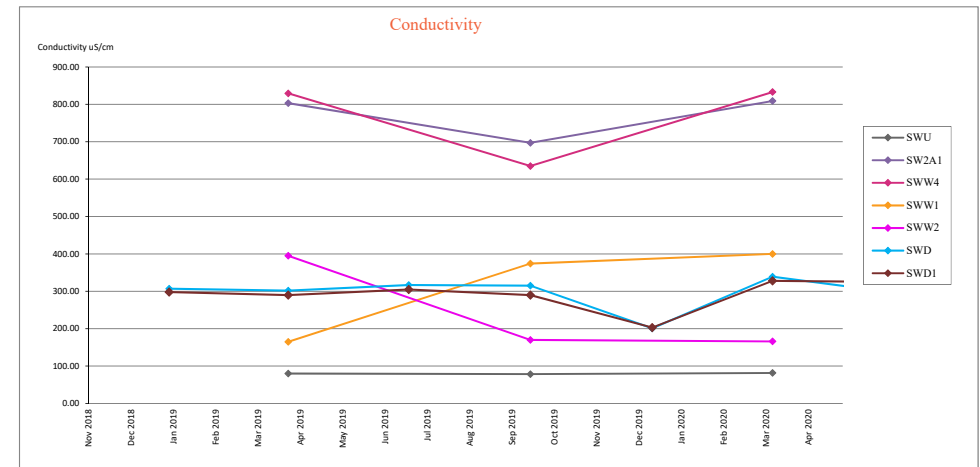
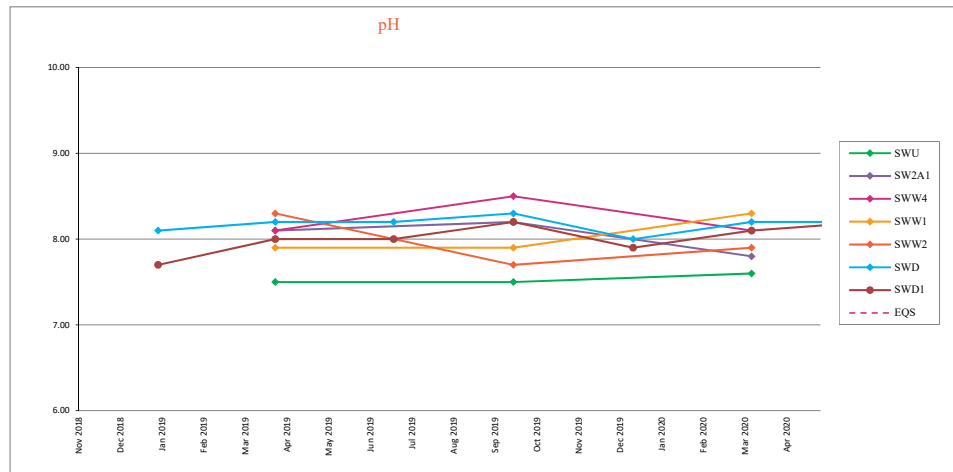
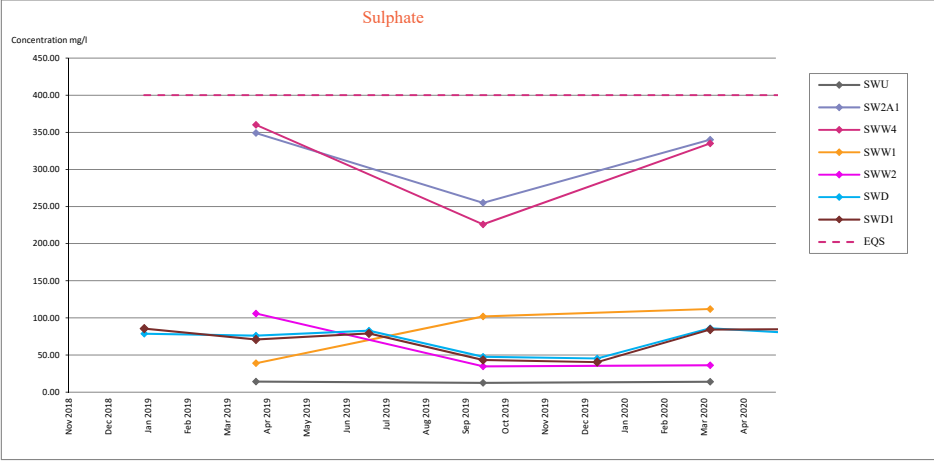
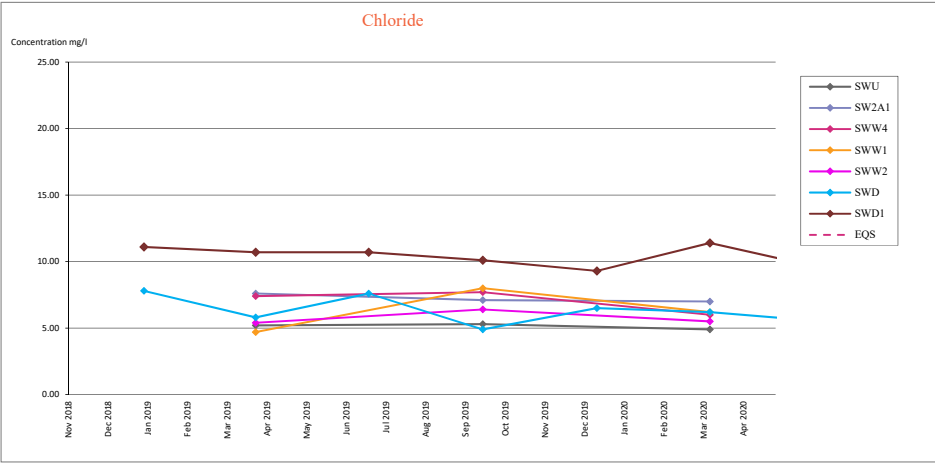
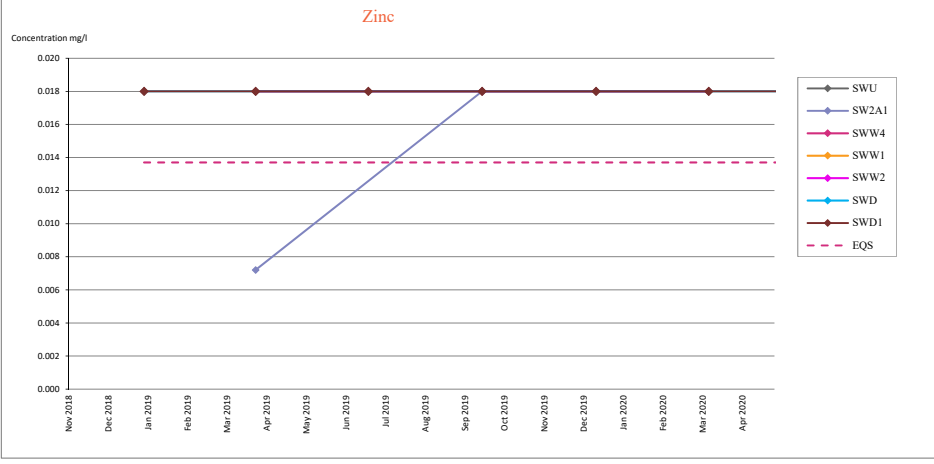
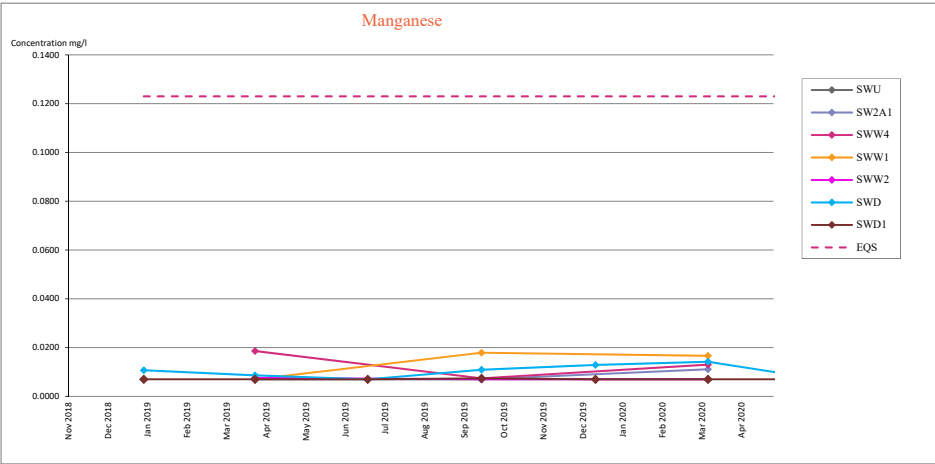
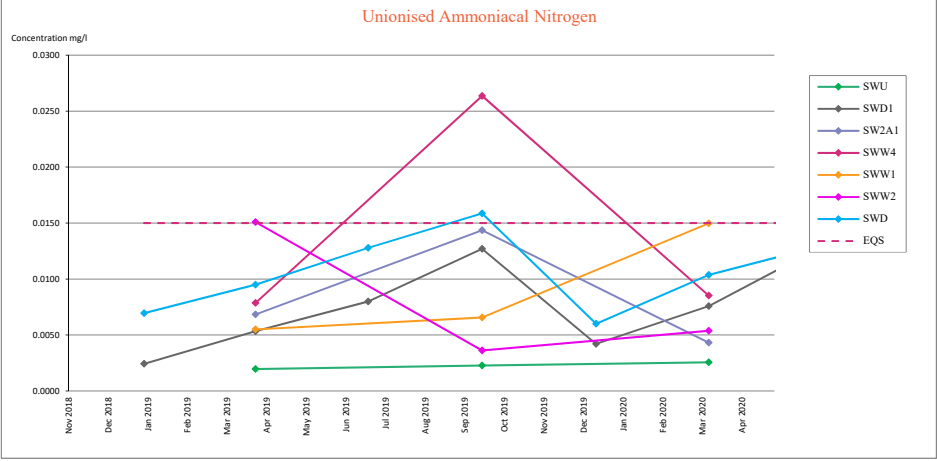
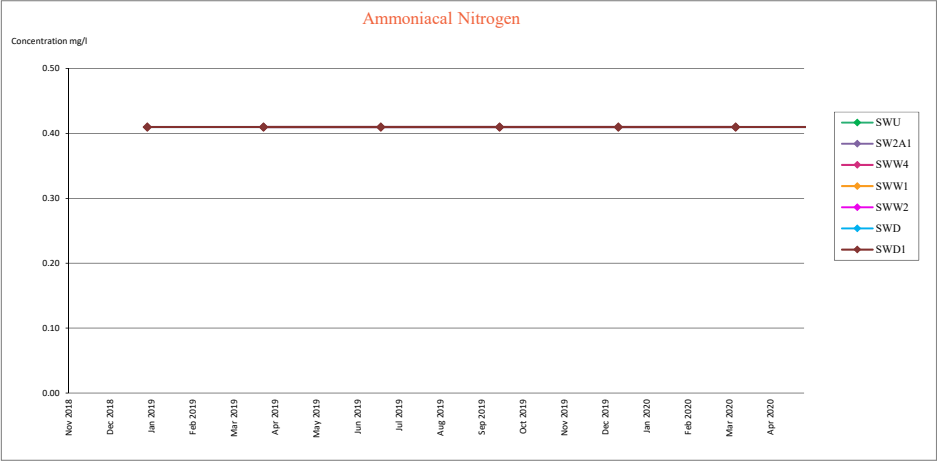


Figure A4
Surface water monitoring graphs





Compliance wells graphs

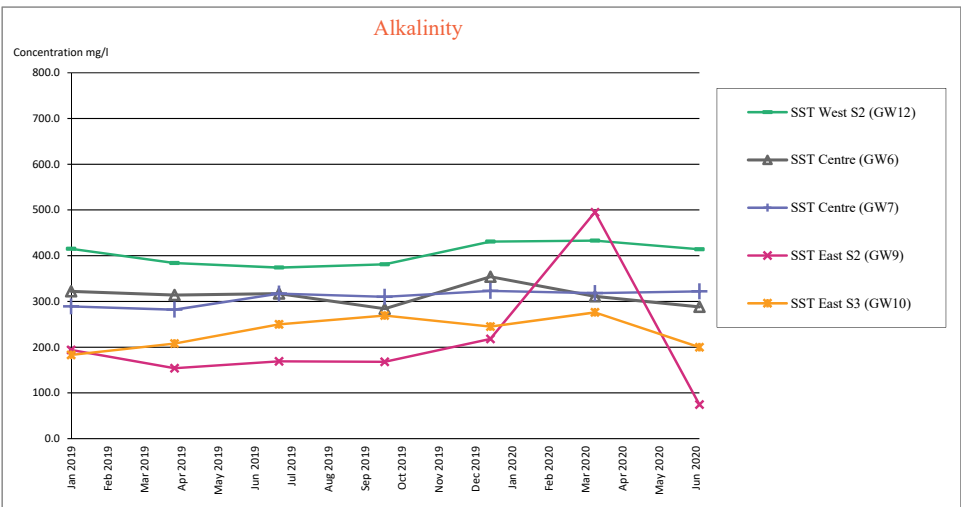
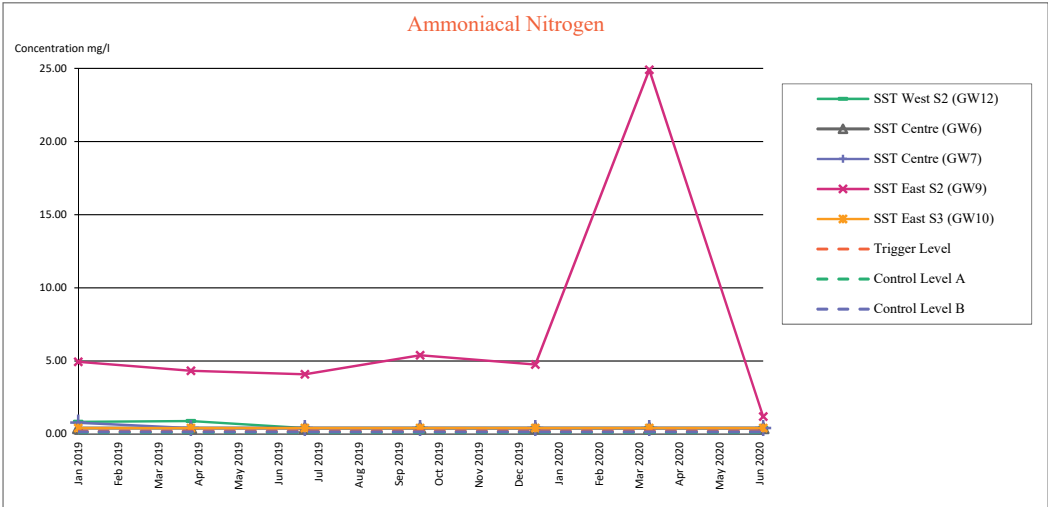
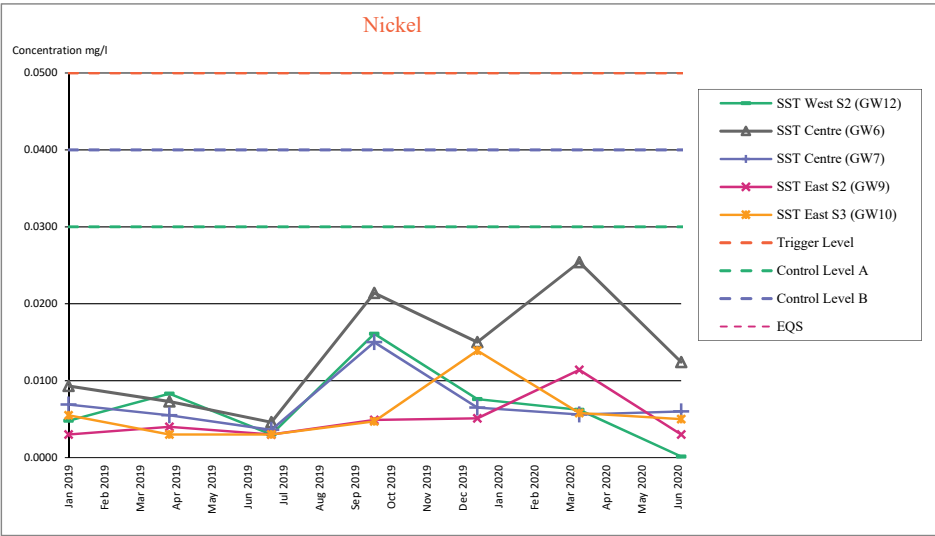
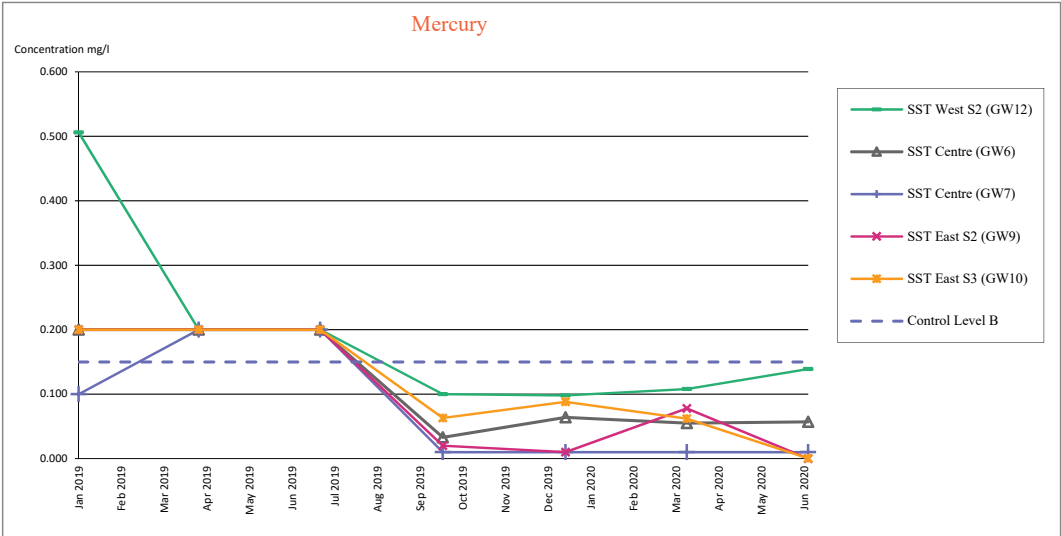
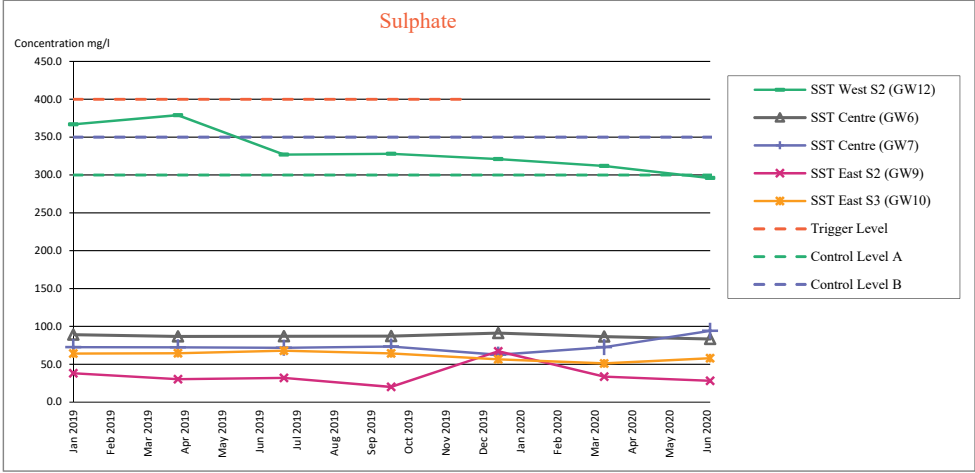
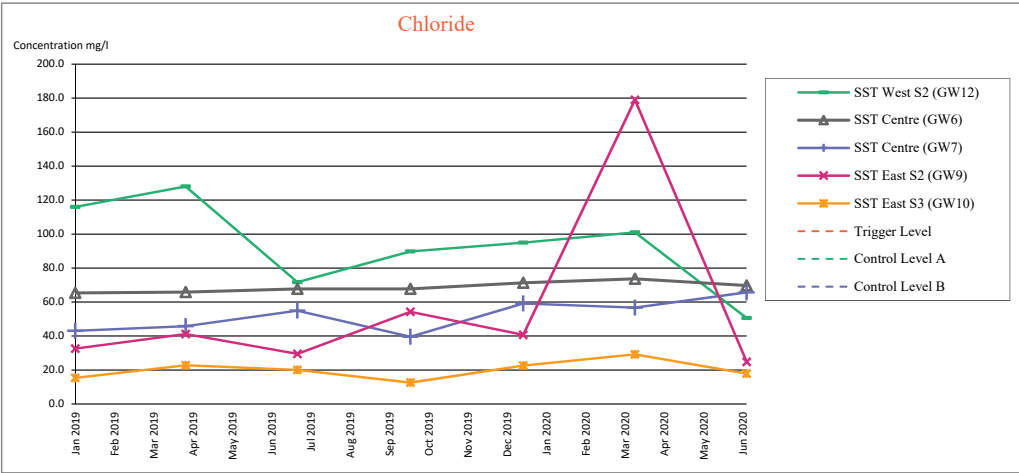
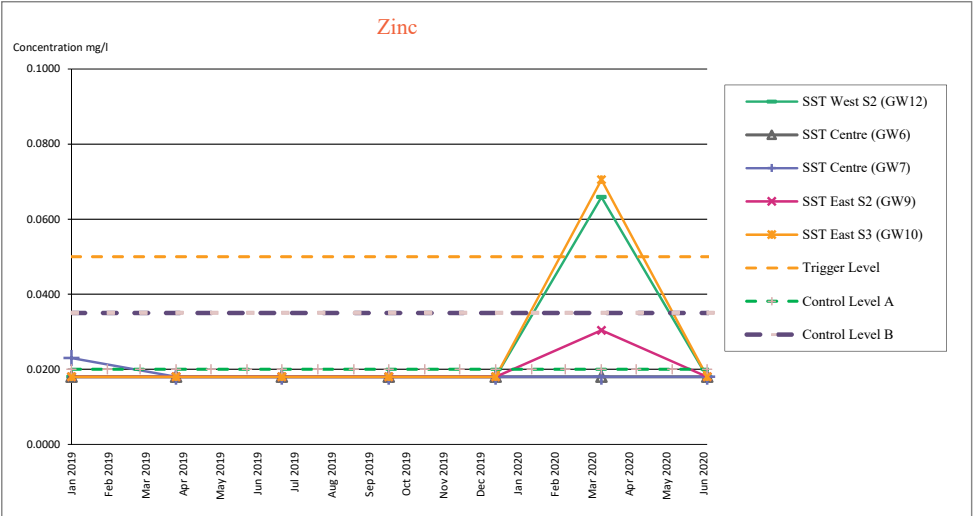
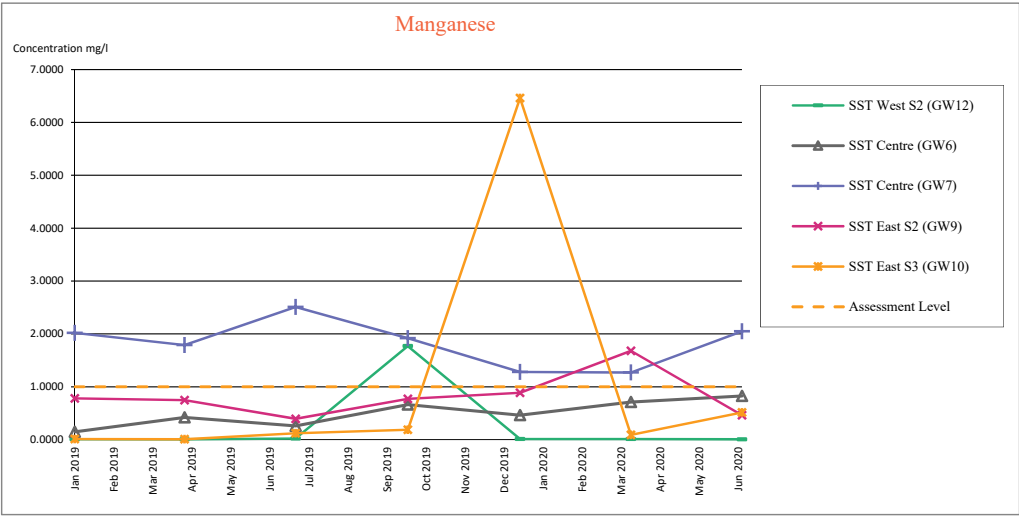


Figure A5
Groundwater quality monitoring results - Compliance wells graphs

Compliance wells graphs



Compliance wells graphs

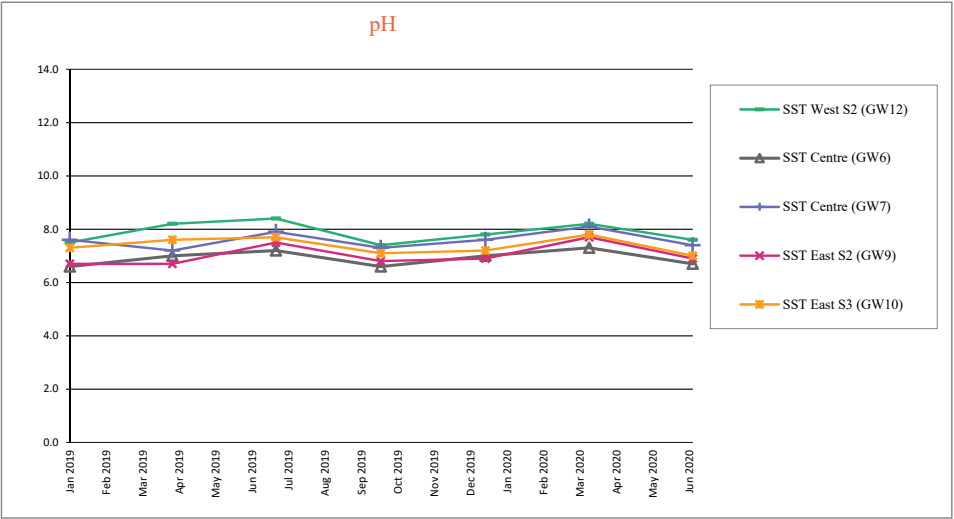


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

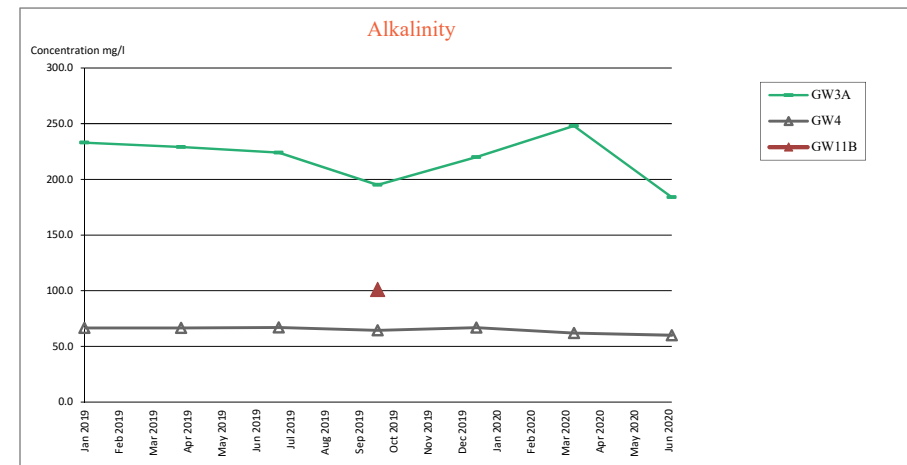
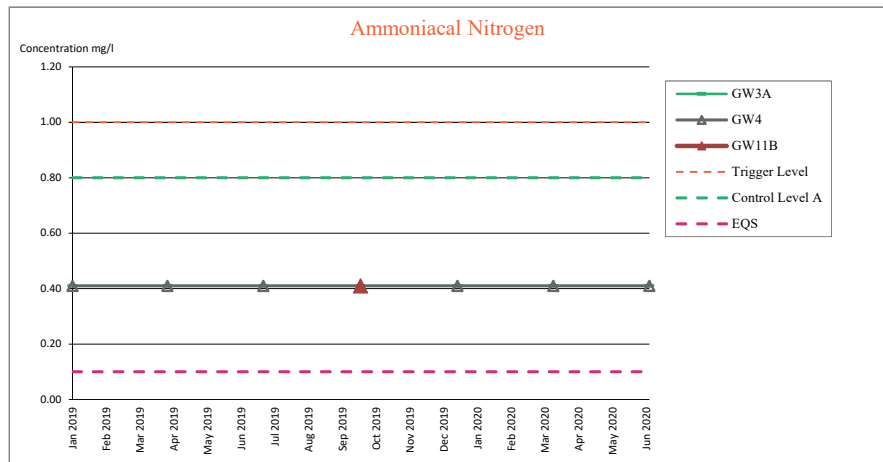
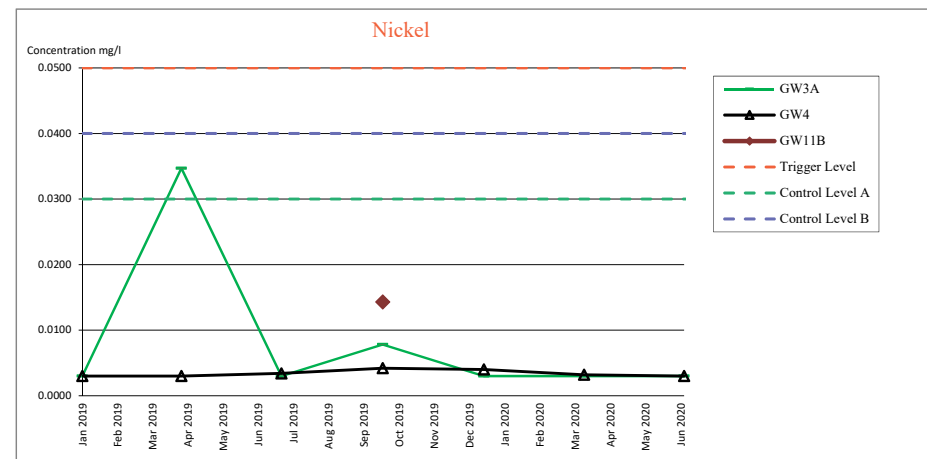


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

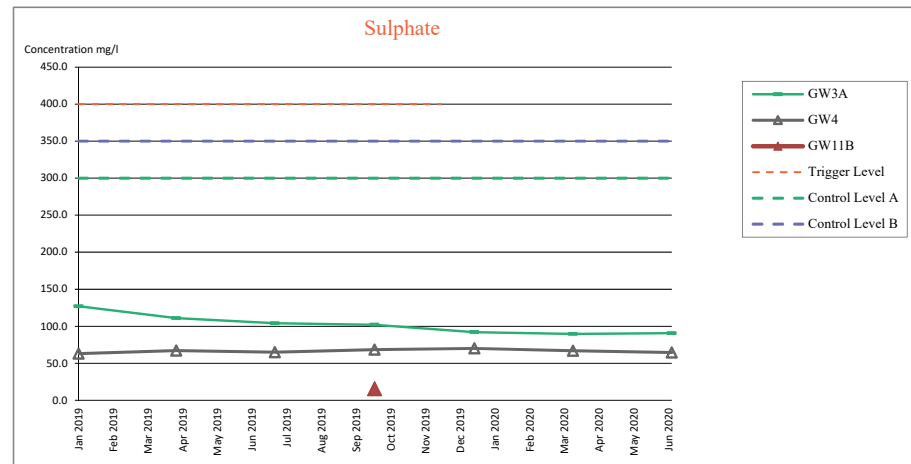
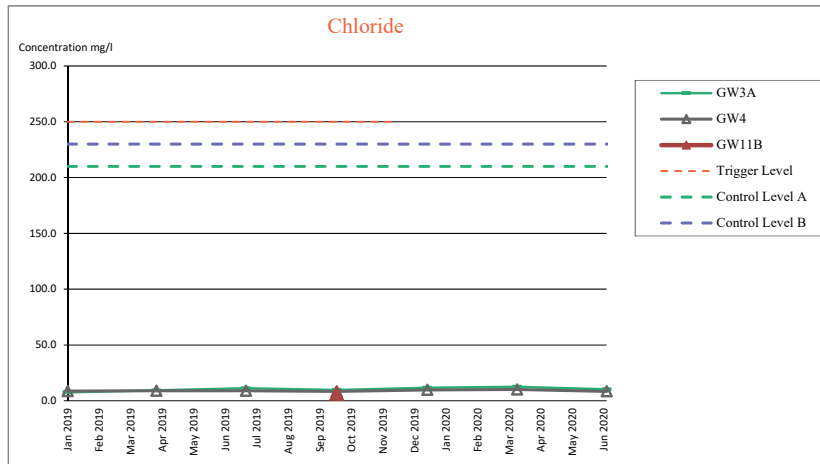
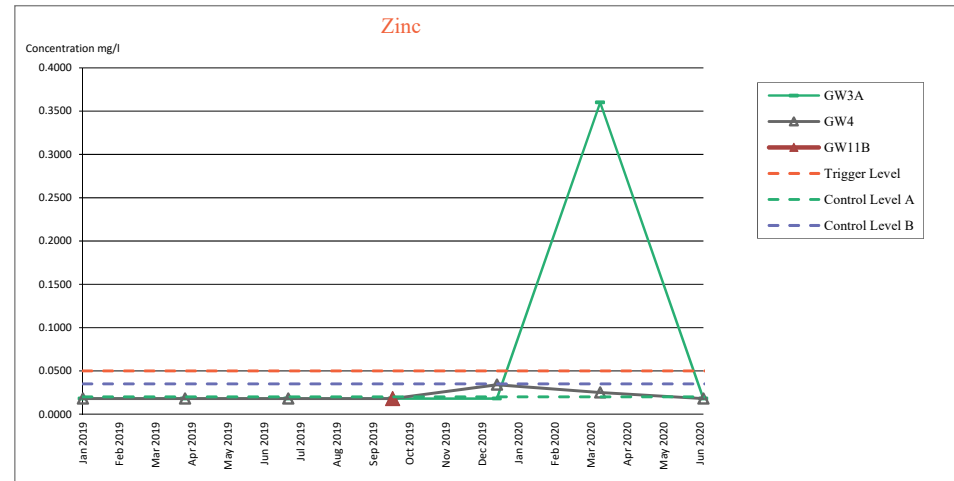
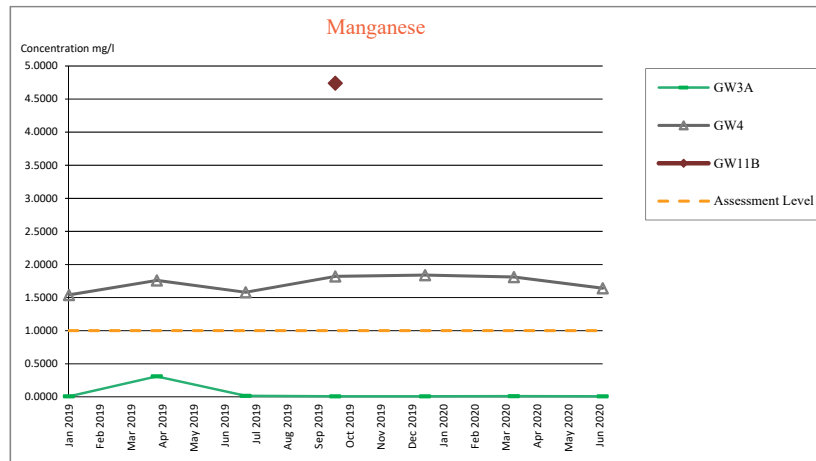


Figure A6
Groundwater quality monitoring results - Upstream wells graphs

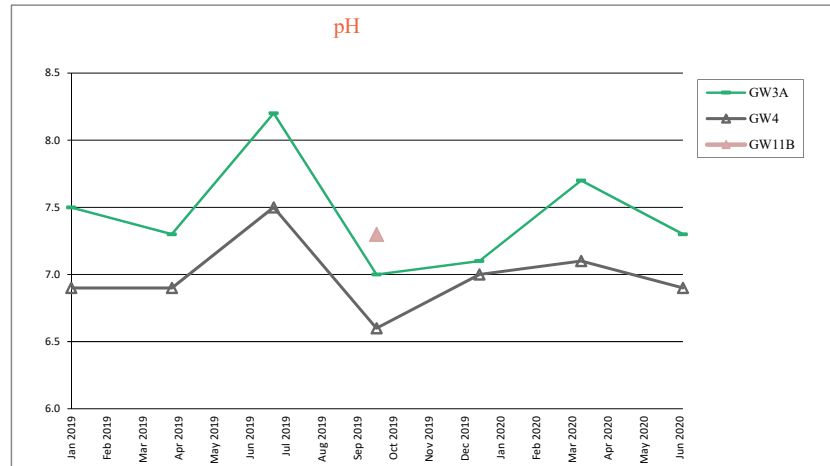
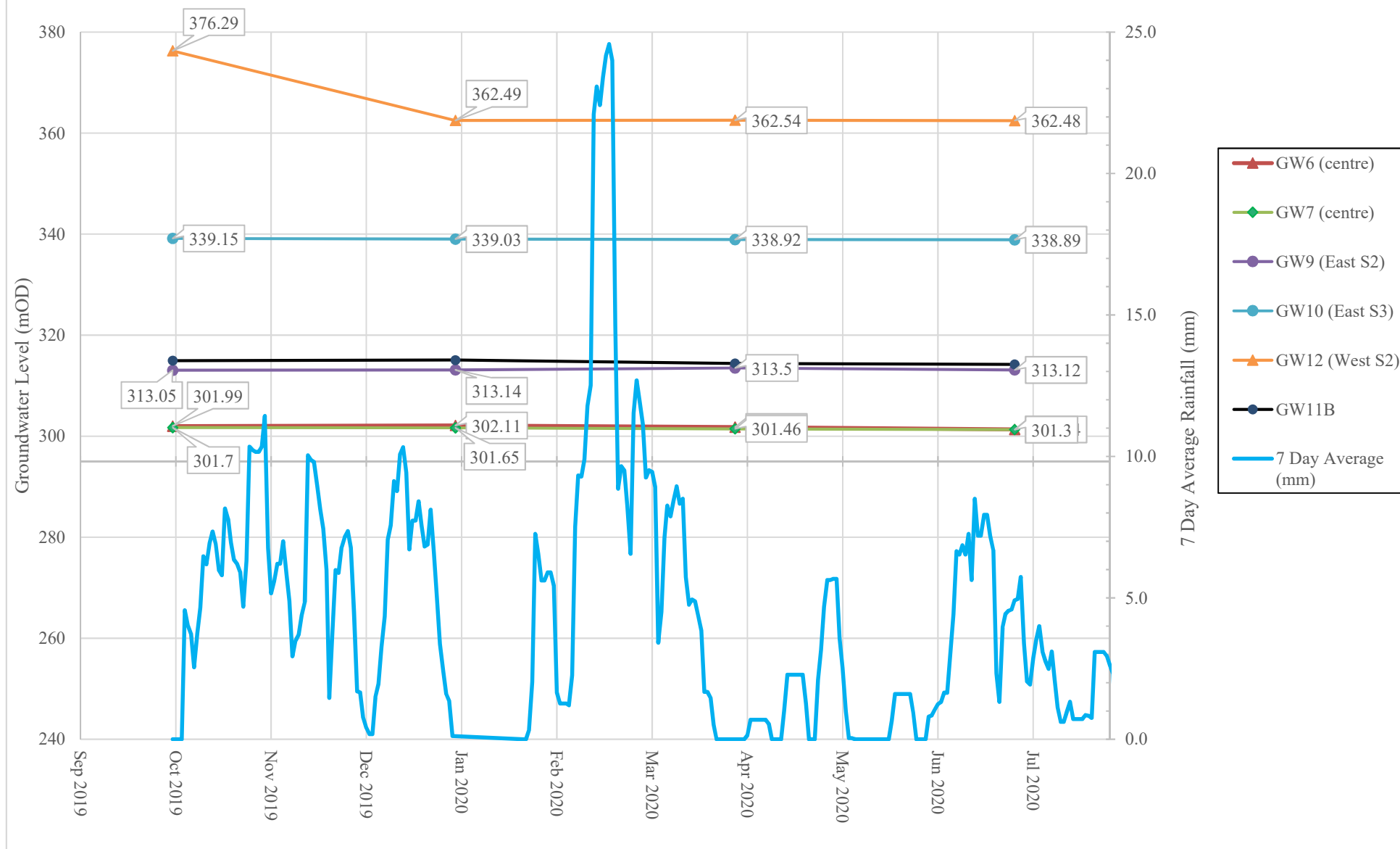


Figure A7
Groundwater monitoring levels downstream of compliance wells



Appendix B

Monitoring Results - Tables

Table B1
Leachate Monitoring Results

July 2020												
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	N/S	N/S	0.0972	0.773	0.405	0.773	0.43	--	0.0193	0.161
Mercury, filt trace as Hg	mg/l	N/S	N/S	N/S	< 0.000002	< 0.000002	N/A	0.000002	0.00	0.00056	< 0.000002	< 0.000002
Nickel in filtrate as Ni	mg/l	N/S	N/S	N/S	0.0772	0.0096	0.157	0.157	0.08	0.0681	0.0088	0.0052
Zinc, ultra-low filtered as Zn	mg/l	N/S	N/S	N/S	2.59	1.9	0.0756	2.59	1.52	1.380	0.0765	0.536
pH	pH Units	N/S	N/S	N/S	8.2	7.7	8.5	8.5	8.13	--	8.4	7.6
Conductivity- Electrical 20C	uS/cm	N/S	N/S	N/S	11000	3910	24700	24700	13203.33	--	2020	1830
Alkalinity as CaCO3	mg/l	N/S	N/S	N/S	6040	2300	12400	12400	6913.33	--	468	813
Ammoniacal Nitrogen as N	mg/l	N/S	N/S	N/S	727	255	2060	2060	1014.00	526	< 0.41	31.8
Chloride as Cl	mg/l	N/S	N/S	N/S	927	184	2300	2300	1137.00	1408	203	134
Sulphate as SO4	mg/l	N/S	N/S	N/S	396	10.7	732	732	379.57	999	308	118
Redox Potential ^(see note 4)	mV	N/S	N/S	N/S	162	37	89	162	96.00	--	144	140
Total Suspended Solids	mg/l	N/S	N/S	N/S	3140	1860	76	3140	1692.00	--	52	6
Solids, Total Dissolved 180 deg C	mg/l	N/S	N/S	N/S	3140	1860	76	3140	1692.00	--	1420	1130
Dissolved Oxygen, Fixed	mg/l	N/S	N/S	N/S	< 0.5	< 0.5	< 0.5	0.5	0.50	--	6.1	4.7
TOC (filtered)	mg/l	N/S	N/S	N/S	330	54.8	1500	1500	628.27	--	19.9	19.5

Notes

- < denotes 'less than'.
 - L1A,L1B, LC1A, LC2A,LC4A, LC5A: Wells in Waste.
 - denotes 'no acceptable maximum concentration available'.
 - The redox potential was not measured on site and there is a possibility that it has changed between sampling and analysis
 - LC5A is a replacement for LC5 well.
 - NS denotes 'not sampled'.
- No monthly average leachate levels above Maximum Acceptable Concentration (MAC)

Table B2
Leachate Head Levels

		Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
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)	40.34			40.30			40.35					
	Leachate elevation (mAOD)	358.51			358.55			358.50			398.85		
	Calculated leachate head (m)	0.89			0.93			0.88					
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)	35.75			35.63			35.73					
	Leachate elevation (mAOD)	365.37			365.49			365.39			401.12		
	Calculated leachate head (m)	2.88			3.00			2.90					
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)	26.86			26.87			26.90					
	Leachate elevation (mAOD)	374.28			374.27			374.24			401.14		
	Calculated leachate head (m)	2.01			2.00			1.97					
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)	26.26			26.13			25.72					
	Leachate elevation (mAOD)	354.49			354.62			355.03			380.75		
	Calculated leachate head (m)	4.35			4.48			4.89					
L1	Casing height (mAOD)	357.00			357.00			357.00			357.00		
	Leachate (mbgl)	21.01			21.01			21.01					
	Leachate (m AOD)	335.99			335.99			335.99			-		
	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			21.04					
	Base of well (m AOD)	335.97			335.97			335.96			357.00		
	Calculated leachate head (m)	-0.81			-0.81			-0.81					
L1A*	Casing height (mAOD)	355.79			355.79			355.79			355.79		
	Leachate (mbgl)	20.84			19.90			20.68					
	Leachate (m AOD)	334.95			335.89			335.11			355.79		
	Base of landfill (m AOD)	316.64			316.64			316.64			316.64		
	Depth of well from top of casing (m)	20.91			20.93			20.93			20.88		
	Base of well (m AOD)	334.88			334.84			334.88			334.84		
	Calculated leachate head (m)	18.31			19.25			18.47					
L1B*	Casing height (mAOD)	354.80			354.80			354.80			354.80		
	Leachate (mbgl)	24.32			25.05			25.45					
	Leachate (m AOD)	330.48			329.75			329.35			354.80		
	Base of landfill (m AOD)	319.60			319.60			319.60			319.60		
	Depth of well from top of casing (m)	34.86			34.86			34.88			34.86		
	Base of well (m AOD)	319.94			319.34			319.94			319.34		
	Calculated leachate head (m)	10.88			10.15			9.75					

2019	Quarterly Leachate Head Averages (m)
January	2.53
February	N/S
March	N/S
April	2.60
May	N/S
June	N/S
July	2.66
August	N/S
September	N/S
October	#DIV/0!
November	N/S
December	N/S

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	Redox Potential	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Bioavailable Ni	Zinc, ultra- low total as Zn	Bioavailable Zn	pH	Conductivity- Electrical 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen **	Measured surface water	Chloride as Cl	Sulphate as SO4	Solids, Suspended	Dissolved oxygen	TOC (Filtered)	Calcium				
				ug/l	mV	mg/l	mg/l	mg/l	mg/l	mg/l		uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l				
Freshwater EQS**				1	-	0.123	0.004	0.004	0.0137	0.0137	-	-	-	-	0.015**	-	250	400	-	-	-	-				
January	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				
		SW2A1		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					
	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					
	Downstream of Landfill	SWD	20/01/2020	<	0.01	-15.00	0.0129	0.0031		<	0.0180	8.00	201.00	53.20	<	0.41	0.0060	6.9	6.50	45.40	2.00	11.50	1.30	25.5		
		SWD1	20/01/2020	<	0.01	-10.00	<	0.0070	0.0030		<	0.018	7.90	203.00	53.40	<	0.41	0.0042	5.3	9.30	40.50	4.00	11.70	1.30	22	
February	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	N/S			
		SW2A1		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	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	N/S				
March	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	N/S			
		SW2A1		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	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	N/S				
April	Upstream of Landfill	SWU	20/04/2020	<	0.01	153	<	0.0070	<	0.0030		<	0.018	7.6	81.6	16.8	<	0.41	0.0026	7.80	4.9	14	2	9.1	<0.7	6.15
		SW2A1	20/04/2020		0.023	180	<	0.0113	<	0.0030			0.044	7.8	809	91.2	<	0.41	0.0043	8.70	7	340	250	11	8.1	116
		SWW4	20/04/2020	<	0.01	158		0.013	<	0.0030		<	0.018	8.1	833	102	<	0.41	0.0085	8.70	6	335	5	8.9	8.3	113
	NW Ditch System	SWW1	20/04/2020	<	0.01	150		0.0166	<	0.0030		<	0.018	8.3	400	95	<	0.41	0.0150	10.30	6.2	112	5	11.2	1.4	38.7
		SWW2	20/04/2020	<	0.01	139	<	0.0070	<	0.0030		<	0.018	7.9	166	37.2	<	0.41	0.0054	8.60	5.5	36.3	2	10.2	<0.7	15.1
	Downstream of Landfill	SWD	20/04/2020	<	0.01	157		0.0142	<	0.0030		<	0.018	8.2	339	94.8	<	0.41	0.0104	8.30	6.2	86.1	10	12.7	1.3	42.7
		SWD1	20/04/2020	<	0.01	160	<	0.0070	<	0.0030		<	0.018	8.1	328	76.4	<	0.41	0.0076	7.10	11.4	84.3	2	11.4	1.7	36.6
May	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	N/S			
		SW2A1		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	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	N/S				
June	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	N/S			
		SW2A1		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	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	N/S				
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	N/S			
		SW2A1		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	N/S			
	SWD1	21/07/2020		<	0.01	87	<	0.0070	<	0.0030		<	0.018	8.20	297.00	84.80	<	0.41	0.0130	11.40	5.50	77.40	10.00	10.50	1.30	36.10
			21/07/2020	<	0.01	95	<	0.0070	<	0.0030		<	0.018	8.20	325.00	88.0000	<	0.41	0.0129	11.30	9.50	85.00	8	10.1	1.9	38.5

Table B3
Surface Water Monitoring Results

Month	Location	Date	Mercury, ultra-low total as Hg	Redox Potential	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Bioavailable Ni	Zinc, ultra- low total as Zn	Bioavailable Zn	pH	Conductivity- Electrical 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen **	Measured surface water	Chloride as Cl	Sulphate as SO4	Solids, Suspended	Dissolved oxygen	TOC (Filtered)	Calcium						
			ug/l	mV	mg/l	mg/l	mg/l	mg/l	mg/l		uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l						
A u g u s t	Upstream of Landfill	SWU SW2AI SWW4	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	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	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 SWW2	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	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 SWD1	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					
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						
S e p t e m b e r	Upstream of Landfill	SWU SW2AI SWW4	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	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	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 SWW2	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					
				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 SWD1	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					
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						
O c t o b e r	Upstream of Landfill	SWU SW2AI SWW4																									
	NW Ditch System	SWW1 SWW2																									
	Downstream of Landfill	SWD SWD1																									
N o v e m b e r	Upstream of Landfill	SWU SW2AI SWW4	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	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	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 SWW2	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					
				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 SWD1	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					
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						
D e c e m b e r	Upstream of Landfill	SWU SW2AI SWW4	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	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	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 SWW2	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					
				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 SWD1	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					
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	-15.0	<	0.007	<	0.003			<	0.0180	7.6	81.6	16.80	<	0.41	0.0026	5.30	4.90	14.00	2.00	8.90	1.30	6.15
Maximum				<	0.0230	180.0		0.017	0.003					0.0435	8.3	833.0	102.00	<	0.41	0.01	11.40	11.40	340.00	250.00	12.70	8.30	116.00

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)

[illegible]

SST East S3																							
GW3A	Jan-19	08/01/19	17839308	92	0.211	<	0.0070	<	0.0030	<	0.0180	7.5	585.0	233.0	<	0.41	7.6	127.0	90.8	11.9	2.1		
	Feb-19	Quarterly																					
	Mar-19																						
	Apr-19	01/04/19	18095225	-	0.318		0.3090	0.0347	<	0.0180	7.3	601.0	229.0	<	0.41	9.3	111.0	416.0	7.2	2.4			
	May-19	Quarterly																					
	Jun-19																						
	Jul-19	01/07/19	18369026	-44	0.20		0.0141	<	0.0030	<	0.0180	8.2	558.0	224.0	<	0.41	11.2	104.0	85.9	9.1	4.5		
	Aug-19	Quarterly																					
	Sep-19																						
	Oct-19	14/10/19	18694531	164	0.426	<	0.0070	0.0078	<	0.0180	7.0	516.0	195	<	0.41	9.7	102.0	69.0	5.9	1.7			
	Nov-19	Quarterly																					
	Dec-19																						
	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																							
GW4	Jan-19	08/01/19	17839309	92	0.20		1.5400	<	0.0030	<	0.0180	6.9	241.0	66.6	<	0.41	8.6	63.0	15.1	2.7	<	0.7	
	Feb-19	Quarterly																					
	Mar-19																						
	Apr-19	01/04/19	18095226	146	0.20		1.7600	<	0.0030	<	0.0180	6.9	274.0	66.6	<	0.41	8.9	67.1	15.7	2.3	1.1		
	May-19	Quarterly																					
	Jun-19																						
	Jul-19	01/07/19	18369027	-80	0.20		1.5800	0.0034	<	0.0180	7.5	256.0	67.0	<	0.41	8.9	64.9	16.3	2.4	2.6			
	Aug-19	Quarterly																					
	Sep-19																						
	Oct-19	14/10/19	18694532	170	0.01		1.8200	0.0042	<	0.0180	6.6	266.0	64.4	<	0.41	8.3	68.4	16.1	7.1	<	0.7		
Nov-19	Quarterly																						
Dec-19																							
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																						
GW11B	Jan-19	Not sampled																					
	Feb-19	Quarterly																					
	Mar-19																						
	Apr-19	Not sampled																					
	May-19	Quarterly																					
	Jun-19																						
	Jul-19	Not sampled																					
	Aug-19	Quarterly																					
	Sep-19																						
	Oct-19	16/10/19	18702426	151	0.044		4.7400	0.0143	<	0.0180	7.3	222.0	101.0	<	0.41	0.0007	6.7	15.5	24.6	3.5	4.3		
Nov-19	Quarterly																						
Dec-19																							
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																					

Table B4
Groundwater monitoring results

Location	Month	Date	Test reference number	Redox Potential	Mercury, filtrate as Hg	Manganese in filtrate as Mn	Nickel in filtrate as Ni	Zinc, ultra-low filtered as Zn	pH	Electrical Conductivity 20C	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	Unionised Ammoniacal Nitrogen ***	Measure water temperature	Chloride as Cl	Sulphate as SO4	Calcium	D.O. concentration	TOC (Filtered)		
				mV	ug/l	mg/l	mg/l	mg/l	pH units	uS/cm	mg/l	mg/l	mg/l	°C	mg/l	mg/l	mg/l	mg/l	mg/l		
Trigger Level					(0.2 ^u)		0.05	(0.05 ^u)	--	--	--	1	--	--	250	400	--	--	--		
Control Level A					(0.1 ^{uu})	--	0.03	(0.02 ^{uu})	--	--	--	0.8	--	--	210	300	--	--	--		
Control Level B					(0.15 ^{uu})	--	0.04	(0.035 ^{uu})	--	--	--	0.9	--	--	230	350	--	--	--		
Assessment Level					--	(1.0 ^u)	--	--	--	--	--	--	--	--	--	--	--	--	--		
DOWNSTREAM WELLS / COMPLIANCE WELLS																					
SST West S2																					
GW12	Jan-19	08/01/19	17839315	75	0.506	0.0092	0.0048	<	0.0180	7.5	1770.0	415.0	0.84		116.0	367.0	131.0	5.0	12.7		
	Feb-19		Quarterly																		
	Mar-19																				
	Apr-19	01/04/19	18095232	113	< 0.200	<	0.0070		0.0083	<	0.0180		0.89		128.0	379.0	151.0	3.7	13.9		
	May-19		Quarterly																		
	Jun-19																				
	Jul-19	01/07/19	18369033	-89	< 0.20	0.0208	<	0.0030	<	0.0180	8.4	1470.0	374.0	<	0.41		71.7	327.0	124.0	6.4	8.4
	Aug-19		Quarterly																		
	Sep-19																				
	Oct-19	14/10/19	18694538	89	<	0.100	1.7700		0.0161	<	0.0180		0.41		89.8	328	135	3.4	10.3		
	Nov-19		Quarterly																		
	Dec-19																				
	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																					
Nov-20																					
Dec-20		Quarterly																			
SST Centre																					
GW6	Jan-19	08/01/19	17839310	47	< 0.20	0.1480	0.0093	<	0.0180	6.6	764.0	322.0	<	0.41		65.4	89.1	50.6	4.5	3.6	
	Feb-19		Quarterly																		
	Mar-19																				
	Apr-19	01/04/19	18095227	95	< 0.20	0.4210	0.0073	<	0.0180	7.0	832.0	314.0	<	0.41		65.9	86.7	56.2	2.6	5.0	
	May-19		Quarterly																		
	Jun-19																				
	Jul-19	01/07/19	18369028	-63	< 0.20	0.2610	0.0046	<	0.0180	7.2	821.0	317.0	<	0.41		67.7	86.9	58.1	2.7	5.9	
	Aug-19		Quarterly																		
	Sep-19																				
	Oct-19	14/10/19	18694533	176		0.033	0.6620	0.0214	<	0.0180	6.6	788	284	<	0.41		67.7	87.2	44.5	7.3	4.1
	Nov-19		Quarterly																		
	Dec-19																				
	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																					
Nov-20																					
Dec-20		Quarterly																			
GW7	Jan-19	08/01/19	17839311	90	<	0.10	2.0200		0.0069	0.0230	7.6	766.0	289.0		0.78		43.1	72.7	71.0	4.9	5.6
	Feb-19		Quarterly																		
	Mar-19																				
	Apr-19	01/04/19	18095228	104	< 0.20	1.7900	0.0055	<	0.0180	7.2	794.0	282.0	<	0.41		45.8	72.3	70.4	3.5	5.7	
	May-19		Quarterly																		
	Jun-19																				
	Jul-19	01/07/19	18369029	-33	< 0.20	2.5100	0.0036	<	0.0180	7.9	875.0	317.0	<	0.41		54.9	71.7	80.4	3.0	5.8	
	Aug-19		Quarterly																		
	Sep-19																				
	Oct-19	14/10/19	18694534	195	<	0.01	1.9200		0.0150	<	0.0180		0.41		39.6	73.5	72.5	8.3	5.2		
	Nov-19		Quarterly																		
	Dec-19																				
	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																					
Nov-20																					
Dec-20		Quarterly																			

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 ^a)	--	--	--	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 ^a)	--	--	--	--	--	--	--	--	--	--	--	--	--
SST East S2																			
GW9	Jan-19	08/01/19	17839312	58	< 0.20	0.7810	< 0.0030	< 0.0180	6.7	520.0	194.0	4.94			32.6	38.1	34.1	2.6	2.9
	Feb-19		Quarterly																
	Mar-19																		
	Apr-19	01/04/19	18095229	92	< 0.20	0.7470	0.0040	< 0.0180	6.7	557.0	154.0	4.33			41.2	30.4	35.8	2.3	4.7
	May-19		Quarterly																
	Jun-19																		
	Jul-19	01/07/19	18369030	-71	< 0.200	0.3940	< 0.0030	< 0.0180	7.5	467.0	169.0	4.09			29.5	31.9	30.1	3.6	3.0
	Aug-19		Quarterly																
	Sep-19																		
	Oct-19	14/10/19	18694535	179	0.020	0.7710	0.0049	< 0.0180	6.8	613.0	168.0	5.39			54.3	20.1	32.7	8.4	7.4
	Nov-19		Quarterly																
	Dec-19																		
	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																		
	Nov-20																		
	Dec-20		Quarterly																
SST East S3																			
GW10	Jan-19	08/01/19	17839313	60	< 0.20	0.0125	0.00550	< 0.0180	7.3	471.0	183.0	< 0.41			15.4	64.2	63.2	8.1	4.8
	Feb-19		Quarterly																
	Mar-19																		
	Apr-19	01/04/19	18095230	88	< 0.200	0.0075	< 0.0030	< 0.0180	7.6	563.0	208.0	< 0.41			22.8	64.5	89.1	6.5	6.8
	May-19		Quarterly																
	Jun-19																		
	Jul-19	01/07/19	18369031	-29	< 0.200	0.1220	< 0.0030	< 0.0180	7.7	615.0	250.0	< 0.41			20.1	67.9	74.8	8.5	7.9
	Aug-19		Quarterly																
	Sep-19																		
	Oct-19	14/10/19	18694536	184	0.063	0.1880	0.0047	< 0.0180	7.1	612.0	269.0	< 0.41			12.6	64.3	85.8	8.1	5.3
	Nov-19		Quarterly																
	Dec-19																		
	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																		
	Nov-20																		
	Dec-20		Quarterly																

	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)

[illegible]

Table B5
Landfill Gas Monitoring Results

METHANE (% by Volume)														CARBON DIOXIDE (% by Volume)												
Location	Valve	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Comments
GMW7	Yellow Valve	0.1	0	0	0	0	0	0	0.1	0				0.5	0.3	0.4	0.6	0.3	0.8	1	0.6	0.6				Yellow Valve,12 depth
	White Valve	0.1	0	0	0	0	0	0	0.1	0				0.5	0.3	0.4	0.6	0.3	0.7	1	0.6	0.5				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	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	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	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	1.32
GMW12	Red Valve	0.1	0	0	0	0	0	0.1	0.1	0				0.6	0.6	0.9	0.7	1.1	0.7	1.3	1.2	0.6				Red Valve, 26.3m depth
	Yellow Valve	0.1	0	0	0	0	0	0.1	0	0				0.4	0.5	1.8	0	2.2	2.5	2.8	3.1	3.3				Yellow Valve,15m depth
	White Valve	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0				1.2	0.5	0.8	0.6	0.7	0.7	1.3	1.7	1.5				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 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	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	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	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	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	5	
GMW13	Red Valve	0.1	0	0	0	0	0	0.1	0.1	0				1.6	1	0.9	1.3	1.1	1.2	1.2	1.3	1.2				Red Valve, 26.3m depth
	Yellow Valve	0.1	0	0	0	0	0	0.1	0.1	0				6.8	6.8	5.9	5.7	5.9	5.6	5.4	5.7	5.4				Yellow Valve,15m depth
	White Valve	0.1	0	0	0	0	0	0.1	0.1	0				2.9	0	2.2	2.5	2.5	2.8	3.2	0.5	2				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	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	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	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	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	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	5.32	
GMW14/14A	Red Valve	0.2	0	0	0	0	0	0.1	0.1	0				3.3	4.3	3.8	2.3	1.6	1.6	1.2	1.7	2				Red Valve, 26.3m depth
	Yellow Valve	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0				5.3	4.7	3.6	3.3	3.3	3	3.1	3.3	2.5				Yellow Valve,15m depth
	White Valve	0.4	0	0	0	0	0.1	0.1	0.1	0				5.5	5.4	4.5	2.3	3.1	3.2	3.2	3.9	4.4				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	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	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	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	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	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	4.9	
GMW1**	Red Valve	0.7	0.1	0.5	0	0.1	0	4.4	3.6	2.4				4.1	2.2	4.3	0	0.4	0	7.9	7.9	3.5				Red Valve, 23.5m depth
	Yellow Valve	1	0.7	12.2	23.6	25.7	19.9	11	6.7	29.2				2.7	0.7	5.1	4.8	9.5	10.9	11.5	11.2	8.7				Yellow Valve,14.7m depth
	White Valve	0.1	1.4	1	water	0.1	0.1	0.1	0	0.2				0	1.1	0.9	water	0.1	1.2	0.1	0.3	1.4				White Valve, 6.5m depth
GMW8*	Yellow Valve	11.4	11.4	3.8	3.3	1.1	2.6	2	0.9	5.1				9.7	8.7	3.3	3.5	1.7	3.7	4.5	1.6	9.2				Yellow Valve,17.5m depth
	White Valve	0.1	0	0	0	0	0	0	0.1	0				4.7	3.9	3.9	4.2	2.2	3.9	4.4	3.9	5				White Valve, 5.7m depth
GMW9*	Red Valve	0.1	0	0	0	0	0	0.1	0.1	0				2.1	1.8	1.7	1.8	1.7	1.7	1.9	2	2				Red Valve, 27m depth
	Yellow Valve	32.4	34.5	30.9	25.9	21.8	20.9	20.9	20.7	24.1				10.3	9.5	10	11.9	12.3	12.9	13.5	14.1	13.1				Yellow Valve,15m depth
	White Valve	0.2	0.1	0.1	0	0	0.1	0.1	0.1	0				0.1	0.1	0.1	0.1	0.1	0.1	4.2	0.2	0.2				White Valve, 8.5m depth
GMW10*	Red Valve	0.1	0	0	0	15.8	30.2	34.8	34.1	36.9				5.2	1.1	6.7	5.6	9.6	11.1	10.5	10.7	8.6				Red Valve, 19.5m depth
	Yellow Valve	34.4	46.5	0	0	10	25.6	39.6	35.1	39.8				5.9	5.7	6.7	4.5	8.4	10.7	10.4	8.7	8.4				Yellow Valve,15m depth
	White Valve	0.1	1.2	1.3	0	0.1	0.3	0.5	0.7	1				7.9	8.8	8.8	9	8.8	8.5	8.5	8.2	8.7				White Valve, 8m depth
GMW17**	Red Valve	0.1	0	0	0	0	0	nt	0	0				1.5	1.4	1.1	1.2	1.3	1.2	nt	1.4	1.4				Red Valve, 26.3m depth
	Yellow Valve	nt	0	0	0	0	0	nt	0	0				nt	5.2	4.5	4.1	4.1	3.7	nt	4	6.3				Yellow Valve,15m depth
	White Valve	0.2	0	0	0	0	0	nt	0	0				3.6	3.3	2.9	3.9	4	4.5	nt	4	3.9				White Valve, 5m depth
GMW18**	Yellow Valve	0.2	0	0	0	0	0	0.1	0	0				0.3	0.1	0.6	1.6	0.5	0	0.1	0.1	1.5				Yellow Valve,12 depth
	White Valve	0.1	0	0	0	0	0	0.1	0	0				6.7	4.9	4.08	5.5	3.9	4.1	4.3	4.8	5.9				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 asterisks (**) are present, no trigger levels have been set, as not require by the Permit (Reference [2]).

Exceedance of Trigger

Exceedance of Control