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UGL

Pre-construction Water Quality Monitoring Report

Event 11 2023

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1. Introduction

In 2020 Snowy Hydro Limited (Snowy Hydro) obtained approval (application number SSI 9208 and EPBC 2018/8322) to expand the existing Snowy Mountains Hydro-electric Scheme (Snowy Scheme), by linking the existing Tantangara and Talbingo reservoirs through a series of underground tunnels and constructing a new underground hydro-electric power station (referred to as 'Snowy 2.0').

To connect Snowy 2.0 to the National Energy Market (NEM), a new transmission connection is required. NSW Electricity Networks Operations Pty Ltd as a trustee for NSW Electricity Operations Trust (known as TransGrid and the Proponent) will construct a substation and overhead transmission lines (the Project) to facilitate the connection of Snowy 2.0 to the existing electrical transmission network. The Project location is approximately 27 kilometres (km) east of Tumbarumba, New South Wales (NSW). UGL has been engaged on behalf of the Proponent to undertake the Project.

The purpose of the pre-construction water quality monitoring is to address the requirements of the Environmental Impact Statement (EIS) (Jacobs 2020) that was prepared by the Proponent under Part 5, Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* to assess the environmental impacts of the proposed Project. Subsequently, an Amendment Report (TransGrid 2021b) was submitted with the Response to Submissions (TransGrid 2021a) to the Department of Planning and Environment (DPE) with updated mitigation measures for the Project.

The objective of the pre-construction surface water quality monitoring is to collect baseline data prior to Project construction works. Baseline data will be compared to ANZG (2018) guidelines to characterise the existing surface water quality. The data will be compared to the water quality objectives (WQO) for the Project area.

2. Program and methodology

The Pre-construction Water Quality Monitoring Program and Methodology (the Program) (NGH 2022) has been prepared to detail the WQOs for the Project, the location of the monitoring locations and the methodology for water sampling.

The Project area within Kosciuszko National Park is an area of high conservation value. Therefore, the water quality objectives for physical and chemical stressors includes **no change beyond natural variability** (ANZG 2018). The Default Guideline Values (DGV) for Upland Rivers has been provided for physical and chemical stressors and is detailed in the Program (NGH 2022).

The location of the sampling points in relation to the Project footprint is provided in Figure 2-1.

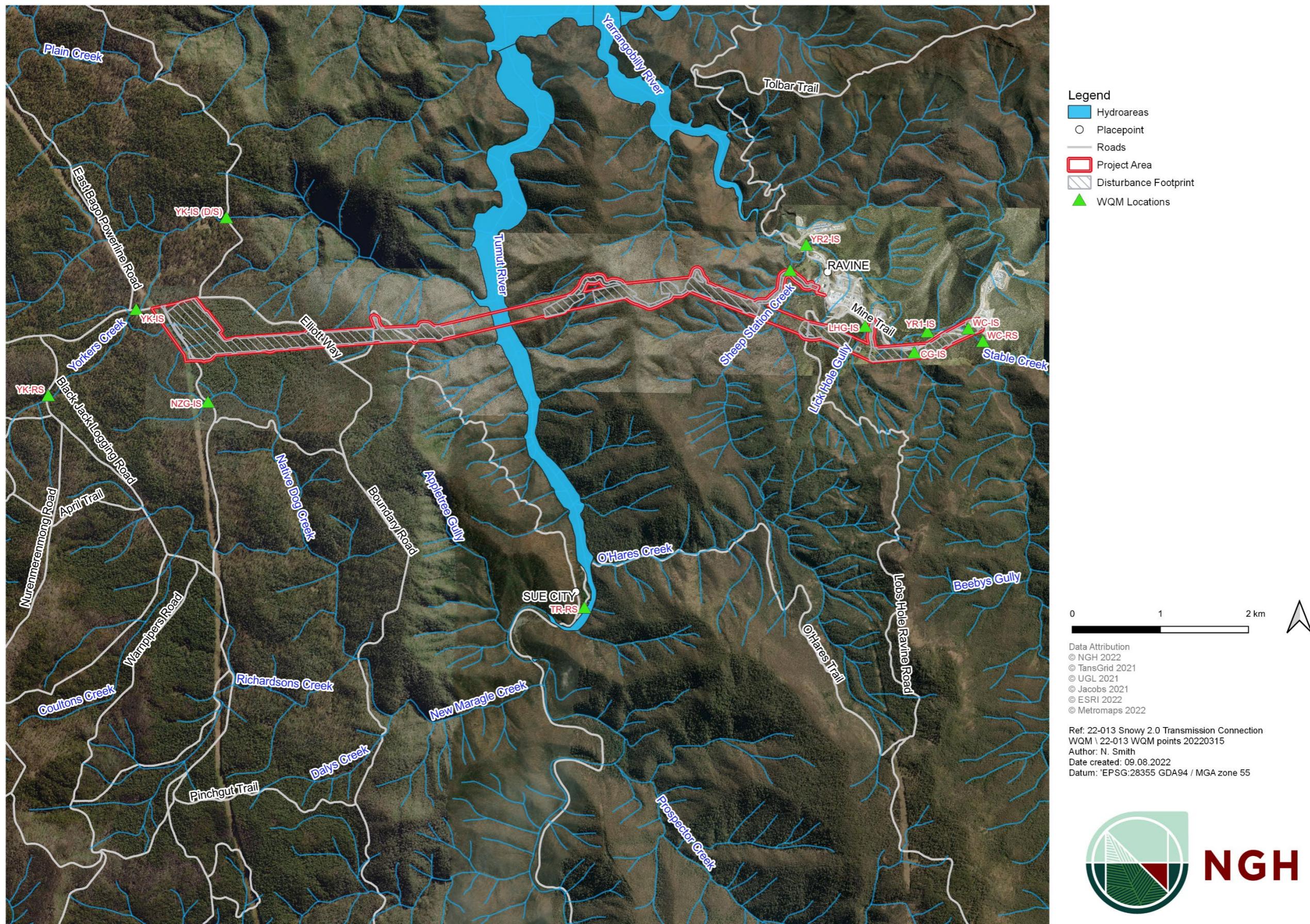


Figure 2-1 WQM locations

3. Monitoring event observations and results

Images for Wallace's Creek, Sheep Station Creek and Yorkers Creek are provided as Figure 3-1 to Figure 3-3. A sediment laden stream of water can be seen in Figure 3-1 downstream of WC-IS. Water quality results for each site and are provided in Appendix A. Results are highlighted where they exceed the default guideline value (refer to the Program (NGH 2022)). Table 3-1 identifies exceedances of the DGVs for metals, cyanide and nutrients. Physico-chemical results have been provided in Figure 3-4 to Figure 3-23. Field data and observations are provided in Appendix B.

3.1. Event 11

NGH conducted the first, second and third rounds of sampling in March (Event 1), April (Event 2), May and early June (Event 3), late June (Event 4), July (Event 5), August (Event 6), early October (Event 7), late October (Event 8), November (Event 9) and December (Event 10) 2022. Reports for each event were prepared following receipt of the laboratory results (NGH 2022a; 2022b; 2022c; 2022d; 2022e, 2022f, 2022g, 2022h, 2022i, 2022j). The results of Event 1 through to Event 10 have been compared in this report to the results of Event 11.

NGH Environmental Scientist, Nicola Smith, conducted the monitoring event with a UGL representative on 18 and 19 January 2023, Event 11. The weather was overcast with showers. Data from the Cabramurra SMHEA automatic weather station on 18 January 2023 (Station ID 072161) indicates that wind speeds were from the north, with speeds of 9km/hr in the morning, trending west-northwest, with speeds of 20km/hr in the afternoon. Temperatures on the day included a low of 15.1°C and a high of 17.5°C. Data from the Tumbarumba weather station for 19 January 2023 (Station ID 072043) indicates that temperatures ranged from a low of 12.5°C to a high of 24°C.

Generally, water flow was observed to be clear with no hydrocarbon sheen, and no odours were present. The banks of each channel were well vegetated with the vegetation matrix weedier in some locations. Evidence of bank erosion from hooved animals was observed at the New Zealand Gully site, the Yorkers Creek impact site and Yorkers Creek reference site. Flows were observed to have decreased, in comparison to recent sampling events.

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Figure 3-1 Sediment laden water downstream of Wallaces Creek impact site (WC-IS)



Figure 3-2 Sheep Station Creek. Showers were increasing the flow creep downstream (SSC-IS)



Figure 3-3 Yorkers Creek (YK-IS(D/S))

3.1.1. Results

The results indicate that the water quality in the locations where samples were taken generally meets the DGVs for Upland Rivers with a 99% species protection level for toxicants. Locations where a laboratory result was returned for a physical or chemical stressor was above the DGV are provided in Table 3-1.

Table 3-1 Results above the DGV for Upland Rivers with 99% species protection level

Site identification	Analyte	DGV	Result	Comment
TR-RS	Aluminium mg/L	0.027	0.06	This is consistent with results obtained since Event 9.
	Total Suspended Solids (TSS)	0.2	3	
CG-IS	Zinc mg/L	0.0024	0.004	Always returns a high total dissolved solid result.
	Total Dissolved Solids (TDS)		288	
LHG-IS	Aluminium mg/L	0.027	0.05	Always returns a high total dissolved solid result. However, results for Event 11 show a gradual decrease in Aluminium since Event 8.
	Total Dissolved Solids (TDS)		311	
	Zinc	0.0024	0.003	
YR1-RS	Total Suspended Solids (TSS)	0.2	5	
YR2-RS	Aluminium mg/L	0.027	0.1	Receives flow from CG-IS and LHG-IS.
	Total Suspended Solids (TSS)	0.2	3	
SSC-IS	Aluminium mg/L	0.027	0.04	Results for Aluminium have decreased consistently since Event 8.
YK-IS (D/S)	Aluminium mg/L	0.027	0.42	Located within Bago State Forest and adjacent to an unsealed track. Unknown activities within the State Forest upstream. Sample taken upstream of culvert.
	Iron mg/L	0.3	0.47	
	Total Suspended Solids (TSS)	0.2	9	
NZG-IS	Aluminium mg/L	0.027	0.23	Located within Bago State Forest.

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Site identification	Analyte	DGV	Result	Comment
				Sample taken upstream of timber supported unsealed track bridge. Banks heavily vegetated, shallow channel.
YK-RS	Aluminium mg/L	0.027	0.37	Located within Bago State Forest and adjacent to an unsealed track. Unknown activities within the State Forest upstream.
	Iron mg/L	0.3	0.54	Sample taken downstream of culvert under unsealed track. Flow through culvert is restricted upstream causing a wetland environment.
	Total Suspended Solids (TSS)	0.2	5	
YK-IS	Aluminium mg/L	0.027	0.36	Located within Bago State Forest and adjacent to Elliott Way (road). Unknown activities within the State Forest upstream.

CG-IS and LHG-IS displayed elevated values for total dissolved solids compared to the other sampling locations. Total suspended solids (TSS) at TR-RS, YR2-RS, YK-IS (D/S) and YK-RS were above the 0.2mg/L assigned DGV (refer to Figure 3-18).

Water temperatures ranged from 13.2 degrees Celsius at TR-RS to 20 degrees Celsius at SSC-IS.

Many of the results are recorded as below (<) the limit of detection. To enable calculation of the statistics, the *Limit of Detection Divided by Two (LOD/2) Method* (Cohen and Ryan 1989) has been applied. This data is provided in Appendix A.

The following time series, Figure 3-4 to Figure 3-23, display physico-chemical water quality through time for monitoring Event 1 (March), Event 2 (April), Event 3 (May/June), Event 4 (June), Event 5 (July), Event 6 (August), Event 7 (early October), Event 8 (late October), Event 9 (November) and Event 10 (December). Where a DGV is available, these values are shown on the graph and have been included for dissolved oxygen (%), conductivity, pH and turbidity.

Temperatures within the Talbingo Reservoir catchment have increased since Event 10, refer to Figure 3-4. YR1-RS registered the most significant increase in temperature, from 11.6°C during Event 10 to 19.8°C in Event 11. Similarly, temperatures within the Yorkers Creek catchment have also increased, refer to Figure 3-5.

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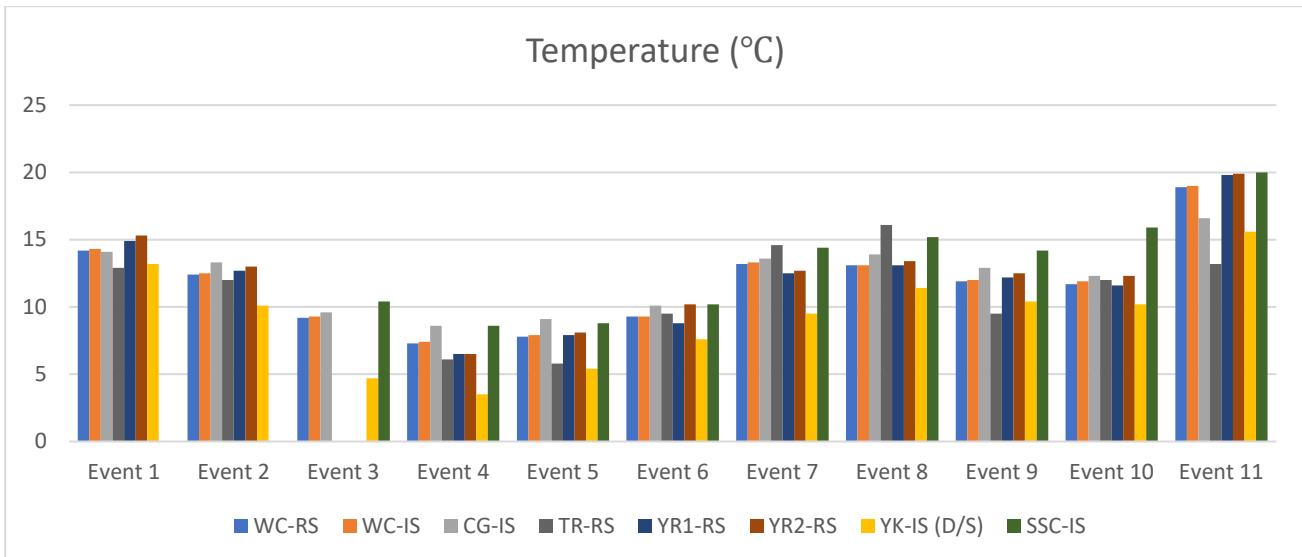


Figure 3-4 Temperature for Talbingo Reservoir catchment

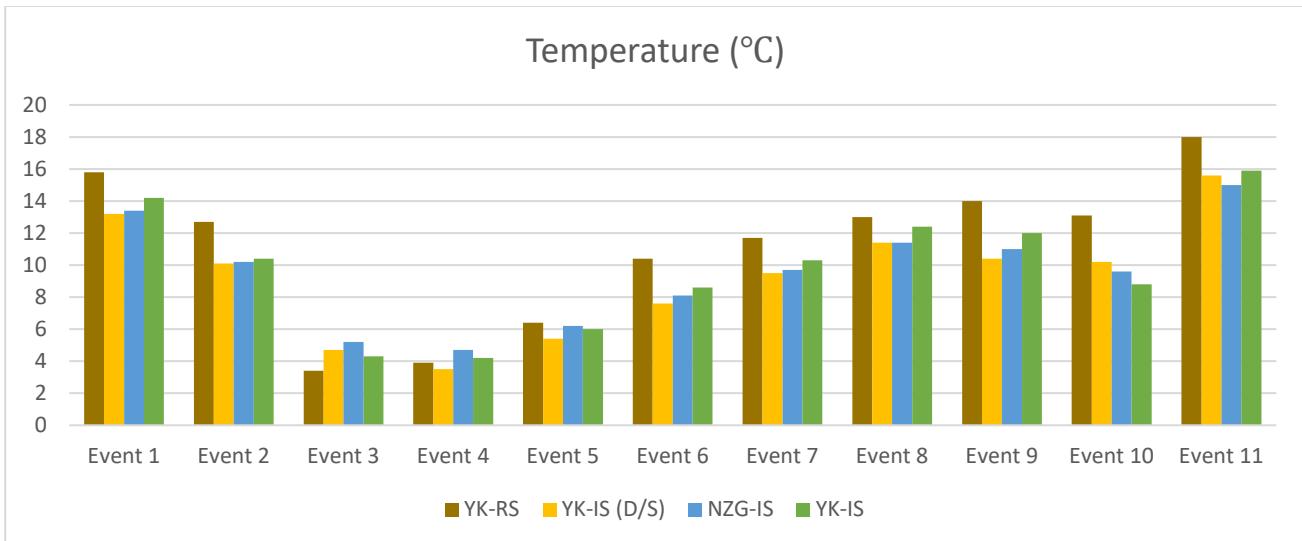


Figure 3-5 Temperature for Yorkers Creek catchment

All DO (%) results for Event 11, except for LGH-IS (85.2%) were within the DGV range (90-110%), refer to Figure 3-6 and Figure 3-7. Results for both catchments were relatively consistent with Event 9.

DO % was not captured for Event 10. Please refer to Event 10 (NGH, 2022) for further information.

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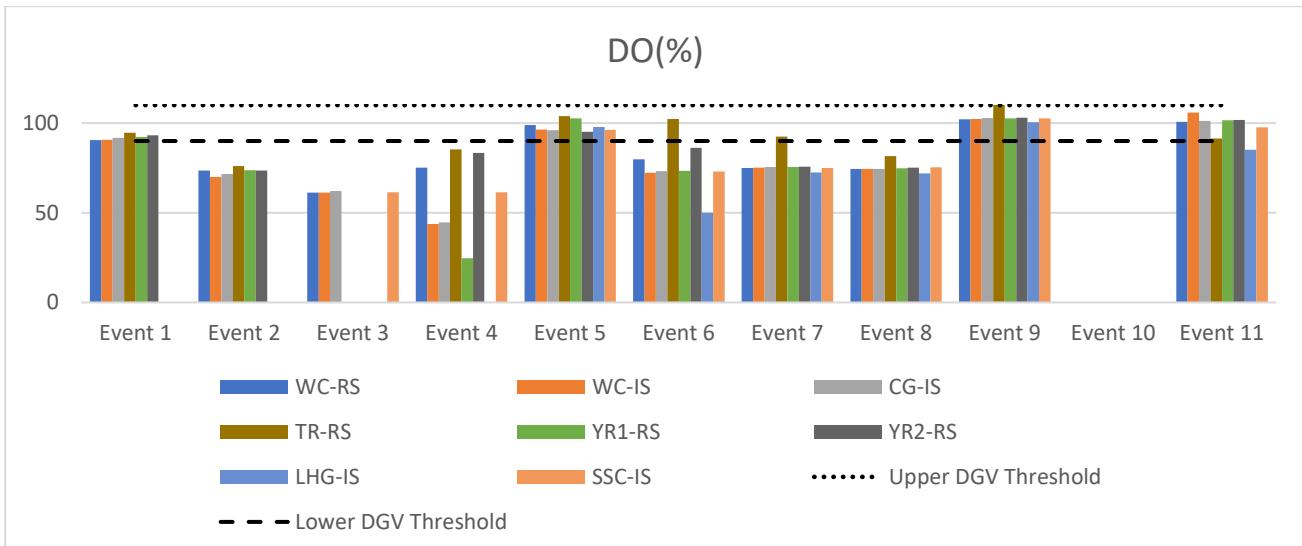


Figure 3-6 Dissolved oxygen (DO%) for Talbingo Reservoir catchment

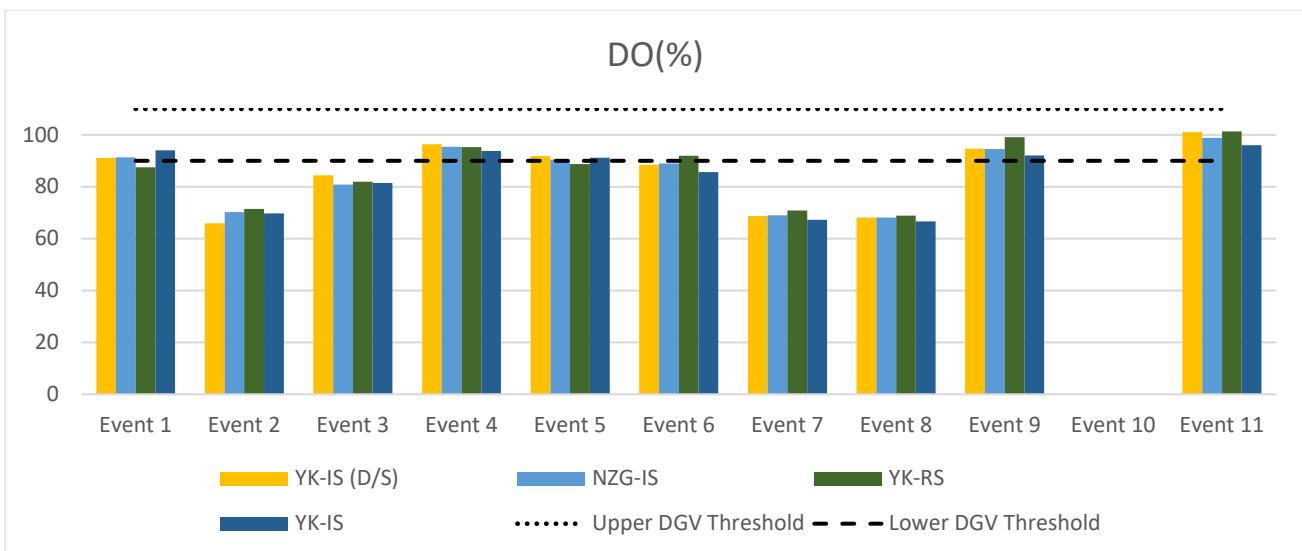


Figure 3-7 Dissolved oxygen (DO%) for Yorkers Creek catchment

The results for DO (ppm) for both catchments show a general decrease, when compared to Event 9 and Event 10, refer to Figure 3-8 and Figure 3-9. The highest reading of DO (ppm) was recorded within the Talbingo catchment at CG-IS (9.17 ppm). The highest reading of DO (ppm) for the Yorkers Creek catchment was at NZG-IS, with a reading of 8.74 ppm.

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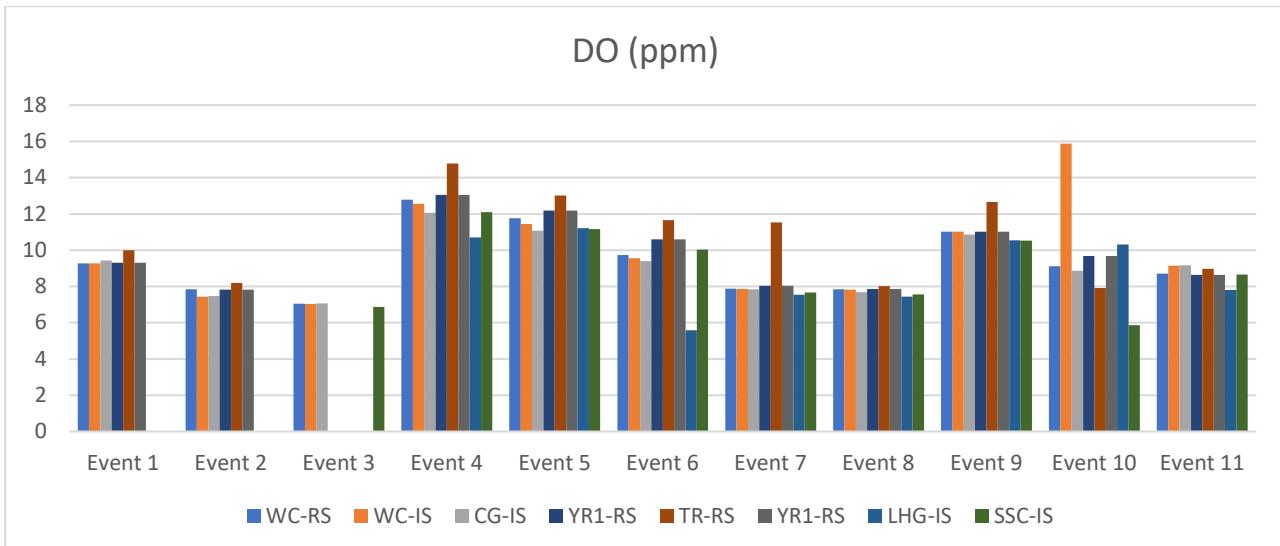


Figure 3-8 Dissolved Oxygen (ppm) for Talbingo Reservoir catchment

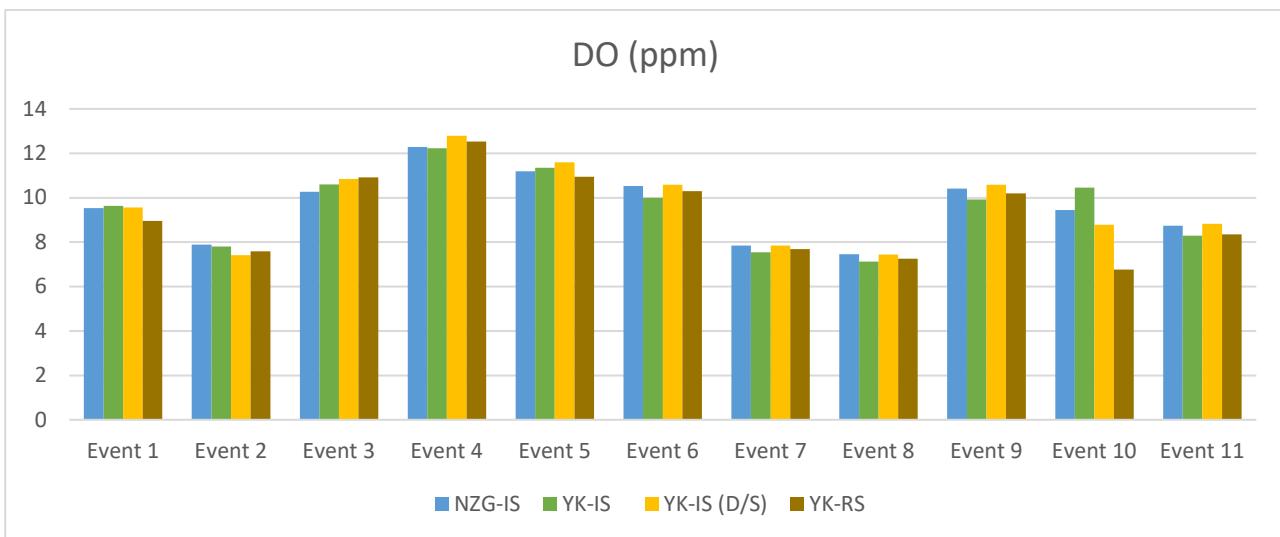


Figure 3-9 Dissolved Oxygen (ppm) for Yorkers Creek catchment

Specific conductance has continued to gradually decline since Event 6 within both catchments. CG-IS returned a result of 375.2 µS/cm for Event 11, down from its peak recording of 583 µS/cm during Event 6,

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refer to

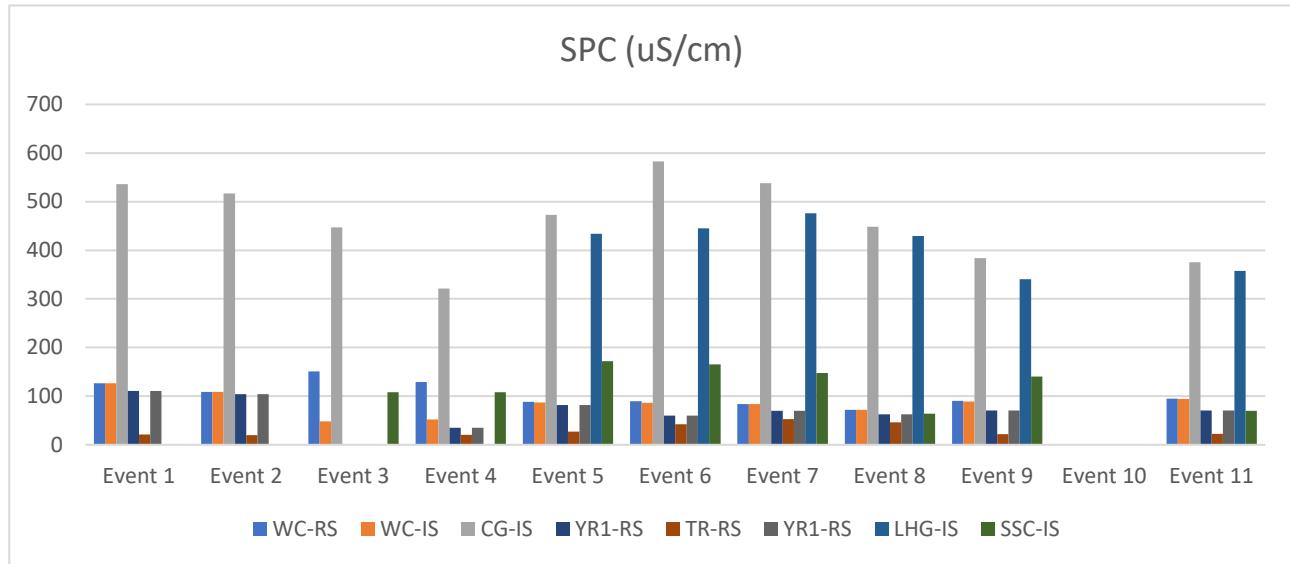


Figure 3-10. Specific conductance within the Yorkers Creek catchment for Event 11 also shows a decrease in specific conductance at all sites, refer to Figure 3-11.

Specific conductance was not captured for Event 10. Please refer to Event 10 (NGH, 2022) for further information.

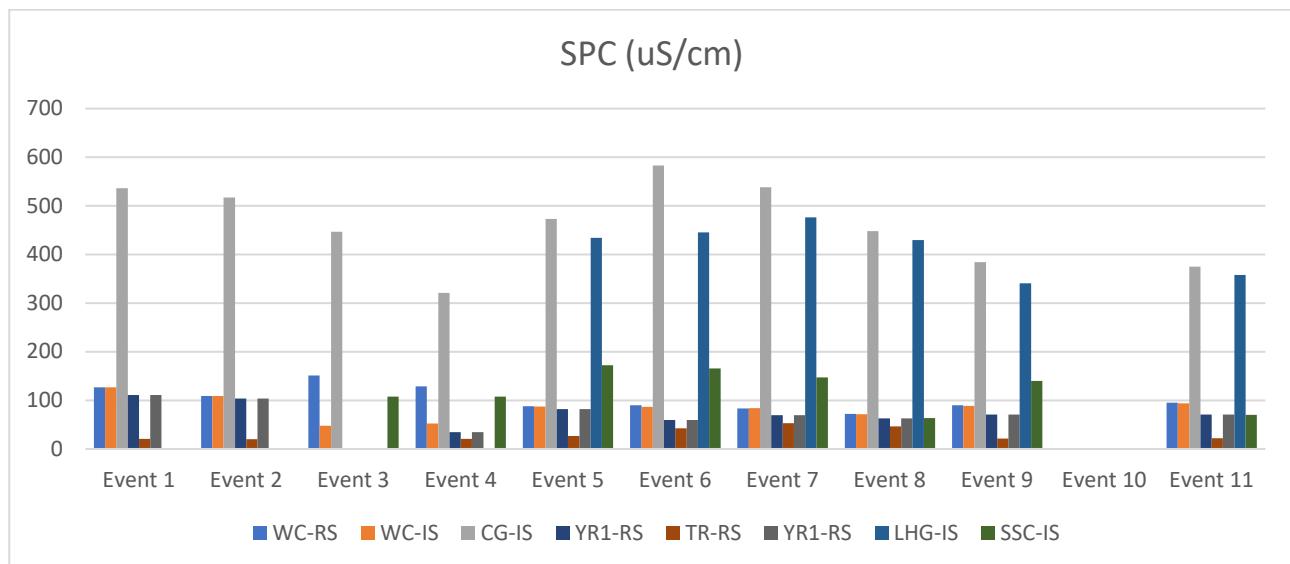


Figure 3-10 Specific Conductance (SPC $\mu\text{S}/\text{cm}$) for Talbingo Reservoir catchment

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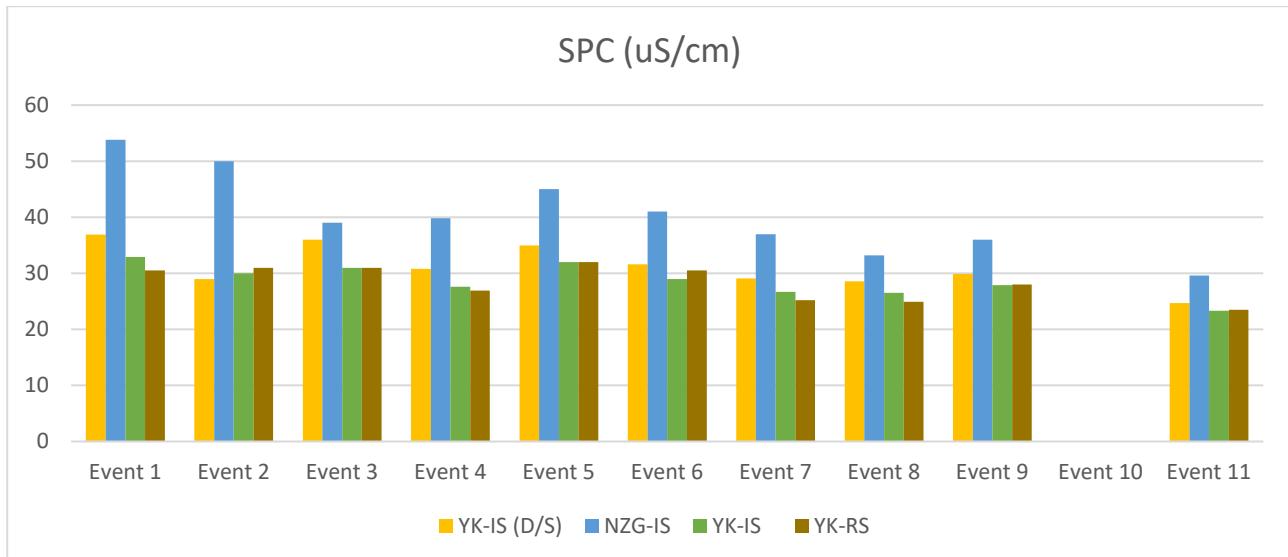


Figure 3-11 Specific Conductance (SPC $\mu\text{S}/\text{cm}$) for Yorkers Creek catchment

Conductivity at CG-IS for Event 11 has decreased from 415.7 $\mu\text{S}/\text{cm}$ in Event 10 to 315.2 $\mu\text{S}/\text{cm}$, refer to

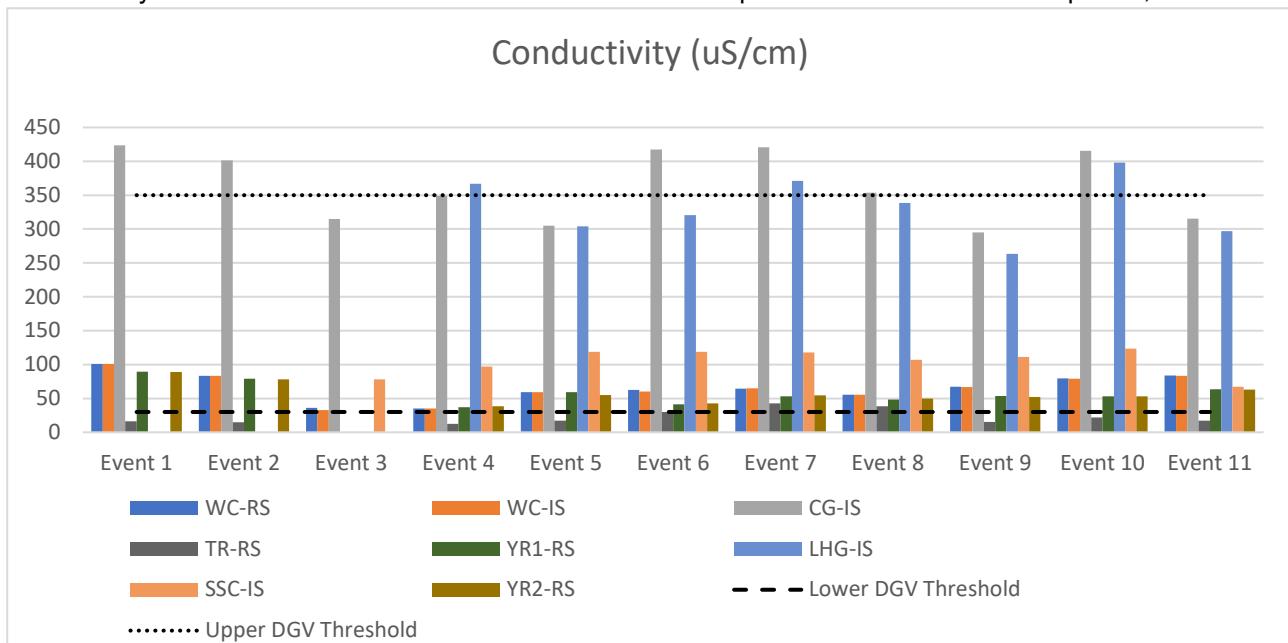
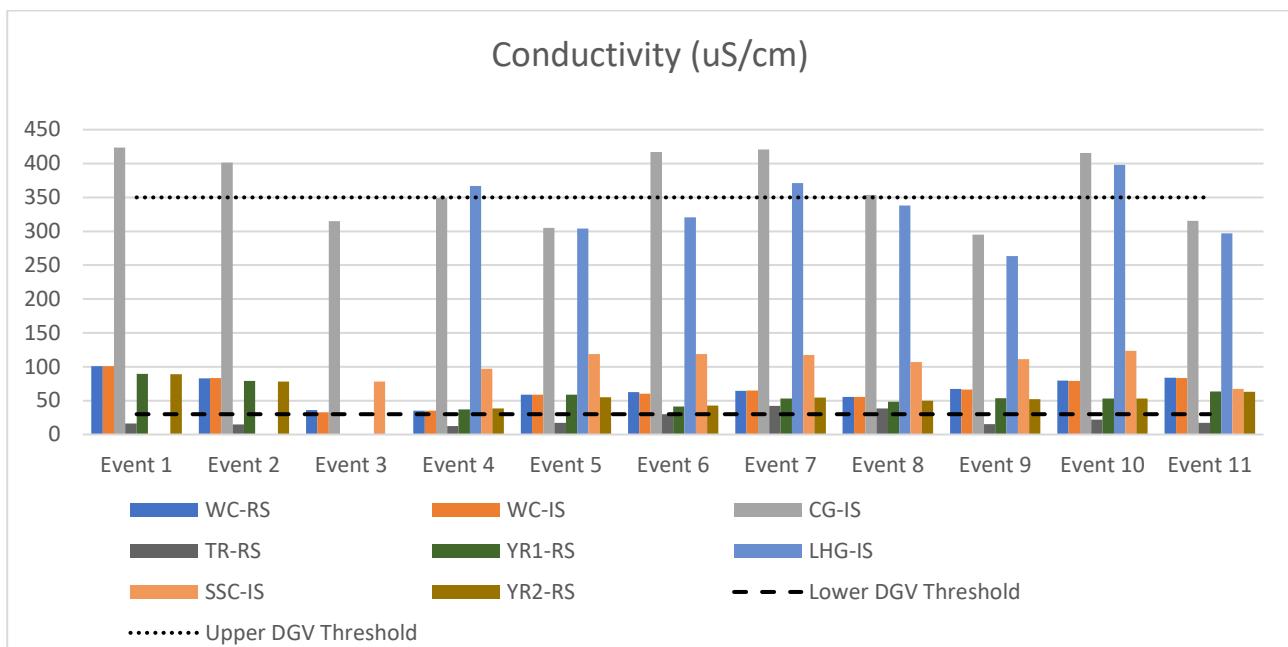
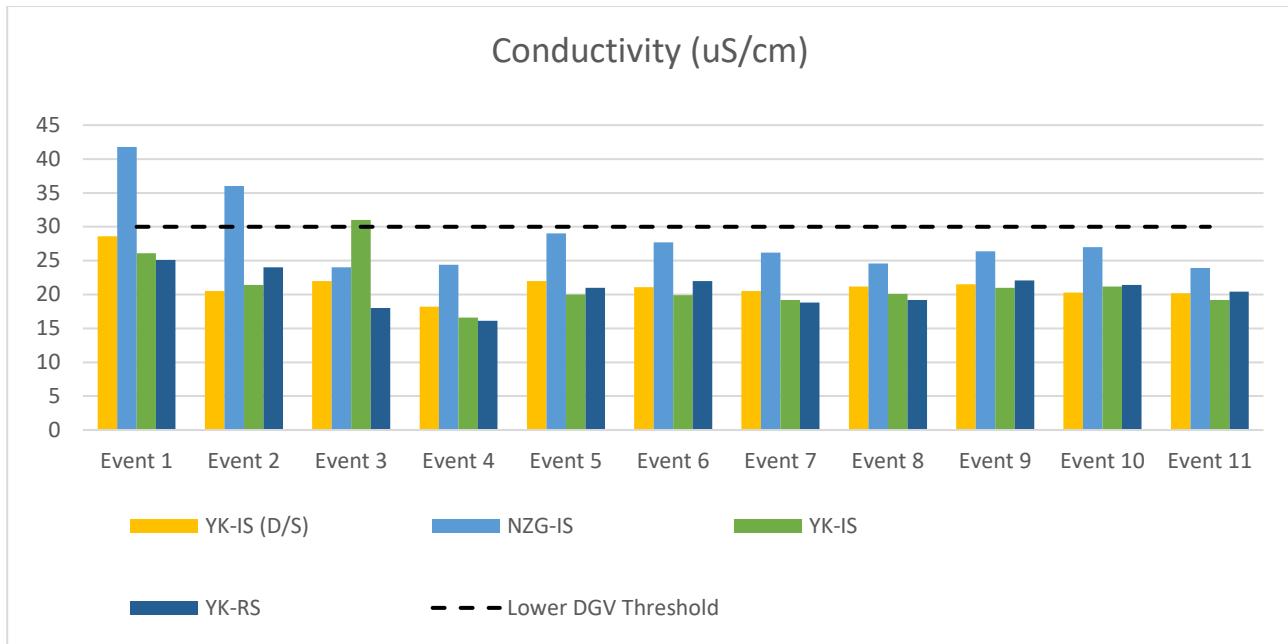


Figure 3-12. Similarly, LHG-IS has a reading of 297 $\mu\text{S}/\text{cm}$ for Event 11, which is down from 397.9 $\mu\text{S}/\text{cm}$ during Event 11. Results for the rest of the Talbingo Reservoir catchment have remained relatively consistent since Event 4 with a returned result from Event 10 of 17.2 $\mu\text{S}/\text{cm}$. Results for the Yorkers Creek catchment continue to return relatively low conductivity readings, refer to Figure 3-13. This is considered likely a result of the geology upstream. The pattern between sites is mostly reflective of the pattern for specific conductance.

Figure 3-12 Conductivity ($\mu\text{S}/\text{cm}$) for Talbingo Reservoir catchmentFigure 3-13 Conductivity ($\mu\text{S}/\text{cm}$) for Yorkers Creek catchment

Turbidity values were within the DGV thresholds (2 – 25 NTU) for all sites during Event 11. Turbidity readings within the Talbingo Reservoir catchment have notably decreased since Event 8, refer to Figure 3-14 and Figure 3-15. Turbidity readings within the Yorkers Creek catchment have remained relatively consistent, refer to Figure 3-16. The lowest value for Event 11 was 1.2 NTU at CG-IS.

Note that the results for CG-IS have been provided in Figure 3-15 in this report to more accurately display the other sampling locations in the Talbingo reservoir catchment.

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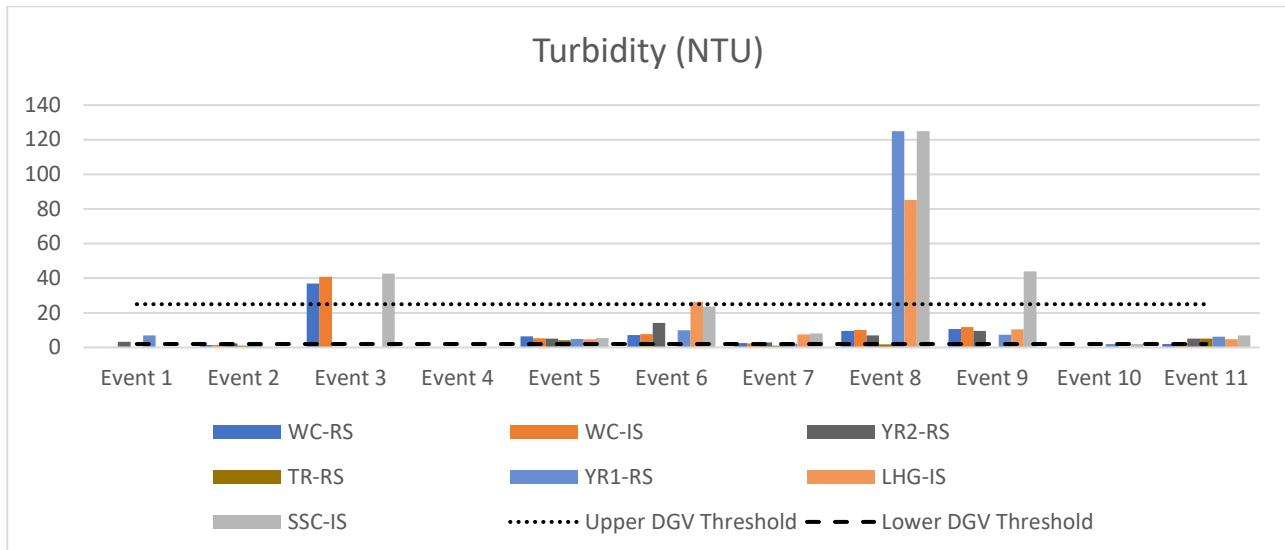


Figure 3-14 Turbidity (NTU) for the Talbingo Reservoir catchment

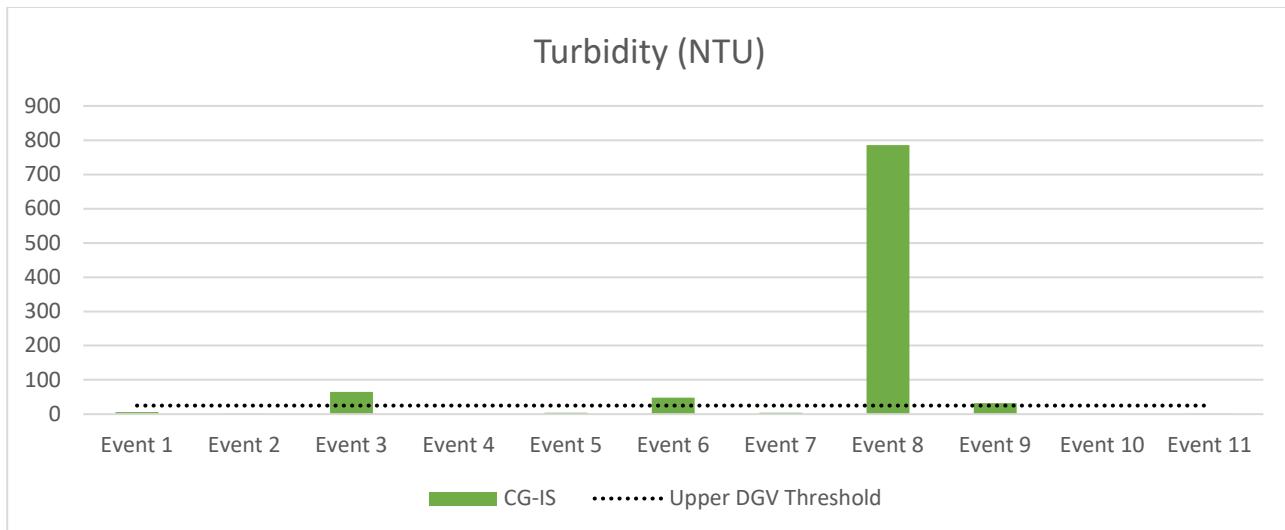


Figure 3-15 Turbidity (NTU) for CG-IS, within the Talbingo Reservoir catchment

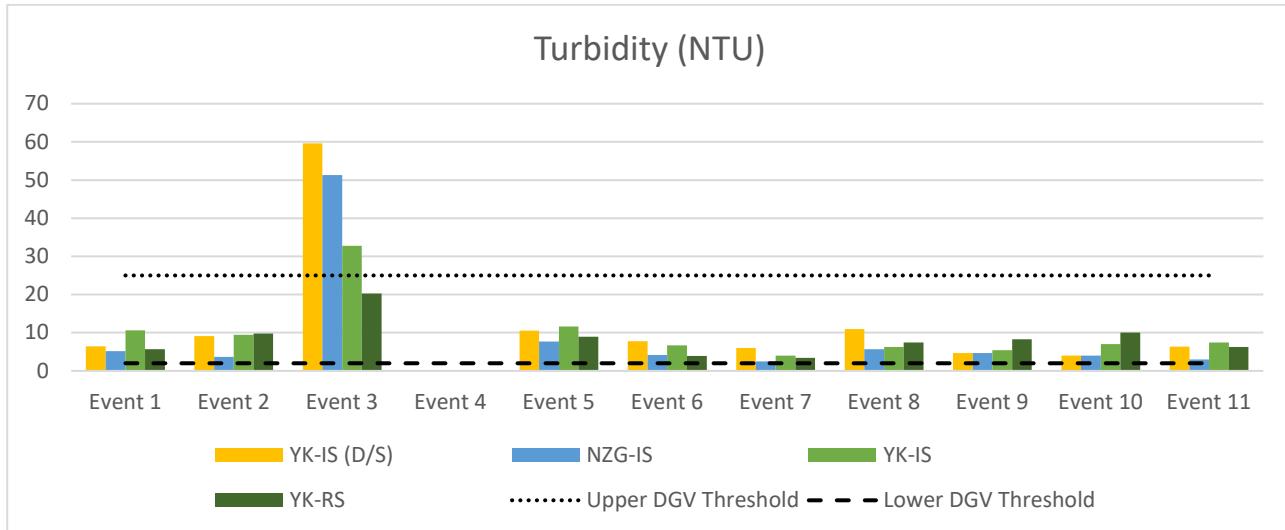


Figure 3-16 Turbidity (NTU) for the Yorkers Creek catchment

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Total suspended solids have slightly increased at YR1-RS, YR2-RS and TR-RS within the Talbingo Reservoir catchment since Event 9 and Event 10, refer to Figure 3-17 and Figure 3-18. Total suspended solids have remained relatively consistent within the Yorkers Creek catchment with the exception of NZG-IS, which decreased from 7 mg/L in Event 10 to below the limit of reporting (0.2 mg/L) for Event 11, refer to Figure 3-19.

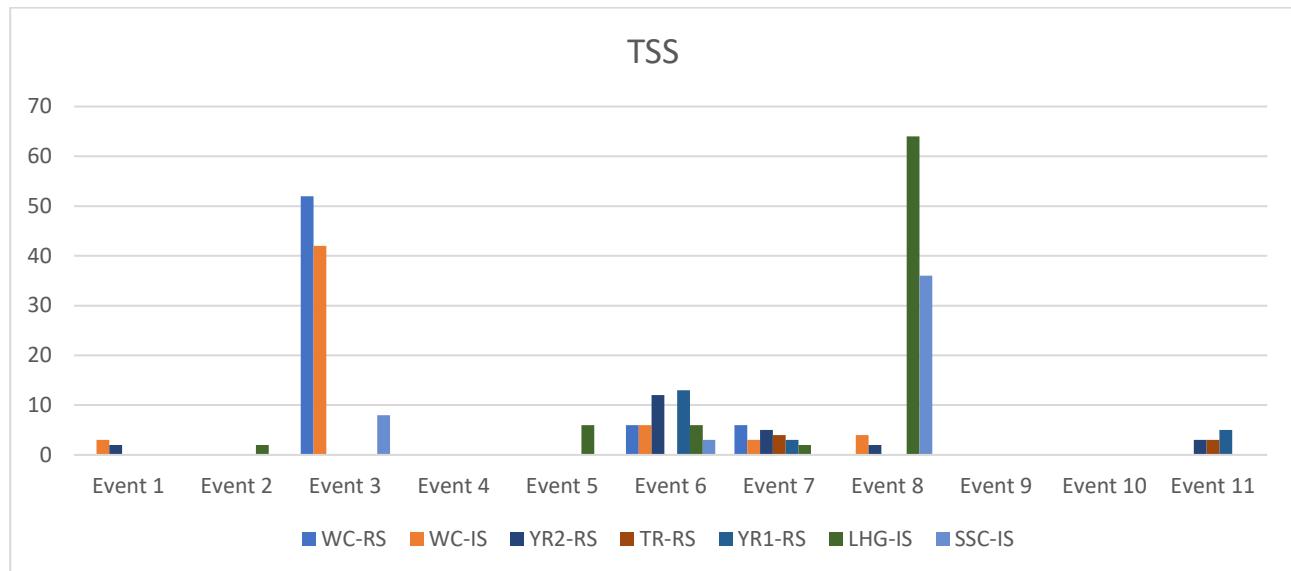


Figure 3-17 Total Suspended Solids for the Talbingo Reservoir catchment

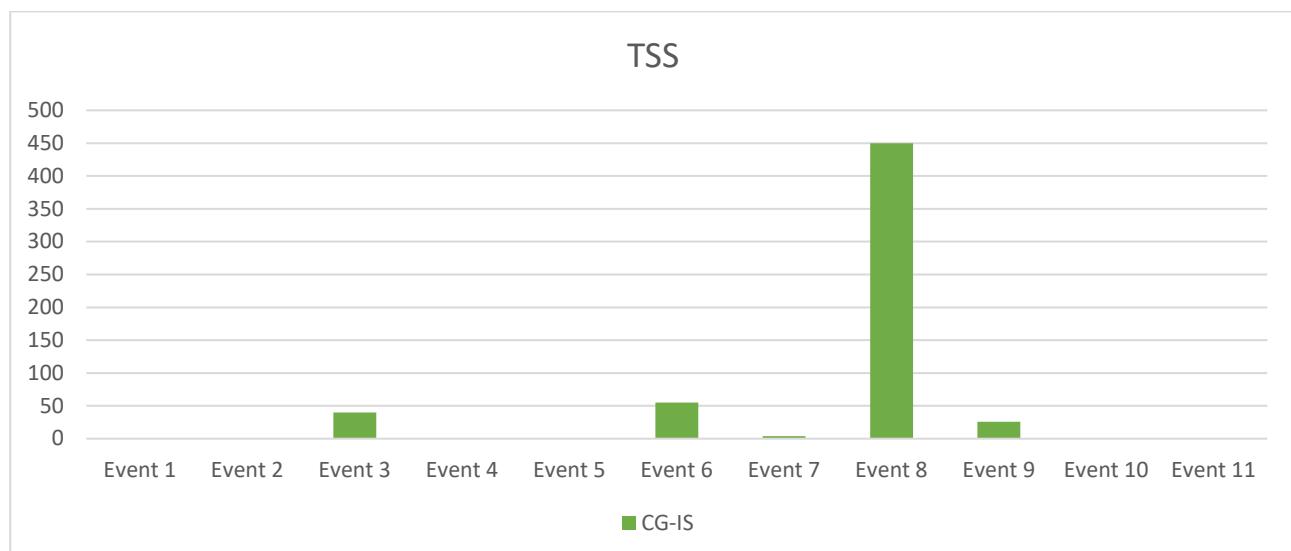


Figure 3-18 Total Suspended Solids for CG-IS, within the Talbingo Reservoir catchment

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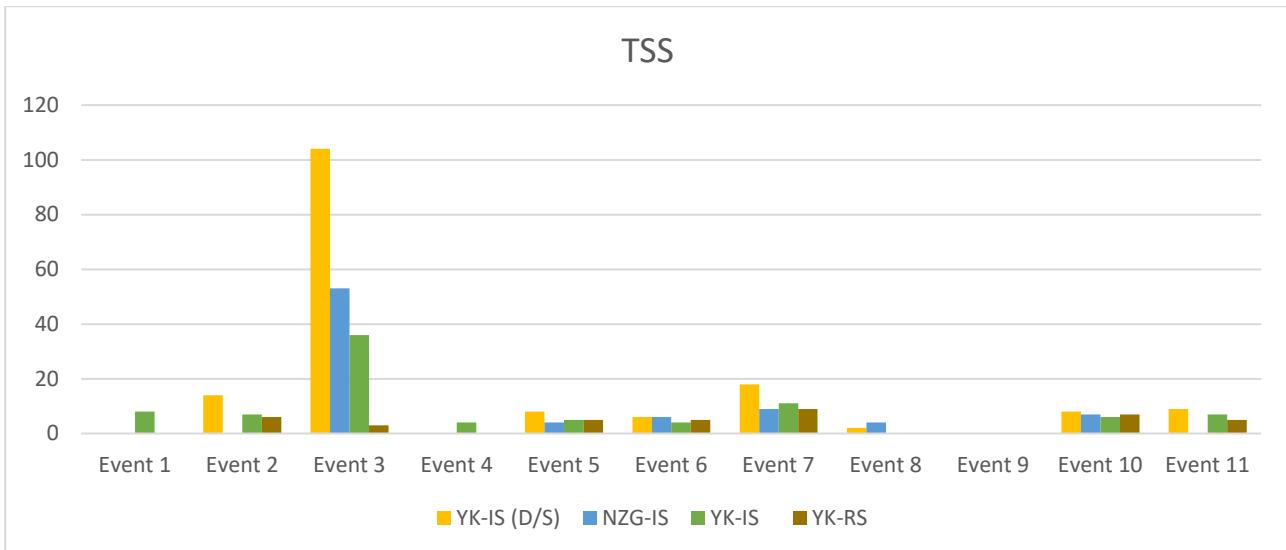


Figure 3-19 Total Suspended Solids for the Yorkers Creek catchment

Values of pH for the Talbingo Reservoir catchment have remained relatively consistent since Event 7. All of the sites had values of pH that fell within the DGV range of 6.5 to 8 pH units, refer to Figure 3-20. There has been a reduction in pH at TR-RS (6.86 pH units) when compared with Event 10 (7.46 pH units).

Values of pH for the Yorkers Creek catchment indicate that there has been a slight decrease in pH since Event 10, refer to Figure 3-21. Two sites within the catchment, YK-IS (6.33 pH units) and YK-RS (6.40 pH units) fell below the lower DGV value of 6.5 pH units.

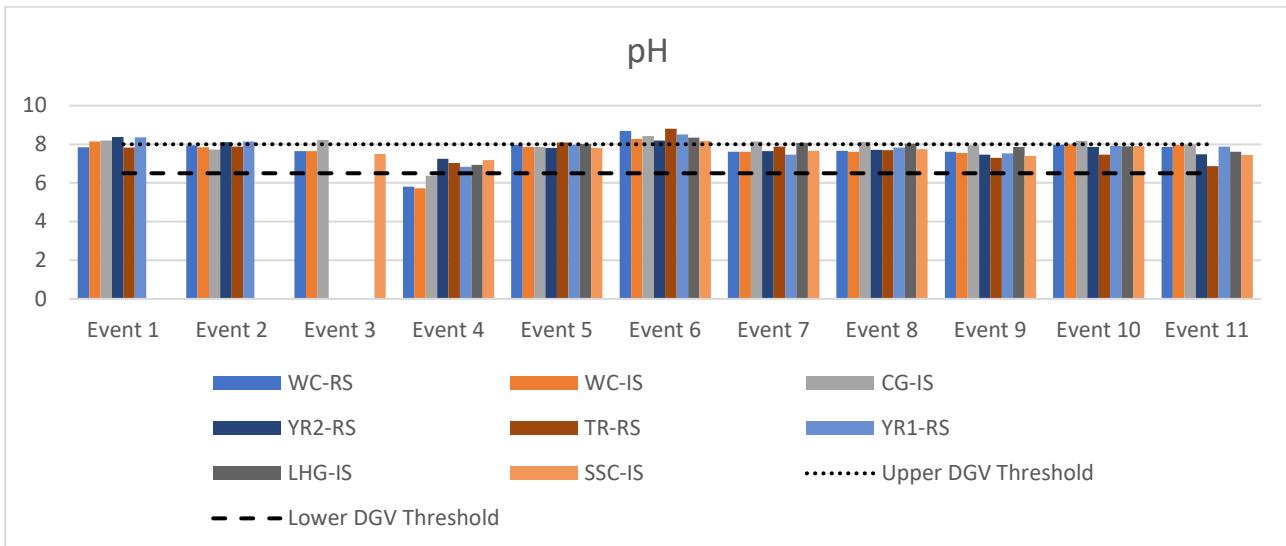


Figure 3-20 Potential of Hydrogen (pH) for Talbingo Reservoir catchment

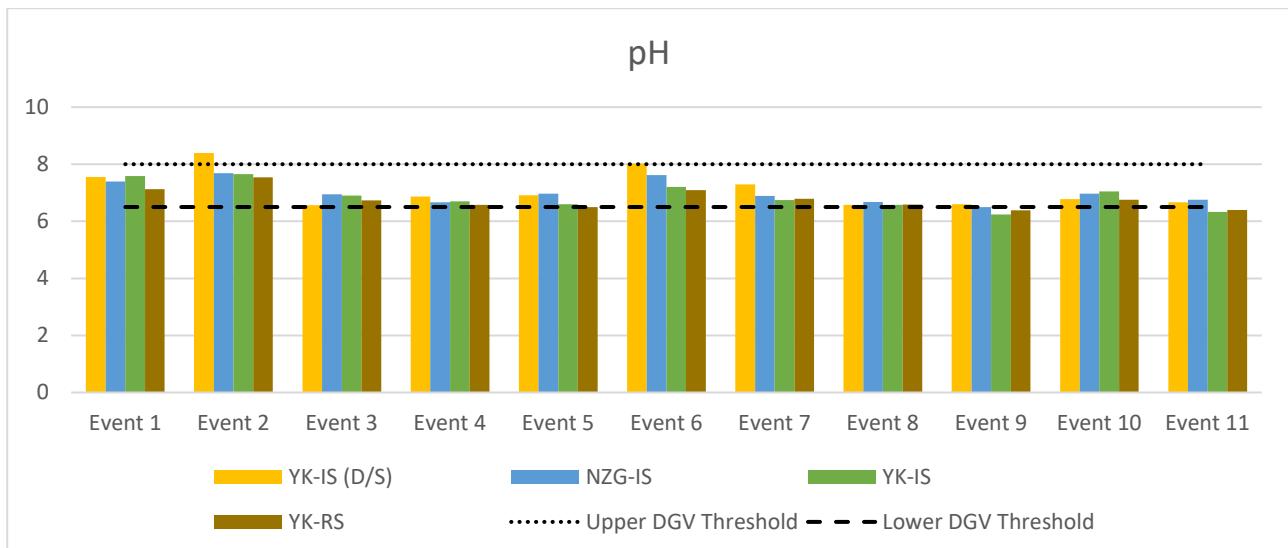


Figure 3-21 Potential of Hydrogen (pH) for Yorkers Creek catchment

The values for the oxygen redox potential during Event 10 have decreased at most sites within the Talbingo Reservoir catchment, with the exception of TR-RS, LHG-IS and YR2-RS, refer to Figure 3-22. Oxygen redox potential increased for all sites within the Yorkers Creek catchments, refer to Figure 3-23.

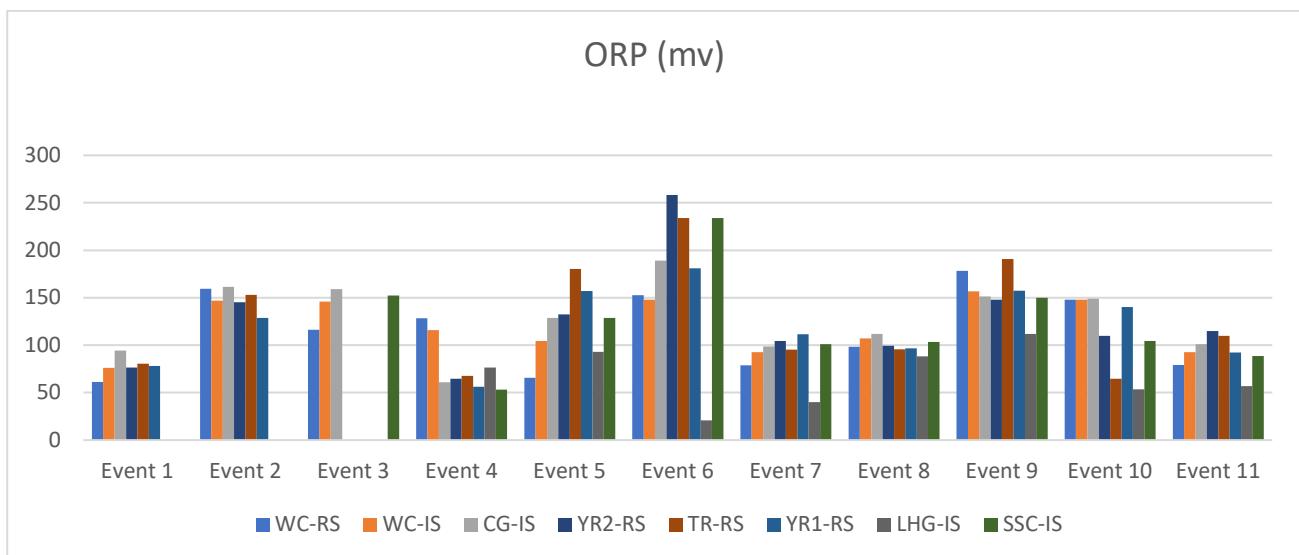


Figure 3-22 Oxygen Redox Potential (ORP) for Talbingo Reservoir catchment

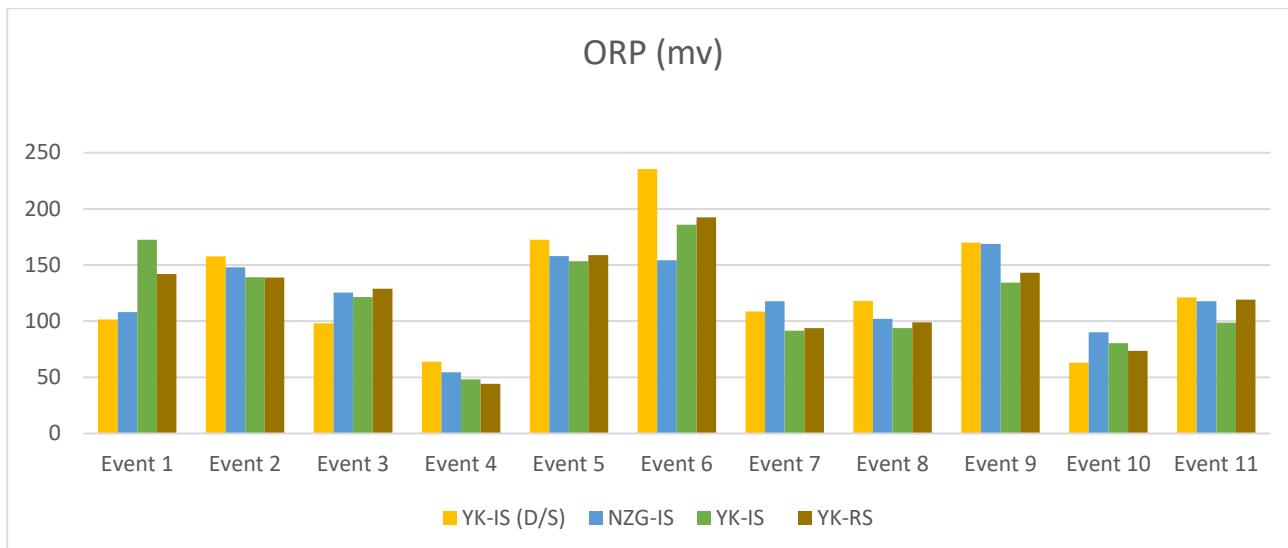


Figure 3-23 Oxygen Redox Potential (ORP) for Yorkers Creek catchment

3.1.2. Quality Assurance / Quality Control

A Quality Assurance and Quality Control (QA/QC) program was undertaken as part of this investigation including:

- A field duplicate sample, at a rate of one per 20 samples, was taken (DUP01) from the WQM site WC-RS on 18 January 2023. DUP01 was analysed for metals and metalloids. The duplicate sample has been compared against the WC-RS sample by Relative Percentage Difference (RPD) and has returned within an acceptable range or less than 30% for inorganic or less than 5 times the laboratory limit of reporting (LOR).
- A water blank was supplied by the laboratory. The water blank sample was analysed for metals and metalloids. There were no exceedances of the sample results above the LORs.

NGH consider the QA/QC program to have been effective and the data reliable and representative to achieve the objectives of the investigation.

Refer to Appendix C for the laboratory analysis certificate, Appendix D for the RPD Table and Appendix E for the calibration certificates.

4. Conclusion

Water temperatures have generally increased across the sites compared to the water temperatures for Event 10. Water quality monitoring results for Event 11 were generally consistent with Event 10. Results for Event 11 did indicate that there has been a slight decrease in pH within the Yorkers Creek catchment, when compared to the results for Event 10. Oxidation reduction potential has decreased within the Talbingo Reservoir catchment and increased within the Yorkers Creek catchment, when compared to results from Event 10.

Laboratory results for Event 11 were generally consistent with the results of the previous monitoring events with the majority of analytes reported below the Limit of Reporting. Results exceeded the DGV for:

- Total suspended solids (0.2 mg/L) at YR1-RS, YR2-RS, TR-RS, YK-IS (D/S), YK-IS, and YK-RS
- Iron (0.3 mg/L) at YK-IS (D/S) and YK-RS
- Aluminium (0.027 mg/L) at most sites: TR-RS, LHG-IS, YR2-RS, SSC-IS, YK-IS (D/S), NZG-IS, YK-RS and YK-IS
- Zinc (0.0024 mg/L) at CG-IS and LHG-IS
- Total dissolved solids were elevated at CG-IS and LHG-IS, which is a pattern that has carried through all events.

All results and statistics are provided in Appendix A.

5. References

- Jacobs Pty Ltd. 2020. *Snowy 2.0 Transmission Connection Project EIS*.
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- TransGrid. 2021b. *Snowy 2.0 Transmission Connection Project Amendment Report*.

APPENDIX A EVENT DATA TABLE

Shear/ oil/grease		Temp. (°C)		Dissolve d Oxygen (DO %)		Specific EC (SPC) (µS/cm)		EC (µS/cm)		pH	Redox (mV)		Turbidity (NTU)		Al (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Chloride (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Hg (mg/L)	TN (mg/L)	TP (mg/L)	Ag (mg/L)	TDS mg/L	TSS (mg/L)	Zn (mg/L)
22-013 Pre-construction WQM	DGV (Default Guideline Value)	No	-	90-110	-	-	-	30-350	6.5-8	-	2-25	0.027	0.0008	0.00006	0.00001	0.001	0.004	0.3	0.001	1.2	0.00006	0.008	0.25	0.02	0.00002	-	0.2	0.0024		
WC-RS	Event 1	No	14.2	90.5	9.26	126.8	100.7	7.85	61.2	0.37	0.01	0.00018	0.00007	0.00005	0.00007	0.001	0.005	0.05	0.001	0.00015	0.0005	3	0.005	0.00001	12	0.1	0.001			
	Event 2	but on sediment	12.4	73.5	7.84	109	83.1	7.95	159.4	1.49	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	1	0.005	0.00001	1	0.1	0.001			
	Event 3	No	9.3	10.3	7.05	101	36.7	7.08	118.8	36.96	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	59	0.0	0.001	59	0.1	0.001			
	Event 4	No	7.3	75.1	12.78	128.9	35.3	5.9	128.4	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	19	0.1	0.001	19	0.1	0.001				
	Event 5	No	7.8	98.9	11.76	88	59	7.96	65.8	645	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	56	0.1	0.001	56	0.1	0.001			
	Event 6	No	9.3	79.86	9.74	89.6	62.7	8.69	152.6	7.15	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	44	6	0.001	44	6	0.001			
	Event 7	no	13.2	74.9	7.87	83.5	64.6	7.62	78.7	2.62	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	53	6	0.001	53	6	0.001			
	Event 8	no	13.1	74.5	7.84	71.8	55.4	7.67	98.4	9.52	0.079	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	39	0.1	0.001	39	0.1	0.001			
	Event 9	No	11.3	102.1	10.52	90	67.4	7.93	170.2	0.3	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	24	0.1	0.001	24	0.1	0.001			
	Event 10	No	11.7	9.15	79.5	7.97	147.8	0.3	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	74	0.1	0.001	74	0.1	0.001					
	Event 11	No	18.9	100.6	8.7	94.9	83.9	7.86	79.1	1.94	0.03	0.0018	0.00001	0.00005	0.00007	0.002	0.005	0.005	0.001	0.00015	0.0005	51	0.1	0.001	51	0.1	0.001			
	Min		7.30	61.30	7.05	71.0	35.0	5.80	61.20	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.01	0.00	1.00	0.00	0.00	0.00	0.00			
	Max		18.90	102.10	12.78	151.8	100.70	8.00	178.40	36.96	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52	0.0	0.00	52	0.1	0.001			
	Mean		11.73	83.13	9.36	103.0	66.15	7.65	115.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.10	1.00	0.00	0.00	0.00	0.00			
	Count		11.00	10.00	11.00	10.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00				
	St. Dev		3.31	9.96	1.85	24.77	20.44	0.78	10.96	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.96	15.47	0.01	21.96	15.47	0.01			
	WC-IS	Event 1	No	14.3	90.6	9.28	126.7	100.8	8.14	0.37	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	81	0.05	0.00001	80	3	0.001			
	Event 2	No	12.5	69.9	7.44	109	83.3	7.84	146.8	0.35	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	63	0.1	0.001	63	0.1	0.001			
	Event 3	No	8.3	61.2	7.03	48	33	7.64	145.8	40.77	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	41	42	0.001	41	42	0.001			
	Event 4	No	7.4	43.7	5.65	42.5	52.3	5.73	11.25	0.53	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	24	0.1	0.001	24	0.1	0.001			
	Event 5	No	7.9	84.4	1.65	87	89.6	7.05	100.3	5.24	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	48	0.1	0.001	48	0.1	0.001			
	Event 6	No	8.3	72.95	0.95	86.6	60.3	8.28	143.8	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	47	6	0.001	47	6	0.001				
	Event 7	No	13.3	75.1	7.86	83.8	65.1	7.61	92.6	2.41	0.015	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	4	3	0.001	4	3	0.001			
	Event 8	No	13.1	74.4	7.82	71.7	55.4	7.62	107.1	10.1	0.016	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	1	4	0.001	1	4	0.001			
	Event 9	No	12	102.2	11.02	88.7	66.7	7.55	158.16	11.9	0.36	0.0018	0.00001	0.00005	0.00007	0.001	0.005	0.005	0.001	0.00015	0.0005	66	0.1	0.001	66	0.1	0.001			
	Event 10	No	11.9	10.00	1																									

APPENDIX B OBSERVATIONS AND FIELD DATA

18 + 19 January 2023.

18 - Overcast, showers,

22-013 Pre-construction WQM		Grease/oil/ sheen	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (ppm)	Specific Conductivity (SPC uS/cm)	Conductivity (uS/cm)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
LHG-IS	Month	No.	16.1	85.2	7.80	357.9	297.0	7.62	56.9	4.82
	Comment	lower flow. Marsh smell, sediment smell. Clear.								
YR2-RS	Month	No.	19.9	101.8	8.30	74.5	63.1	7.48	88.115.00	5.07
	Comment	lower flow, rock bar exposed again. slightly turbid.								
SSC-IS	Month	No	19.9	101.8	8.66	69.9	67.3	7.44	88.5	6.93
	Comment	Was standing water but with rain throughout the day The flow was many times way off - see photos. Turbid / tanne skinned H2O sample								
TR-RS	Month	No	13.2	19.91.4	8.97	22.3	17.2	6.86	109.9	5.08
	Comment	Very low. Bark exposed. lowest flow has been.								
YK-IS (D/S)	Month	No.	15.4	101.1	8.82	24.7	20.2	6.66	119.121.2	6.32
	Comment	lower flow, clear. Regrowth of reeds on banks.								

Sunny

22-013 Pre-construction WQM		Grease/oil/ sheen	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (ppm)	Specific Conductivity (SPC uS/cm)	Conductivity (uS/cm)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
NZG-IS	Month	No	15.0	98.8	8.74	29.6	23.9	6.75	117.8	3.03
	Comment	Clear, lower flow.								
YK-IS	Month	No	15.9	96.0	8.29	23.3	19.2	6.33	98.6	7.47
	Comment	Cloudy, lower flow.								
YK-RS	Month	No	18.0	101.3	8.35	23.5	1620.4	6.40	119.1	6.30
	Comment	Clear, lower flow.								

⊗ lots of hooved animals around!

APPENDIX C LABORATORY CERTIFICATES

NGH Environmental
Suite 1/39 Fitzmaurice Street
Wagga Wagga NSW 2650
Attention: Nicole Isles

Friday, February 10, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>			
		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0213	WC-RS 18.01.23	Aluminium (dissolved)	0.03 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	52 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0214	WC-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0214	WC-IS 18.01.23	Aluminium (dissolved)	0.03 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.03 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	43 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0215	CG-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0215	CG-IS 18.01.23	Aluminium (dissolved)	0.05 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.01 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	288 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	0.004 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0216	YR1-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0216	YR1-IS 18.01.23	Aluminium (dissolved)	0.22 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.16 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	50 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	5 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0217	LHG-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0217	LHG-IS 18.01.23	Aluminium (dissolved)	0.05 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.08 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.005 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	311 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	0.003 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0218	YR2-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0218	YR2-IS 18.01.23	Aluminium (dissolved)	0.10 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.08 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	92 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	3 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0219	SSC-IS 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0219	SSC-IS 18.01.23	Aluminium (dissolved)	0.04 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	38 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0220	TR-RS 19.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0220	TR-RS 19.01.23	Aluminium (dissolved)	0.06 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.09 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	<2 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	3 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0221	YK-IS (d/s) 19.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0221	YK-IS (d/s) 19.01.23	Aluminium (dissolved)	0.42 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.47 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	12 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	9 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0222	NZG-IS 19.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0222	NZG-IS 19.01.23	Aluminium (dissolved)	0.23 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.22 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	79 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0223	YK-IS 19.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0223	YK-IS 19.01.23	Aluminium (dissolved)	0.36 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.40 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	2 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	7 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0224	YK-RS 19.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0224	YK-RS 19.01.23	Aluminium (dissolved)	0.37 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	0.54 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	78 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	5 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0225	DUP01 18.01.23				

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		19-January-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Jan-0225	DUP01 18.01.23	Aluminium (dissolved)	0.03 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Jan-0226	WATER BLANK				
		Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Arsenic	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B	0.01

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		19-January-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	Client	19-January-2023		
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
				<u>Limit of Reporting</u>
23Jan-0226	WATER BLANK			
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.01
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B 0.002
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002

Note:
** NATA Accreditation does not cover the performance of this service.*

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Water	Client	19-January-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			



Signed Michael Glazier, Laboratory Manager.

<i>All samples analysed as received. All soil results are reported on a dry basis. The EAL takes no responsibility for the end use of results within this report. This report shall not be reproduced except in full. This report replaces any previously issued report</i>

APPENDIX D RPD TABLE

			Al (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Cyanide (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Hg (mg/L)	Ni (mg/L)	Ag (mg/L)	Zn (mg/L)
DUP01	Event 1	DUP01	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		YR1-IS	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 2	DUP01	<0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.001	0.000015	0.0005	0.00001	0.001
		WC-IS	<0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.002	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range except Mn	0%	0%	0%	0%	0%	0%	0%	0%	67%	0%	0%	0%	0%
	Event 3	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		YK-IS (DS)	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Water Blanks	Event 4	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 5	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 6	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 7	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Water Blanks	Event 8	DUP01	1.79	0.00015	0.00001	0.000005	0.0001	0.001	0.73	0.0005	0.011	0.000015	0.0005	0.00001	0.002
		SSC-IS	1.73	0.00015	0.00001	0.000005	0.0001	0.001	0.69	0.0005	0.011	0.000015	0.0005	0.00001	0.002
		RPD% - Acceptable Range	3.4090909	0%	0%	0%	0%	0%	28.57	0%	0%	0%	0%	0%	0%
	Event 9	DUP01	0.35	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		WC-RS	0.36	0.00015	0.00001	0.000005	0.0001	0.001	0.08	0.0005	0.004	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	2.82	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 10	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.09	0.0005	0.005	0.000015	0.0005	0.00001	0.006
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.08	0.0005	0.004	0.000015	0.0005	0.00001	0.019
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	11.76	0%	0%	0%	0%	0%	0%
	Event 11	DUP01	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.02	0.0005	0.005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.02	0.0005	0.005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

RPD % $= \frac{|(X_2 - X_1)|}{(X_2 + X_1)/2}$

How to calculate the Relative Percent Difference (RPD)

The basic equation for RPD is

$$RPD = \frac{|R1 - R2|}{\frac{R1 + R2}{2}} \times 100$$

where

R1 is sample 1, and
R2 is sample 2.

R1 and R2 are your sample and duplicate values. Basically, this equation has you calculate the RPD by dividing the difference between the sample and duplicate by the average of the two. Using absolute value signs ensures the RPD doesn't end up as a negative percentage, which wouldn't make sense when looking for a percent difference.

The equation you plug into Excel looks like this:

=ABS((B3-C3)/AVERAGE(B3:C3)*100)

ABS stands for Absolute Value. Using the cell labels in the equation, as seen above (B3, C3), allows you to use the equation down for all your sample/duplicate pairs so you don't have to write a new equation each time. You can do this by clicking on the cell with the equation in it, then click and drag the bottom right corner of the cell down for the rest of your samples.

APPENDIX E CALIBRATION CERTIFICATES