



NGH

UGL

Pre-construction Water Quality Monitoring Report

Event 8 2022

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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.

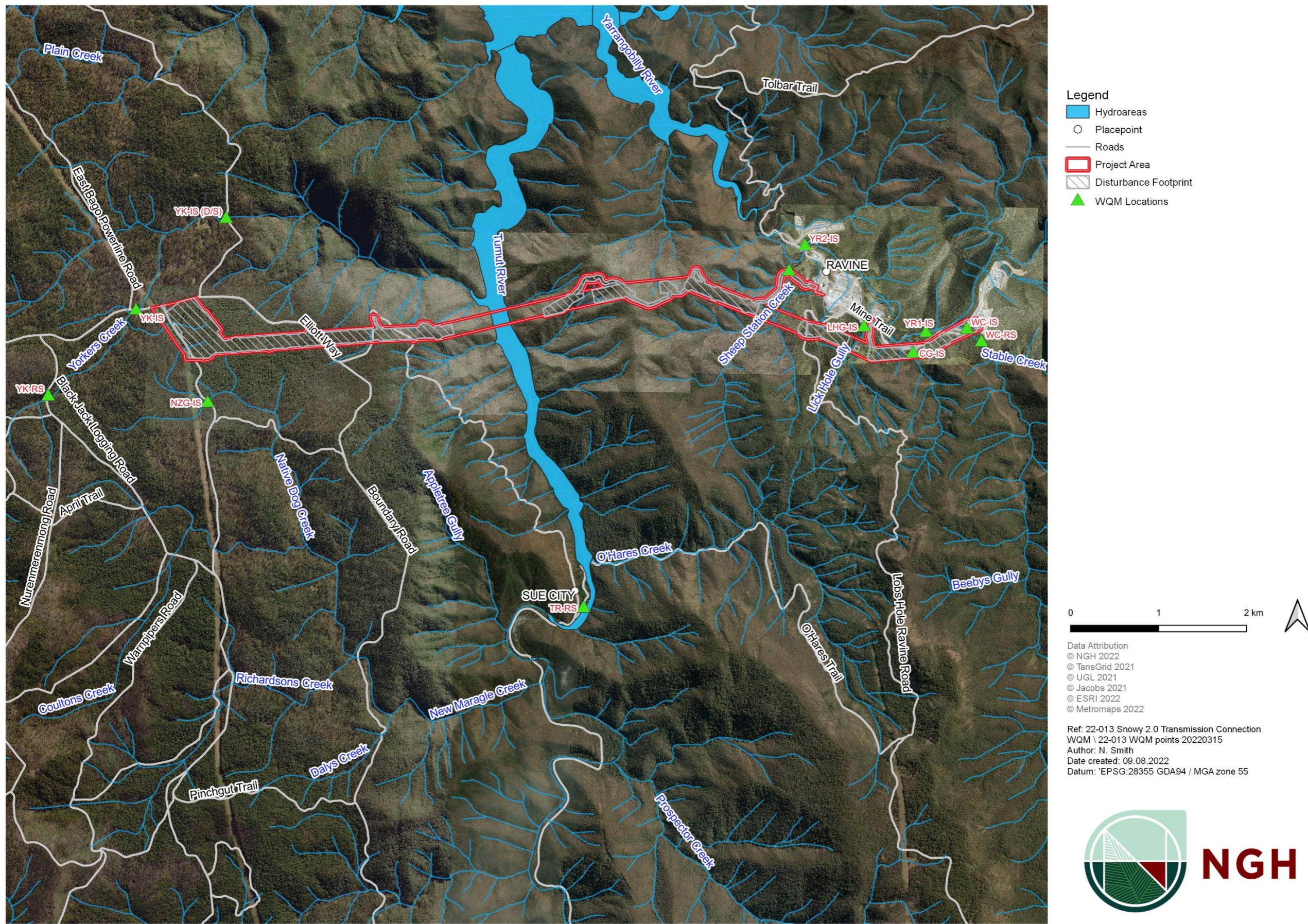


Figure 2-1 WQM locations

3. Monitoring event observations and results

Images for Cave Gully, Lick Hole Gully and Sheep Station Creek are provided as Figure 3-1 to Figure 3-3. 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 8

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) and October (Event 7) 2022. Reports for each event were prepared following receipt of the laboratory results (NGH 2022a; 2022b; 2022c; 2022d; 2022e, 2022f, 2022g). The results of Event 1 through to Event 7 have been compared in this report to the results of Event 8.

NGH Environmental Scientist, Nicola Smith, conducted the monitoring event with a UGL representative on 26 and 27 October 2022 (Event 8). The weather was overcast, with low cloud and a breeze. Data from the Cabramurra SMHEA automatic weather station on 26 October 2022 (Station ID 072161) indicates that wind speeds were from the west-north-west at 17km/hr in the morning, with wind speeds of 37km/hr in the afternoon. Temperatures on the day included a low of 7.6°C and a high of 10.1°C. Data from the Tumbarumba weather station for 27 October 2022 (Station ID 072043) indicates that wind speeds were from the north at 13km/hr. Temperatures on the day included a low of 11.5°C and a high of 17.5°C.

Generally, water flow was observed to be turbid 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. Flow was observed to have maintained an elevated level compared to Events 1 and 2 in all channels as a result of the wet weather or snow melt.

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Figure 3-1 Cave Gully (CG-IS)



Figure 3-2 Lick Hole Gully (LHG-IS)



Figure 3-3 Sheep Station Creek (SSC-IS)

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
YR1-RS	Aluminium mg/L	0.027	0.088	
WC-RS	Aluminium mg/L	0.027	0.079	Much higher than other sampling events.
WC-IS	Aluminium mg/L	0.027	0.076	Much higher than other sampling events.
	Total Suspended Solids (TSS)	0.2	4	This is consistent with prior sampling events for this site.
CG-IS	Aluminium mg/L	0.027	1.06	Always returns a high total dissolved solid result. However, this event the water was obviously turbid, refer to Figure 3-1.
	Iron mg/L	0.3	0.52	
	Total Dissolved Solids (TDS)		277	
	Total Suspended Solids (TSS)	0.2	450	
LHG-IS	Aluminium mg/L	0.027	0.41	Always returns a high total dissolved solid result. However, this event the water was obviously turbid, refer to Figure 3-2.
	Total Dissolved Solids (TDS)		273	
	Total Suspended Solids (TSS)	0.2	64	
YR2-RS	Aluminium mg/L	0.027	0.1	Receives flow from CG-IS and LHG-IS regarding increase in TSS.
	Total Suspended Solids (TSS)	0.2	2	

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Site identification	Analyte	DGV	Result	Comment
SSC-IS	Aluminium mg/L	0.027	1.73	During this sampling event the water was obviously turbid, refer to Figure 3-3.
	Iron mg/L	0.3	0.69	
	Total Suspended Solids (TSS)	0.2	36	
YK-IS (D/S)	Aluminium mg/L	0.027	0.16	Located within Bago State Forest and adjacent to an unsealed track. Unknown activities within the State Forest upstream. Sample taken upstream of culvert. Al and Fe results are less than those from YK-RS and YK-IS, both located upstream.
	Total Suspended Solids (TSS)	0.2	2	
NZG-IS	Aluminium mg/L	0.027	0.1	Located within Bago State Forest. Sample taken upstream of timber supported unsealed track bridge. Banks heavily vegetated, shallow channel.
	Total Suspended Solids (TSS)	0.2	4	
YK-RS	Aluminium mg/L	0.027	0.18	Located within Bago State Forest and adjacent to an unsealed track. Unknown activities within the State Forest upstream. Sample taken downstream of culvert under unsealed track. Flow through culvert is restricted upstream causing a wetland environment.
YK-IS	Aluminium mg/L	0.027	0.18	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 at sites WC-IS, CG-IS, LHG-IS, YR2-RS, SSC-IS, YK-IS (D/S) and NZG-IS were above the 0.2mg/L assigned DGV, refer to Figure 3-17, Figure 3-18, Figure 3-19 and Appendix A.

Water temperatures ranged from 11.4 – 16.1 degrees Celsius with YK-IS (D/S) and NZG-IS at 11.4 degrees Celsius and TR-RS at 16.1 degrees Celsius.

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) and Event 8 (late October). Where a DGV is available, these values are shown on the graph and have been included for dissolved oxygen (%), conductivity, pH and turbidity.

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Temperatures within the Talbingo Reservoir catchment show minor increases when compared to the results from Event 7, refer to Figure 3-4. Temperatures have increased within the Yorkers Creek catchment, refer to Figure 3-5. However, temperatures remain the lowest at YK-IS(D/S), YK-IS and NZG-IS, which are within Bago State Forest.

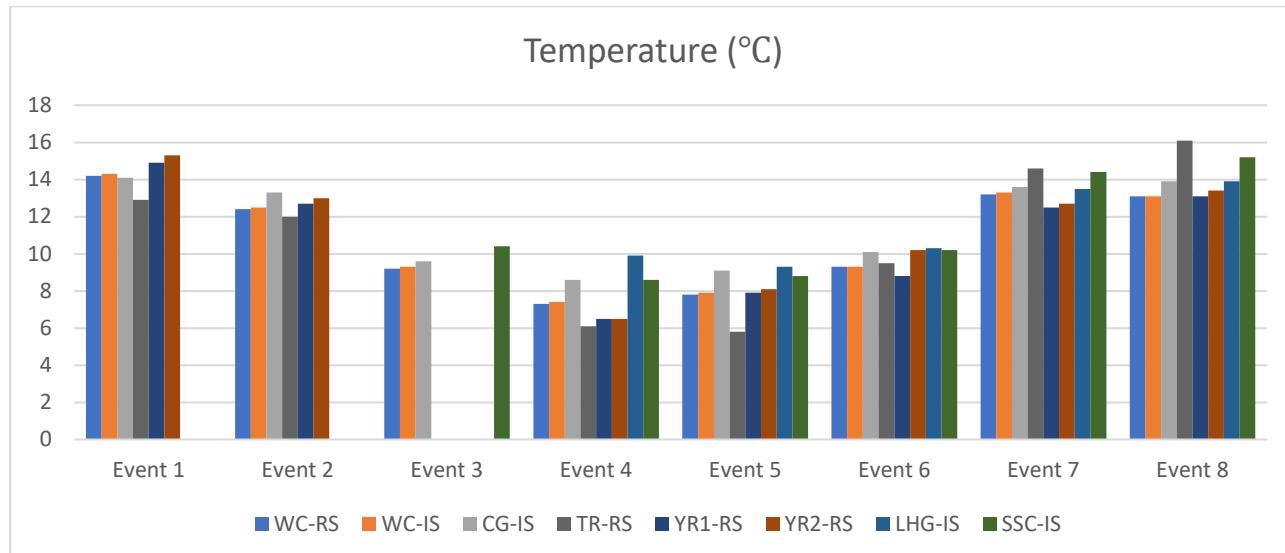


Figure 3-4 Temperature for Talbingo Reservoir catchment

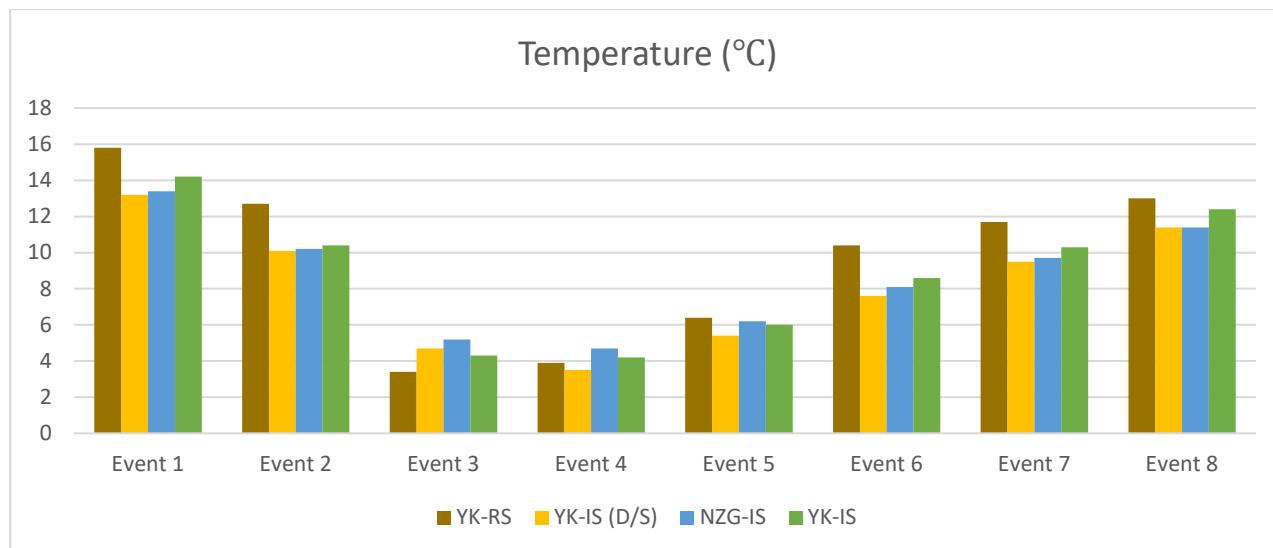


Figure 3-5 Temperature for Yorkers Creek catchment

All DO (%) results for Event 8 were below the DGV range, refer to Figure 3-6 and Figure 3-7. Results were relatively consistent with Event 7, except for TR-RS, which showed a decrease from 92.4% to 81.5%.

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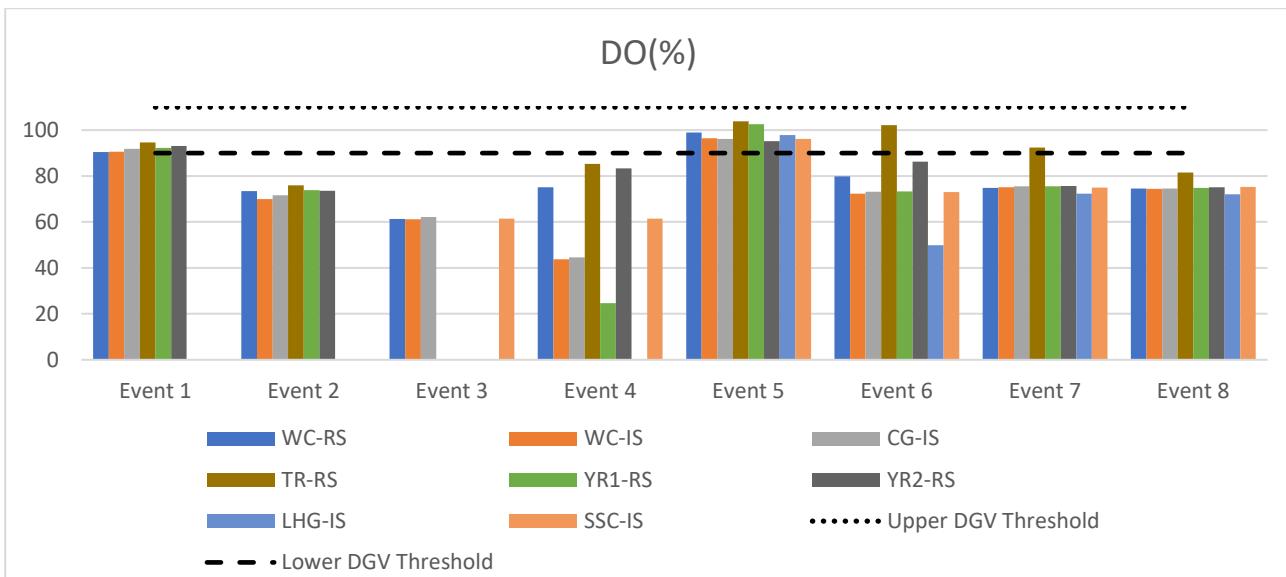


Figure 3-6 Dissolved oxygen (DO%) for Talbingo Reservoir catchment

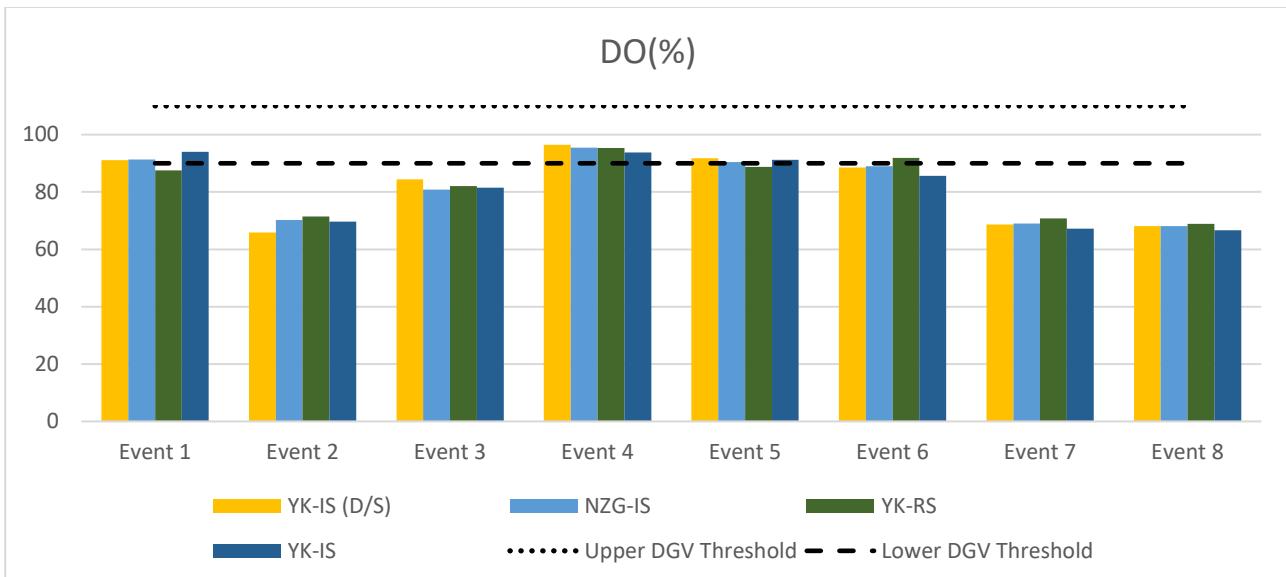


Figure 3-7 Dissolved oxygen (DO%) for Yorkers Creek catchment

The DO (ppm) pattern in the results for Event 8 is similar to Event 7, refer to Figure 3-8 and Figure 3-9. The highest readings of DO (ppm) was recorded within the Talbingo catchment at TR-RS (8.02ppm). The results for TR-RS show a decrease since Event 7 (11.53ppm). Similarly, results at the Yorkers Creek catchment also show a slight decrease in DO (ppm), when compared to Event 7.

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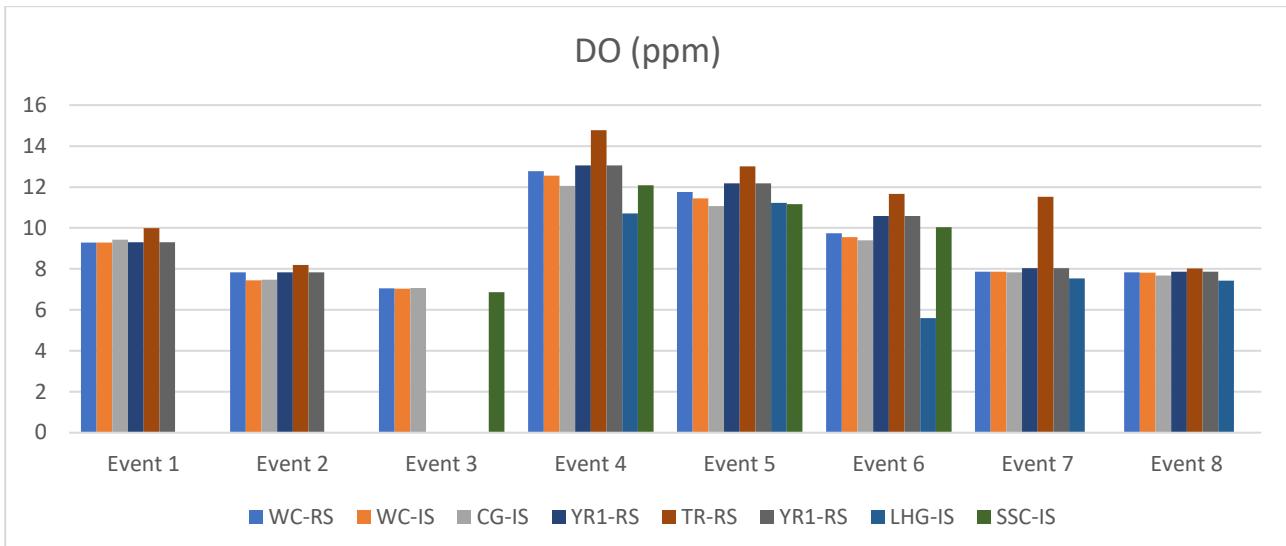


Figure 3-8 Dissolved Oxygen (ppm) for Talbingo Reservoir catchment

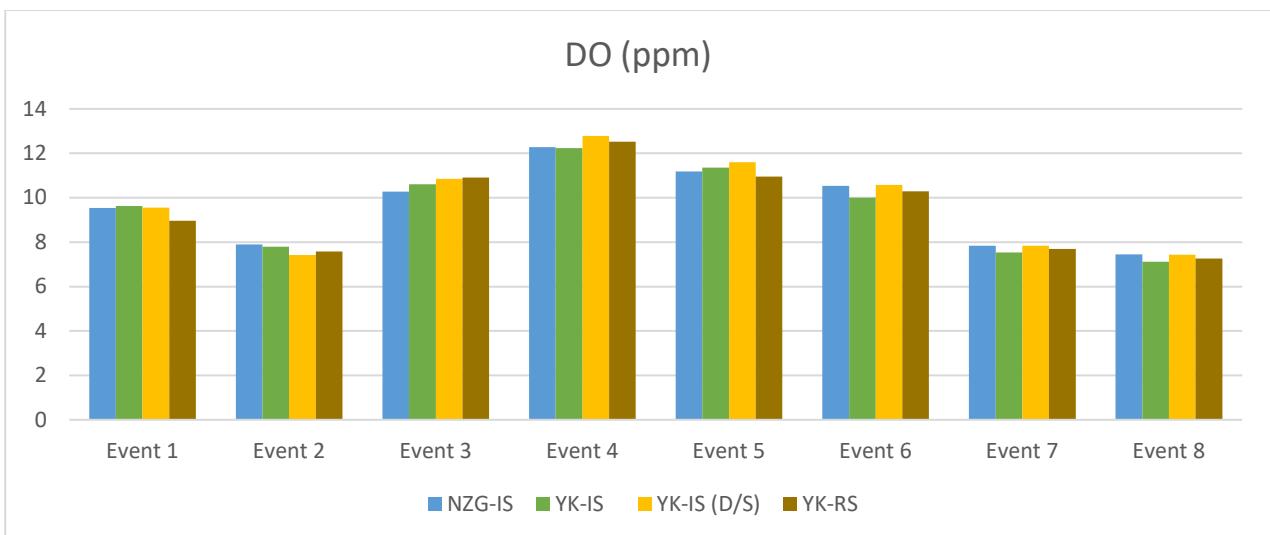


Figure 3-9 Dissolved Oxygen (ppm) for Yorkers Creek catchment

The pattern of specific conductance between sites remains similar between Event 7 and Event 8. CG-IS returned a result of $448.3\mu\text{S}/\text{cm}$ for Event 8, which represents a consistent decrease since Event 6 ($583\mu\text{S}/\text{cm}$) and Event 7 ($538\mu\text{S}/\text{cm}$). LHG-IS also returned a reading of $429.4\mu\text{S}/\text{cm}$ for Event 8, showing a decrease from Event 7 ($476.2\mu\text{S}/\text{cm}$), refer to Figure 3-10. Specific conductance for Event 8 within the Yorkers catchment shows a slight decrease, when compared with Event 7, refer to Figure 3-11.

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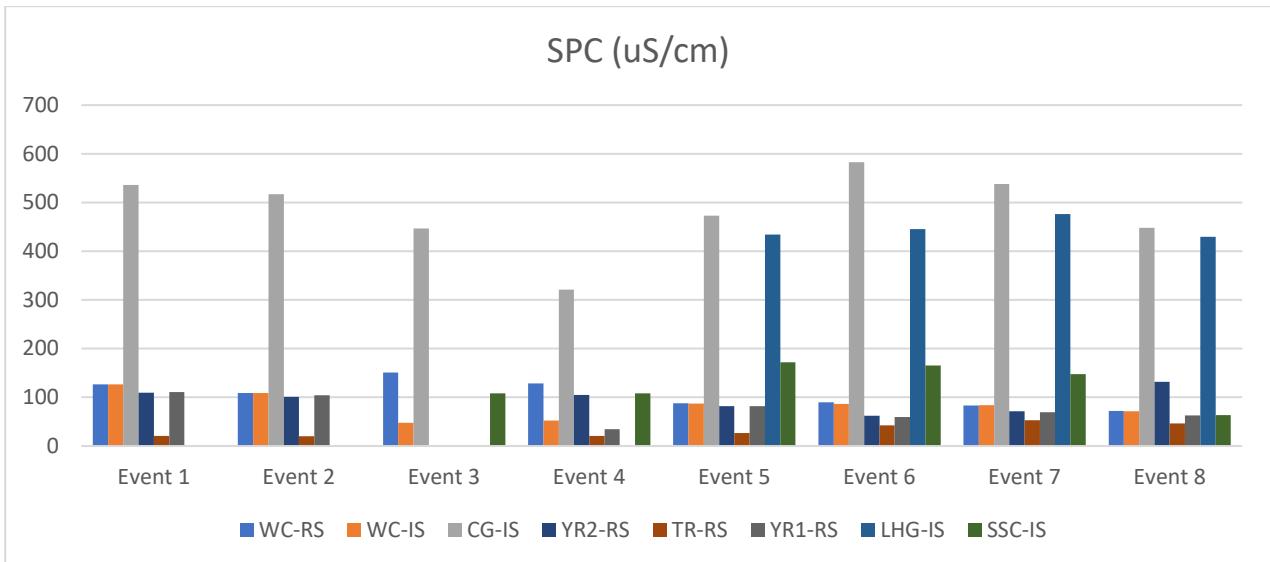


Figure 3-10 Specific Conductance (SPC µS/cm) for Talbingo Reservoir catchment

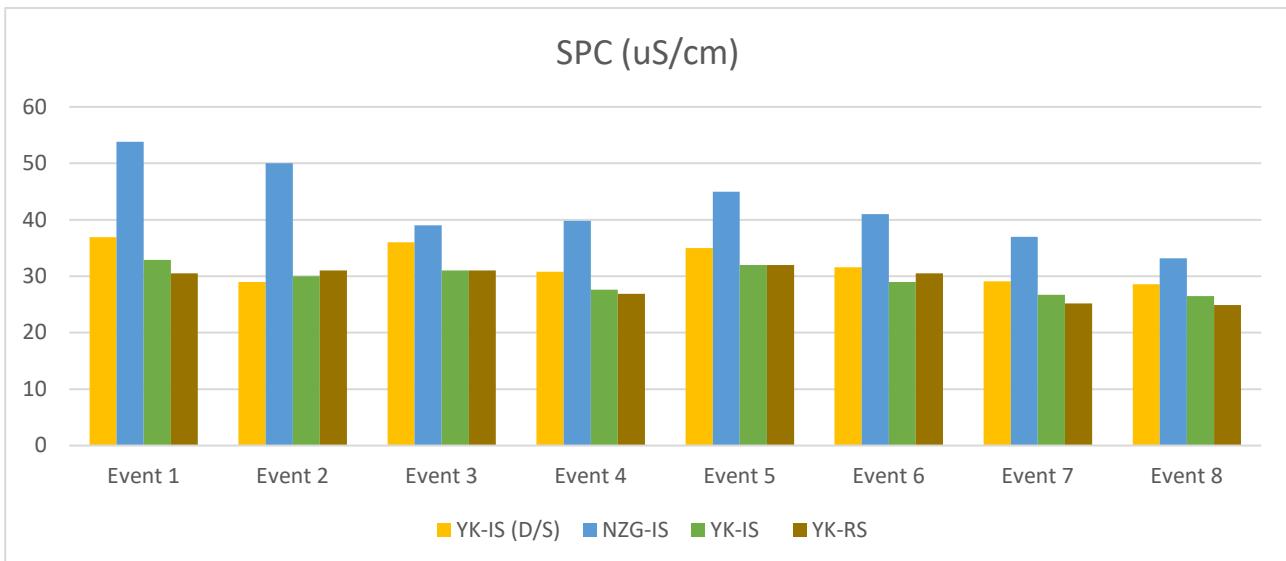
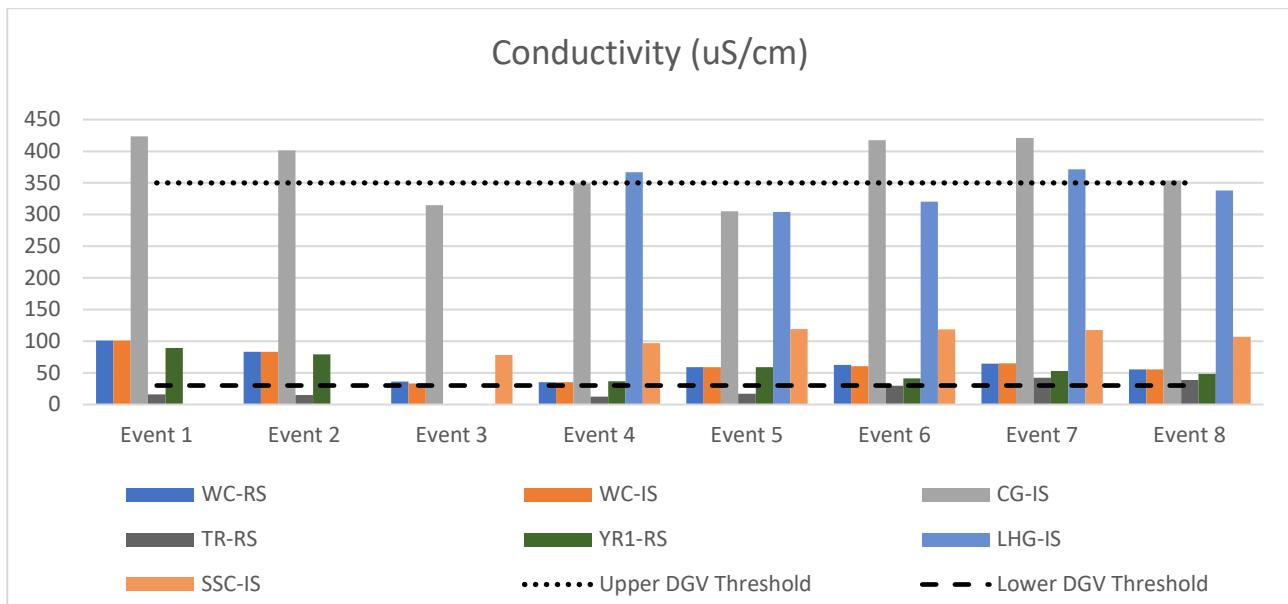
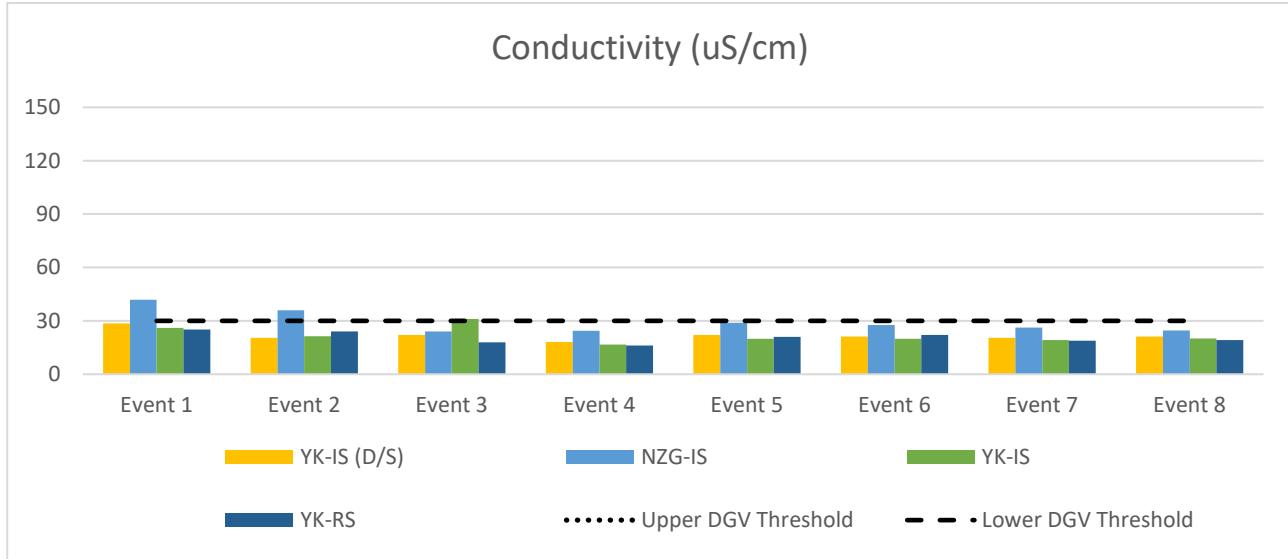


Figure 3-11 Specific Conductance (SPC µS/cm) for Yorkers Creek catchment

Conductivity at CG-IS for Event 8, has decreased from 420.8µS/cm to 353.6µS/cm, refer to Figure 3-12. Conductivity at CG-IS is still just above the upper limit of the DGV range of 350µS/cm. Similarly, LHG-IS has a reading of 338.3µS/cm for Event 8, which is down from 371.3µS/cm during Event 7 and below the upper DGV limit (350µS/cm). In comparison, 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 elevated at CG-IS, YR1-RS, LHG-IS and SSC-IS during Event 8. YR1-RS (124.93 NTU), LHG-IS (85.15 NTU) and SSC-IS (124.93 NTU) are well above the DGV range of 2 – 25 NTU, refer to Figure 3-9. Turbidity values at CG-IS were notably higher still, registering at 785.48 NTU (refer to Figure 3-15). Evidence of extreme channel erosion was observed during the testing process, and it is considered likely that rainfall experienced during the lead up to the sampling event may have contributed to the turbid conditions. Turbidity readings within the Yorkers Creek catchment were also elevated, with YK-IS (D/S) registering the highest reading of 10.96 NTU, refer to Figure 3-16. The lowest value for Event 8 was 1.84 NTU at TR-RS.

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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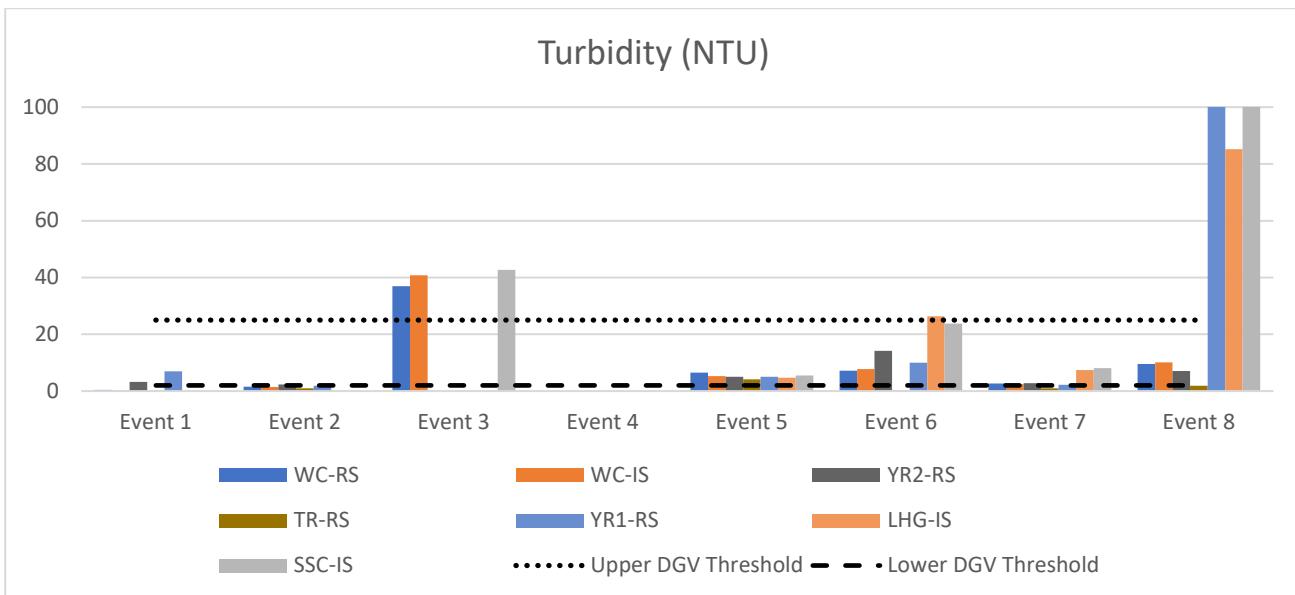


Figure 3-14 Turbidity (NTU) for the Talbingo Reservoir catchment

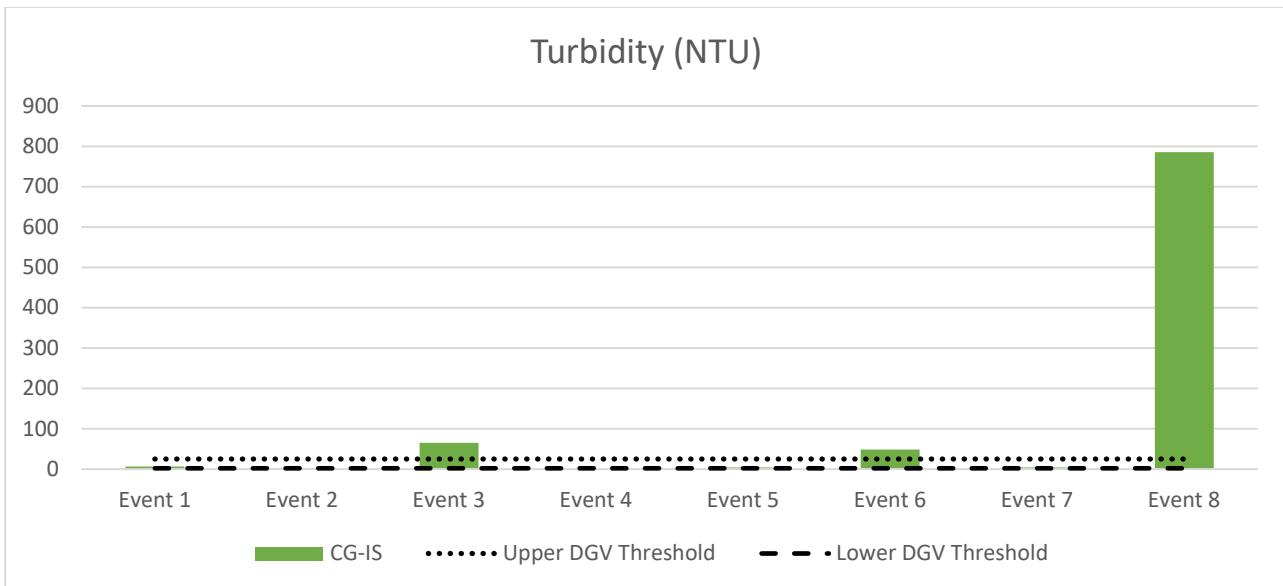


Figure 3-15 Turbidity (NTU) for CG-IS, within the Talbingo Reservoir catchment

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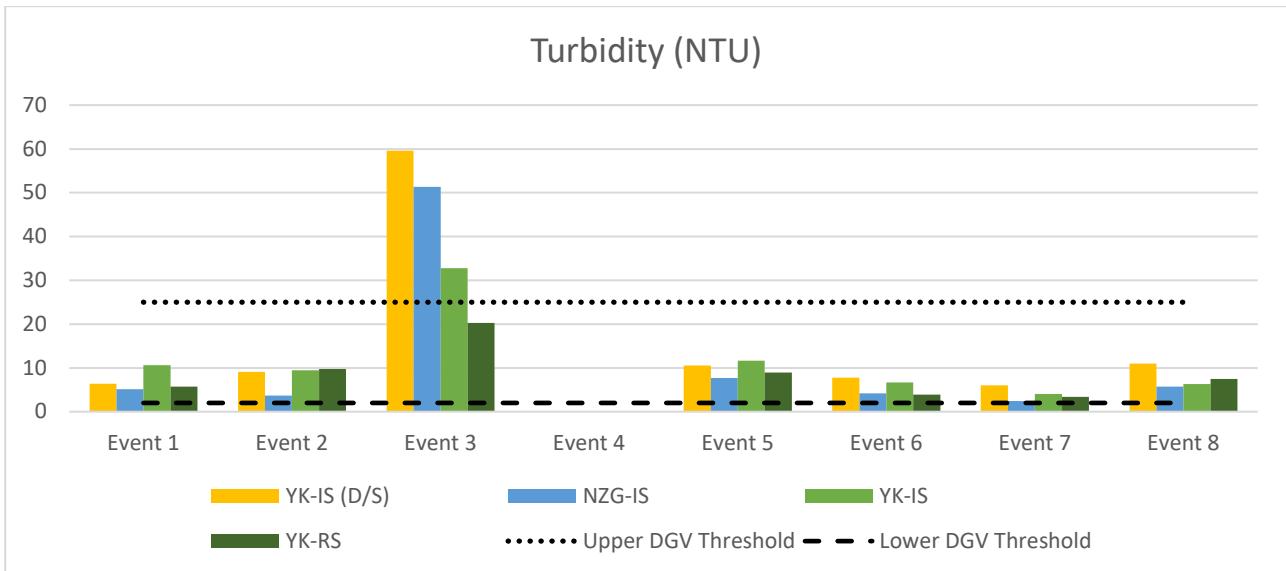


Figure 3-16 Turbidity (NTU) for the Yorkers Creek catchment

Total suspended solids were elevated within the Talbingo Reservoir catchment at LGH-IS (64mg/L) and SSC-IS (36mg/L) YR2-RS (12mg/L) during Event 8 compared with Event 6 and Event 7, refer to Figure 3-17. Results for CG-IS (450mg/L), also within the Talbingo Reservoir catchment, were much higher than that recorded in Event 7. This is consistent with the turbidity results mentioned above and could be attributed to recent rainfall, significant bank erosion or upstream activities.

Total Suspended Solids recorded within the Yorkers Creek catchment were lower than that recorded during Event 7, refer to Figure 3-19.

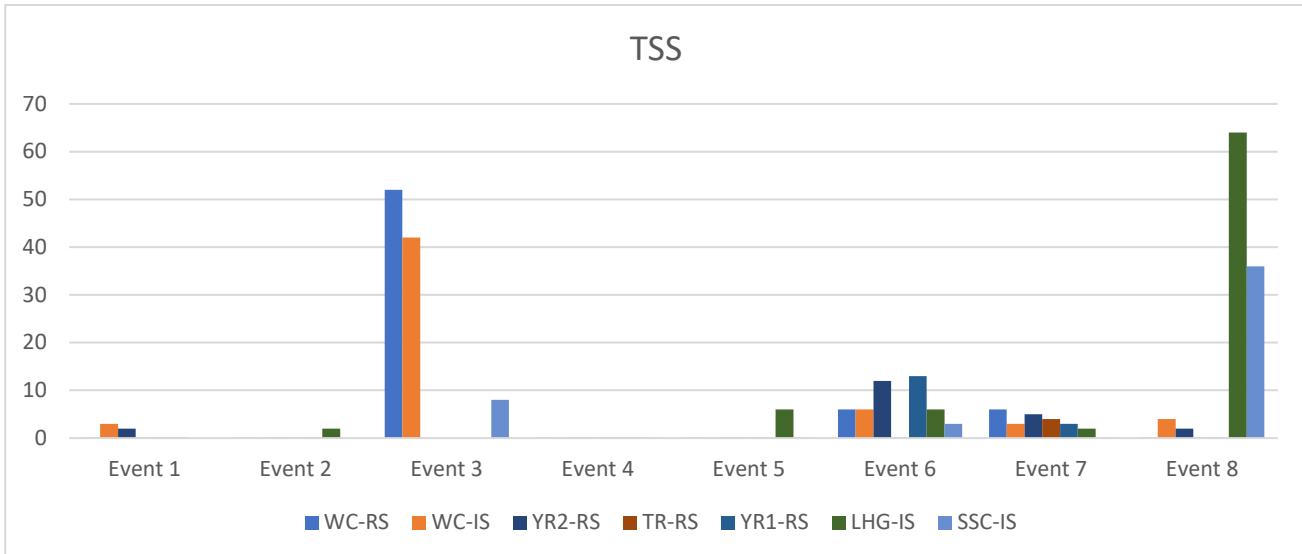


Figure 3-17 Total Suspended Solids for the Talbingo Reservoir catchment

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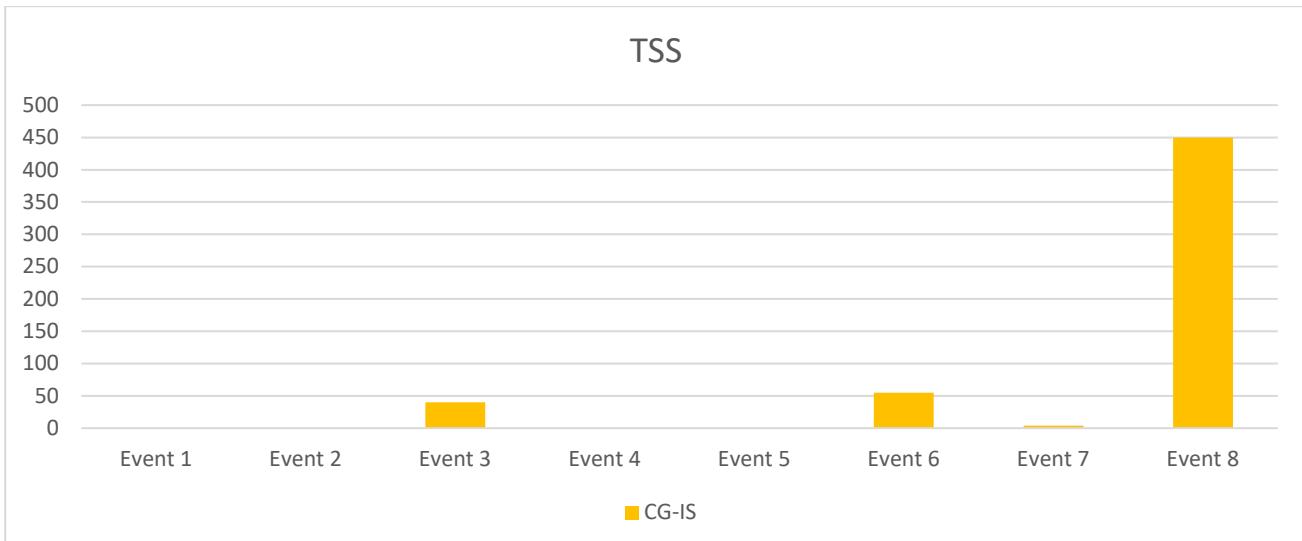


Figure 3-18 Total Suspended Solids for CG-IS, within the Talbingo Reservoir catchment

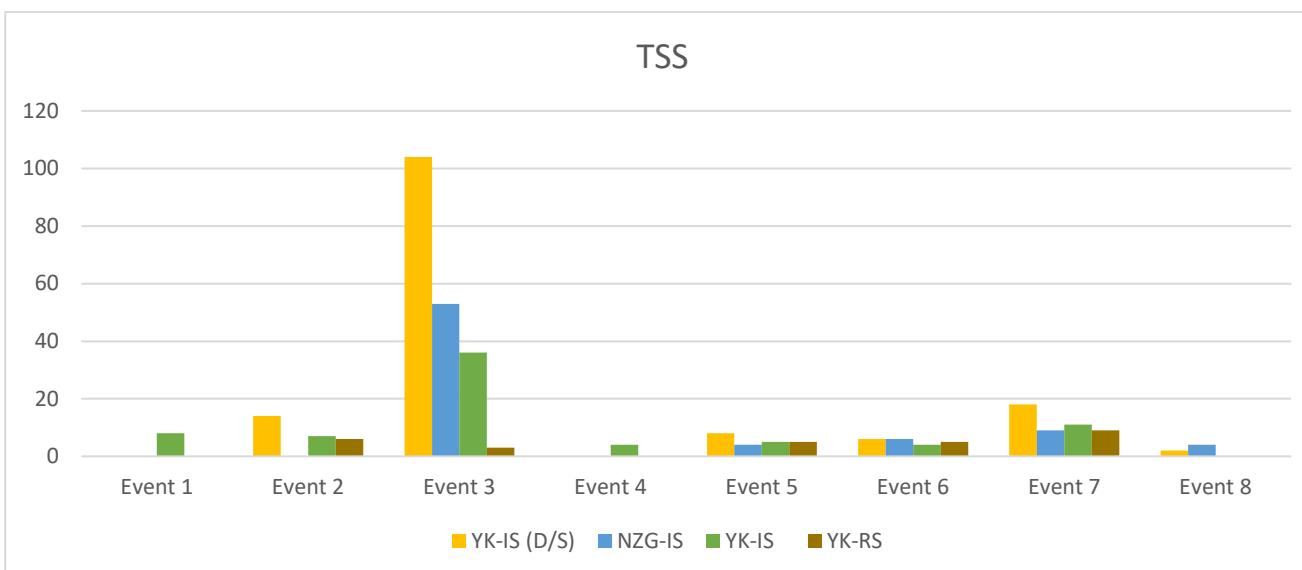


Figure 3-19 Total Suspended Solids for CG-IS, for the Yorkers Creek catchment

Values of pH for the Talbingo Reservoir catchment have remained relatively consistent with Event 7. Two of the sites had values of pH that slightly exceeded the DGV range of 6.5 to 8 pH units and include CG-IS, and LHG-IS, refer to Figure 3-20.

Values of pH for the Yorkers Creek catchment indicate that there has been a slight reduction in pH across Event 6, Event 7 and Event 8, refer to Figure 3-21. All sites within the catchment fell within the DGV range of 6.5 to 8 pH units.

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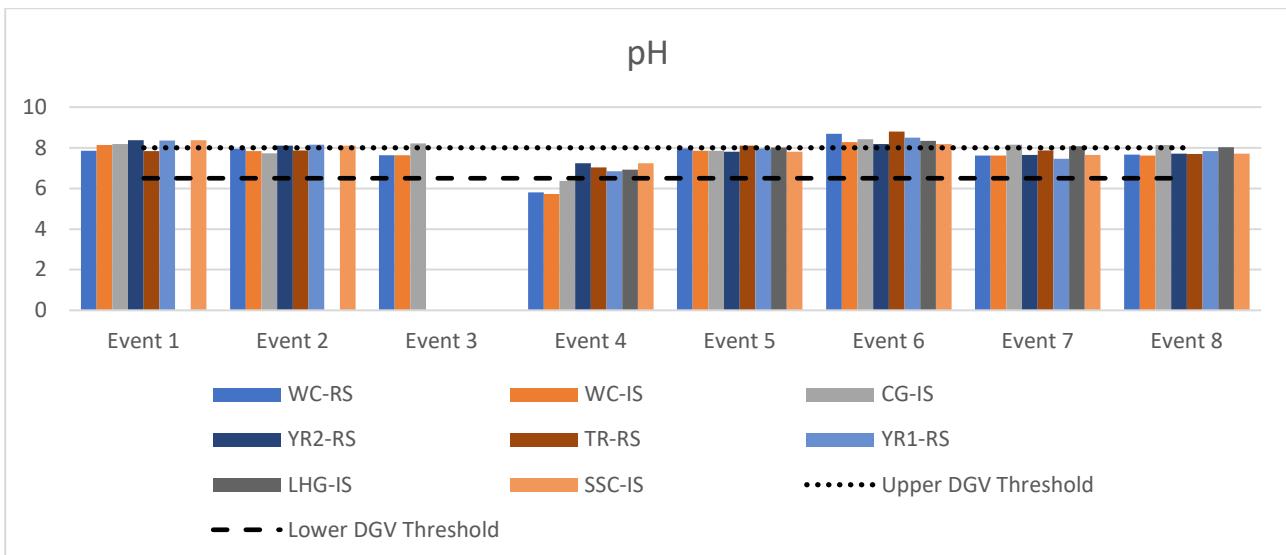


Figure 3-20 Potential of Hydrogen (pH) for Talbingo Reservoir catchment

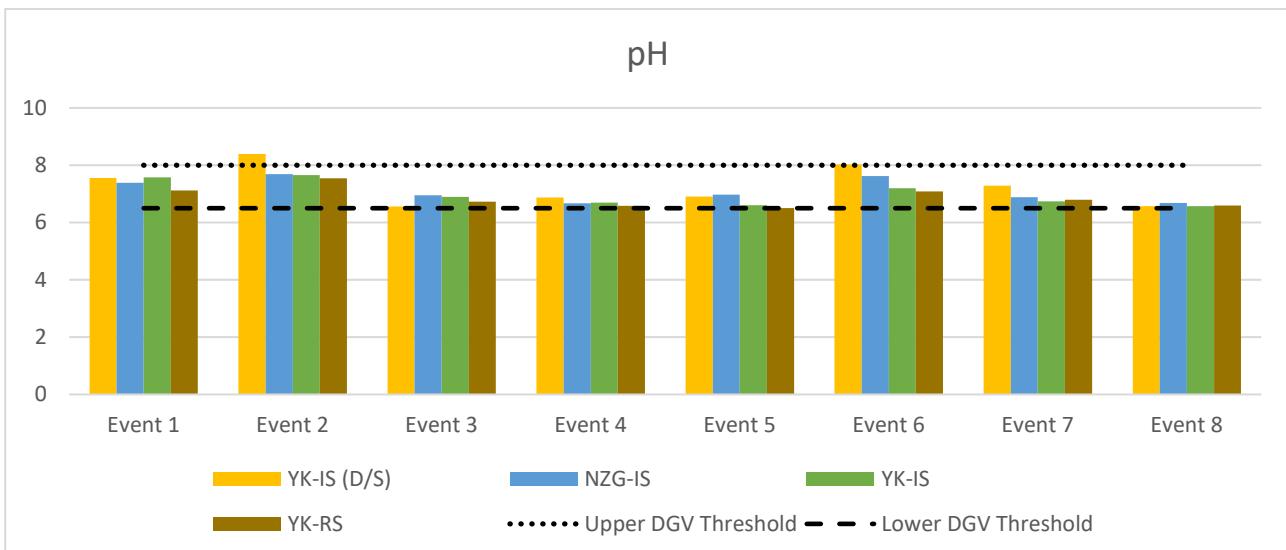


Figure 3-21 Potential of Hydrogen (pH) for Yorkers Creek catchment

The values for the oxygen redox potential during Event 8 increased slightly at the Talbingo and Yorkers Creek catchments, when compared with results from Event 7. LHG-IS recorded the largest increase from 39.9mV during Event 7 to 88.4mV during Event 8, refer to Figure 3-22. YK-IS (D/S) returned the peak result of 118mV, refer to Figure 3-23. NZG-IS returned a result of 102.2mV; however, this has decreased since the reading taken during Event 7 (117.9mV).

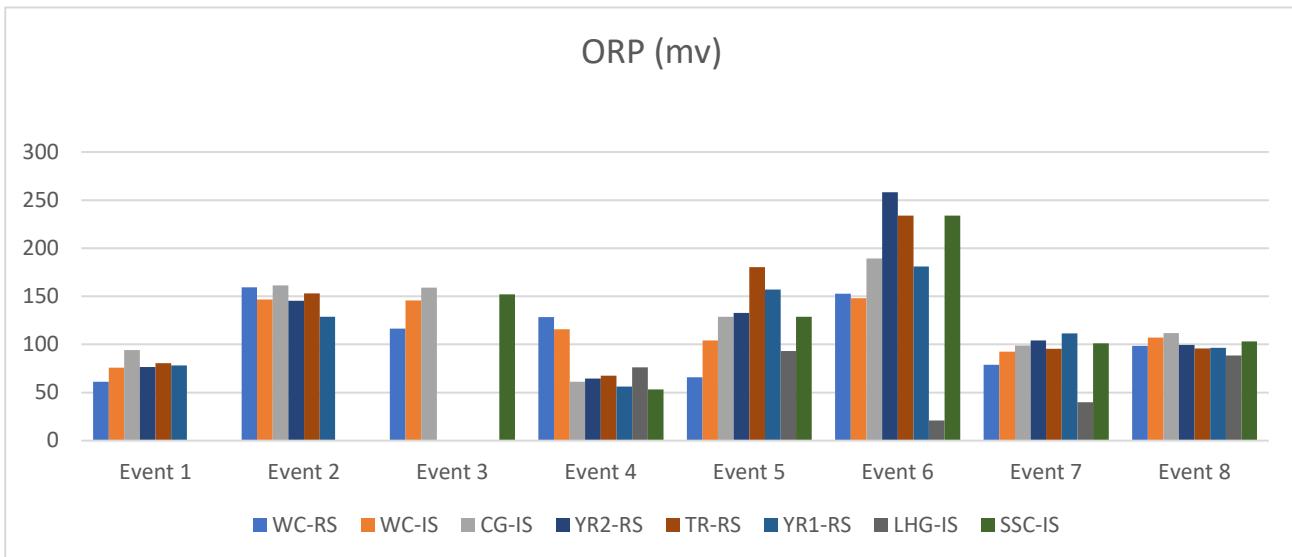


Figure 3-22 Oxygen Redox Potential (ORP) for Talbingo Reservoir catchment

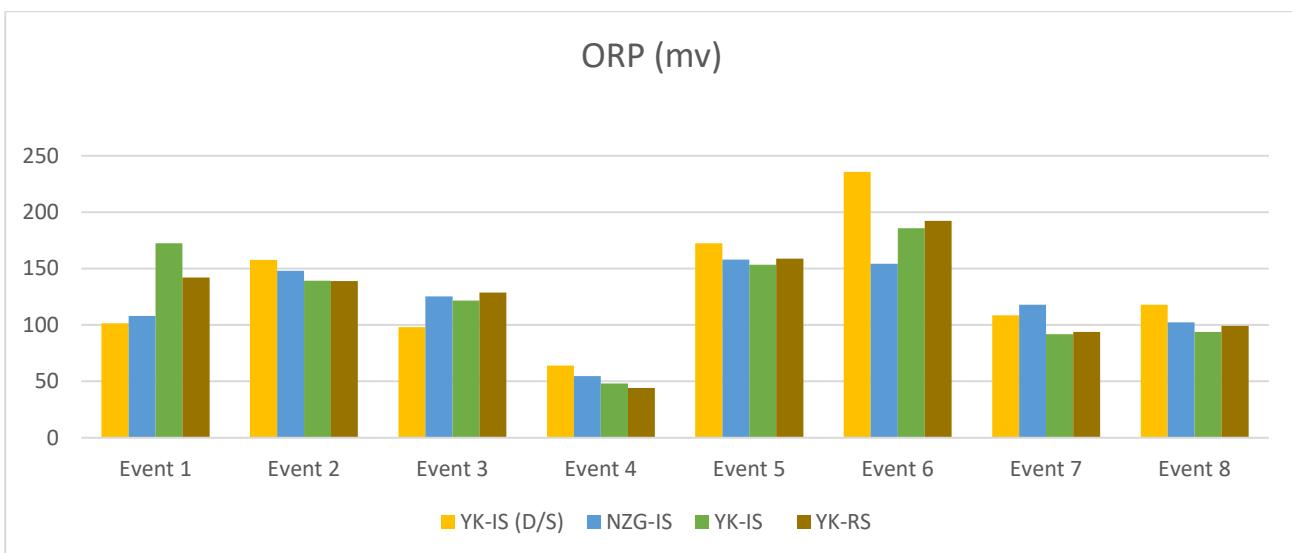


Figure 3-23 Oxygen Redox Potential (ORP) for Yorkers Creek catchment

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 SSC-IS on 26 October 2022. DUP01 was analysed for metals and metalloids. The duplicate sample has been compared against the SSC-IS 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). The RPD was 0%.
- 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 had generally increased across the sites compared to the water temperatures for Event 7 and at most locations, are the highest they have been since Event 2 sampling. Water quality monitoring results for Event 8 were generally elevated compared to the results of Event 7. However, results showed dissolved oxygen had decreased at most sites compared to the results of Event 7.

Laboratory results for Event 8 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 (0.2mg/L) at WC-IS, CG-IS, LHG-IS, YR2-RS, SSC-IS, YK-IS (D/S) and NZG-IS. Similarly, Iron was above the DGV at CG-IS and SSC-IS, while aluminium was above the DGV at most sites (YR1-RS, WC-RS, WC-IS, CG-IS, LHG-IS, YR2-RS, SSC-IS, YK-IS (D/S), NZG-IS, YK-RS, YK-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

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- TransGrid. 2021b. *Snowy 2.0 Transmission Connection Project Amendment Report*.

APPENDIX A EVENT DATA TABLE

22-013 Pre-construction WQM		Sheen/oil/grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidit y (NTU)	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)	TN (mg/L)	TP (mg/L)	Ag (mg/L)	TDS mg/L	TSS (mg/L)	Zn (mg/L)
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	9.28	126.8	100.7	7.85	61.2	0.37	0.01	0.00015	0.00001	0.00005	0.0001	0.001	0.03	0.005	0.011	0.00015	0.005	3	0.005	0.00001	12	0.1	0.001
	Event 2	but on sedim	12.4	73.5	7.94	109	83.1	7.95	159.4	1.49	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.001	0.00015	0.005	0.1	0.005	0.00001	1	0.1	0.001
	Event 3	No	9.2	61.3	7.05	151	36	7.64	116.3	36.96	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	50	52	0.001
	Event 4	No	7.3	75.1	12.78	126.9	35.3	5.8	128.4	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00018	0.005	0.1	0.005	0.00001	19	0.1	0.001	
	Event 5	No	7.8	98.9	11.76	88	59	7.96	65.8	6.45	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	56	0.1	0.001
	Event 6	No	9.3	79.86	9.74	89.6	62.7	6.69	152.6	7.15	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	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	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	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	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.002	0.00015	0.005	0.1	0.005	0.00001	39	0.1	0.001
	Min		7.30	61.30	7.05	71.80	35.0	5.80	61.20	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.00	1.00	0.10	0.00
	Max		14.20	98.90	12.78	151.00	100.70	8.69	159.40	36.96	0.08	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	3.00	0.08	0.00	56.00	52.00	0.00
	Mean		10.81	78.57	9.27	106.08	62.10	7.65	107.60	9.22	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.46	0.01	0.00	34.25	8.06	0.00
	Count		8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	
	St. Dev		2.71	11.48	2.06	27.41	22.01	0.82	37.87	12.67	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.03	0.03	0.00	20.78	17.95	0.00
WC-IS	Event 1	No	14.3	90.6	9.28	126.7	100.8	6.14	78	0.32	0.01	0.00015	0.00001	0.00005	0.0001	0.001	0.03	0.005	0.011	0.00015	0.005	0.1	0.005	0.00001	80	3	0.001
	Event 2	No	12.5	69.9	7.44	109	83.3	7.84	146.8	1.39	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.002	0.00015	0.005	0.8	0.005	0.00001	63	0.1	0.001
	Event 3	No	9.3	61.2	7.03	48	33	7.64	145.8	40.77	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00018	0.005	0.1	0.02	0.00001	41	42	0.001
	Event 4	No	7.4	43.7	12.55	52.3	35	5.73	115.9	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.02	0.00001	27	0.1	0.001	
	Event 5	No	7.9	96.4	11.45	87	59	7.86	104.3	5.24	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	48	0.1	0.001
	Event 6	No	9.3	72.36	9.55	86.6	60.3	6.28	148	7.78	0.015	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	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	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.005	0.00015	0.005	0.1	0.005	0.00001	4	3	0.001
	Event 8	No	13.1	74.4	7.82	71.7	55.4	7.62	107.1	10.1	0.076	0.00015	0.00001	0.00005	0.0001	0.001	0.005	0.005	0.001	0.00015	0.005	0.1	0.01	0.00001	1	4	0.001
	Min		7.40	43.70	7.03	48.00	33.00	5.73	76.00	0.32	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.00	1.00	0.10	0.00
	Max		14.30	96.40	12.55	126.70	100.80	8.28	148.00	40.77	0.08	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.80	0.02	0.00	80.00	42.00	0.00
	Mean		10.89	72.96	9.12	83.14	61.49	7.59	117.06	9.72	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.19	0.01	0.00	38.88	7.29	0.00
	Count		8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00		
	St. Dev		2.70	16.35	2.00	26.49	22.65	0.79	27.30	14.14	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.01	0.00	27.30	14.19	0.00
CG-IS	Event 1	No	14.1	91.8	9.43	536</td																					

APPENDIX B OBSERVATIONS AND FIELD DATA

Event 8. Overcast, rainfall, low cloud, wet, breeze.

Wed 26
Thurs 27 October
2022

Rain throughout the day.

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	13.9	72.0	7.83	429.4	338.3	8.02	88.4	85.15
	Comment	turbid ~ 100 NTU hgl flow.								
YR2-RS	Month	No	13.4	75.1	7.84	131.6	49.7	7.71	99.5	7.06
	Comment	Standard - rock bar covered - hgl flow.								
SSC-IS	Month	No	15.2	75.3	7.84	63.8	106.9	7.74	103.3	124.93
	Comment	DUP01 turbid ~ 100 NTU								
TR-RS	Month	No	16.1	81.5	8.02	46.4	38.6	7.7	95.7	1.84
	Comment	Clear elevated level								
YK-IS (D/S)	Month	No	11.4	68.1	7.44	28.6	21.2	6.57	118.0	10.96
	Comment	Clear. Elevated level, fast flowing.								

Rain
showers

APPENDIX C LABORATORY CERTIFICATES

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

Wednesday, November 23, 2022


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2210-0090
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For all enquiries related to this report please quote document number: 2210-0090

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
	Date/Time sample taken			<u>Limit of Reporting</u>
22Oct-0277	WC-RS 26.10.22 2.09pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.079 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.08 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	39 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0278	WC-IS 26.10.22 2.18pm			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
	Date/Time sample taken			<u>Limit of Reporting</u>
22Oct-0278	WC-IS 26.10.22 2.18pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.076 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.001 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	<2 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	4 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0279	CG-IS 26.10.22 2.38pm			0.002

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LABORATORY ANALYSIS REPORT

Report Number: 2210-0090
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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		Date/Time sample taken		<u>Limit of Reporting</u>
22Oct-0279	CG-IS 26.10.22 2.38pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.088 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	35 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0280	YRI-IS 26.10.22 2.51pm			0.002

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Wednesday, November 23, 2022


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LABORATORY ANALYSIS REPORT

Report Number: 2210-0090
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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
Water		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		Date/Time sample taken		<u>Limit of Reporting</u>
22Oct-0280	YRI-IS 26.10.22 2.51pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	1.06 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	0.52 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.011 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.35 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	277 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	450 mg/L	APHA 2540 D
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
22Oct-0281	LGH-IS 26.10.22 3.07pm			0.002

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LABORATORY ANALYSIS REPORT

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
Water		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		Date/Time sample taken		<u>Limit of Reporting</u>
22Oct-0281	LGH-IS 26.10.22 3.07pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.41 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	0.11 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.005 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.07 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	273 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	64 mg/L	APHA 2540 D
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
22Oct-0282	YR2-IS 26.10.22 3.40pm			0.002

NGH Environmental
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LABORATORY ANALYSIS REPORT

Report Number: 2210-0090
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For all enquiries related to this report please quote document number: 2210-0090

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
				<u>Limit of Reporting</u>
22Oct-0282	YR2-IS 26.10.22 3.40pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.10 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	<0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	48 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0283	SSC-IS 26.10.22 3.29pm			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
	Date/Time sample taken			<u>Limit of Reporting</u>
22Oct-0283	SSC-IS 26.10.22 3.29pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	1.73 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	0.69 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.011 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.03 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	81 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	36 mg/L	APHA 2540 D
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
22Oct-0284	TR-RS 27.10.22 11.54am			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
	Date/Time sample taken			<u>Limit of Reporting</u>
22Oct-0284	TR-RS 27.10.22 11.54am	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	<0.0003 mg/L	APHA 3030 B/3120 B 0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	<0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	37 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0285	YK-IS(d/s) 27.10.22 12.20pm			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		Date/Time sample taken		<u>Limit of Reporting</u>
22Oct-0285	YK-IS(d/s) 27.10.22 12.20pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.16 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	27 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0286	NZG-IS 27.10.22 12.41pm			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
	Date/Time sample taken			<u>Limit of Reporting</u>
22Oct-0286	NZG-IS 27.10.22 12.41pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.10 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	<0.01 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	27 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	4 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0287	YK-IS 27.10.22 12.53pm			0.002

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		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		Date/Time sample taken		<u>Limit of Reporting</u>
22Oct-0287	YK-IS 27.10.22 12.53pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.18 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.03 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	27 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0288	TK-RS 27.10.22 1.04pm			0.002

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
Water		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>
		<u>Date/Time sample taken</u>		<u>Limit of Reporting</u>
22Oct-0288	TK-RS 27.10.22 1.04pm	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
		Arsenic	0.18 mg/L	APHA 3030 B/3120 B
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B
		Cyanide	<0.002 mg/L	* APHA 4500-CN E
		Iron (dissolved)	0.07 mg/L	APHA 3030 B/3120 B
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B
		Mercury	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014
		Phosphorus, Total	0.02 mg/L	LTM-W-030
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B
		Total Dissolved Solids	<2 mg/L	LTM-W-035
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B
22Oct-0289	DUP01 26.10.22			0.002

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		28-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	N. Smith	28-October-2022

<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
22Oct-0289	DUP01 26.10.22				

22Oct-0289	DUP01 26.10.22	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	
		Arsenic	1.79 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	0.73 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	0.011 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

22Oct-0290	Water Blank 26.10.22	Aluminium (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.0002 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00001 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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		28-October-2022		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	28-October-2022		
<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>
22Oct-0290	Water Blank 26.10.22	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 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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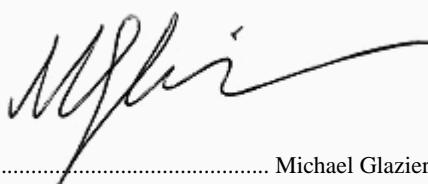
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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>			
Water	N. Smith	28-October-2022			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
	Date/Time sample taken				



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
	Event 2	RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		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
	Event 3	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 4	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.005	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	0.005	0.000015	0.0005	0.00001	0.001
	Event 5	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	0.005	0.000015	0.0005	0.00001	0.001
	Event 6	WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	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%
	Event 7	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.005	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	0.005	0.000015	0.0005	0.00001	0.001
	Event 8	RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		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
	Event 9	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%	5.6338028	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	2.8169014	0%	0%	0%	0%	0%	28.571429	0%	0%	0%	0%	0%	0%

RPD % $|x_2 - x_1| / ((x_2 + x_1)/2)$

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

Multi Parameter Water Meter

Instrument YSI Pro DSS
Serial No. 21B104422



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
	Intensity	✓	
Display	Operation (segments)	✓	
	Condition	✓	
Grill Filter	Seal	✓	
	Condition	✓	
PCB	Condition	✓	
	Condition	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	✓	
	Beeper		
Alarms	Settings		
	Version		
Software	Operation		
	Download		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. COND		2.76ms		385041	2.76ms
2. Temp		21.7°C		MultiTherm	22.1°C
3. pH 4		pH 4.00		389384	pH 3.93
4. pH 7		pH 7.00		386467	pH 6.91
5. ORP mV		236.3mV		390802/387761	236.2mV
6. DO		0ppm		379624	0ppm
7. Turbidity		100NTU		395515	99.78 NTU

Calibrated by:

Alex Buist

Calibration date: 20/10/2022

Next calibration due: 19/11/2022