



NGH



Pre-construction Water Quality Monitoring Report

Event 7 2022

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W. www.nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW

Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

BRISBANE

T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

CANBERRA - NSW SE & ACT

Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

GOLD COAST

2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)
T. (07) 3129 7633

E. ngh@nghconsulting.com.au

NEWCASTLE - HUNTER & NORTH COAST

Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

SYDNEY REGION

Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

WAGGA WAGGA - RIVERINA & WESTERN NSW

35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

WODONGA

Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

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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.

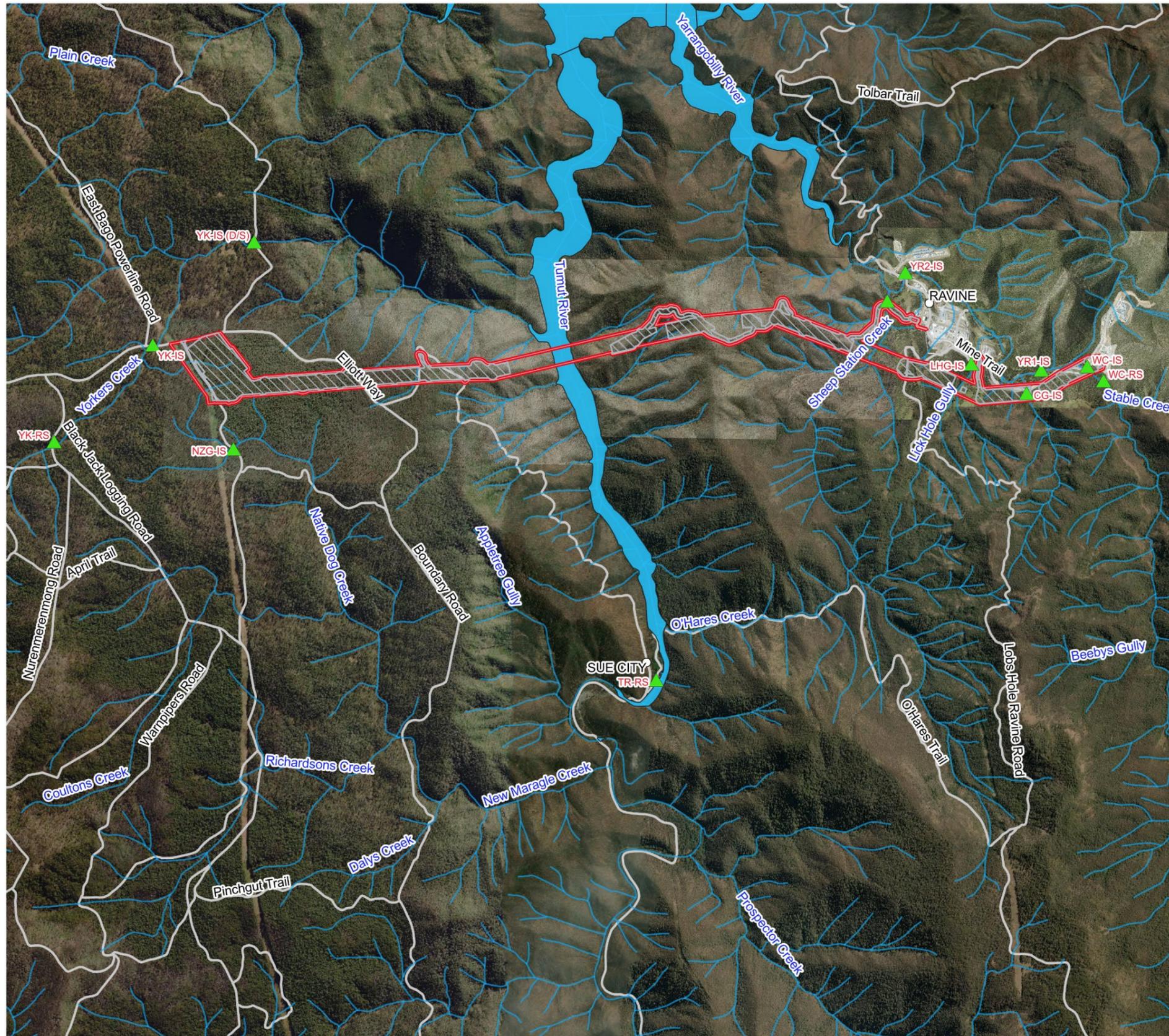
The objective of the pre-construction surface water quality monitoring is to collect baseline data prior to Project construction works. Baseline data will be compared to ANZG (2018) guidelines to characterise the existing surface water quality. The data will be compared to the water quality objectives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



- Legend**
- Hydroareas
 - Placepoint
 - Roads
 - Project Area
 - Disturbance Footprint
 - ▲ WQM Locations



Data Attribution
 © NGH 2022
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 © Jacobs 2021
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Ref: 22-013 Snowy 2.0 Transmission Connection
 WQM \ 22-013 WQM points 20220315
 Author: N. Smith
 Date created: 09.08.2022
 Datum: 'EPSG:28355 GDA94 / MGA zone 55



Figure 2-1 WQM locations

3. Monitoring event observations and results

Images for Wallaces Creek, Lick Hole Gully and Sheep Station Creek are provided as Figure 3-1 to Figure 3-3. Water quality results for each site 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 3-17. Field data and observations are provided in Appendix B.

3.1. Event 7

NGH conducted the previous rounds of sampling in March (Event 1), April (Event 2), May and early June (Event 3), late June (Event 4), July (Event 5) and August (Event 6) 2022. Reports for each event were prepared following receipt of the laboratory results (NGH 2022a; 2022b; 2022c; 2022d; 2022e; 2022f). The results of Event 1, Event 2, Event 3, Event 4, Event 5 and Event 6 have been compared in this report to the results of Event 7.

NGH Environmental Scientist, Nicola Smith, conducted the monitoring event with a UGL representative on 11 and 12 October 2022. Data from the Cabramurra SMHEA automatic weather station on 11 October 2022 (Station ID 072161) indicates that wind speeds were from the north-west of 17km/hr in the afternoon. Temperatures on the day included a low of 3.1°C and a high of 13.6°C. Data from the Tumbarumba weather station for 12 October 2022 (Station ID 072043) indicates that the day was calm with a low of 6.5°C and a high of 20.0°C. The day was mild and sunny.

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.



Figure 3-1 Wallaces Creek (WC-RS)



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. Values recorded at all locations for chemical stressors were all below the DGV for Event 7.

Both CG-IS and LHG-IS display elevated values for total dissolved solids compared to the other sampling locations. Total suspended solids at all sites other than SSC-IS are above the 0.2mg/L assigned DGV, refer to Figure 3-16, Figure 3-17 and Appendix A.

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 3-17, 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) and Event 7 (early October). Where a DGV is available, these values are shown on the graph and have been included for dissolved oxygen (%), conductivity, pH and turbidity.

Water temperatures ranged from 9.5 – 14.6 degrees Celsius with YK-IS(D/S) at 9.5 degrees Celsius and TR-RS at 14.6 degrees Celsius, refer to Figure 3-4. Temperatures are lowest at YK-IS(D/S), YK-IS, YK-RS and NZG-IS within Bago State Forest, refer to Figure 3-5. Temperatures at all locations have increased from Event 6.

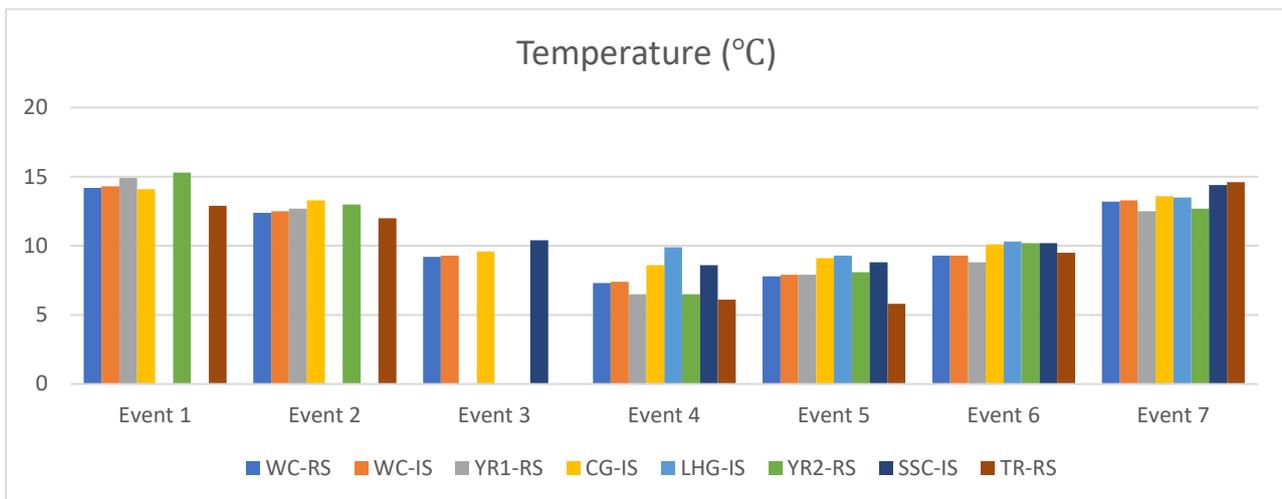


Figure 3-4 Temperature for Talbingo Reservoir catchment

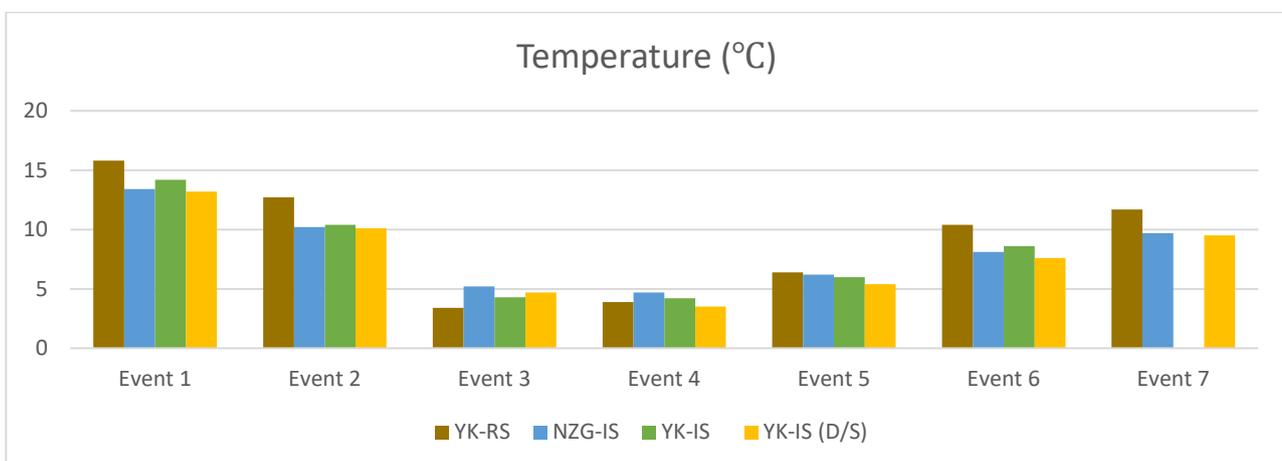


Figure 3-5 Temperature for Yorkers Creek catchment

All DO (%) results for Event 7 were generally below the DGV range. One location, TR-RS 92.4%, returned a value within the DGV range, refer to Figure 3-6. Results had generally decreased from Event 6 in both catchments. The pattern of DO (%) in the Yorkers Creek catchment remains similar to previous sampling events, refer Figure 3-7.

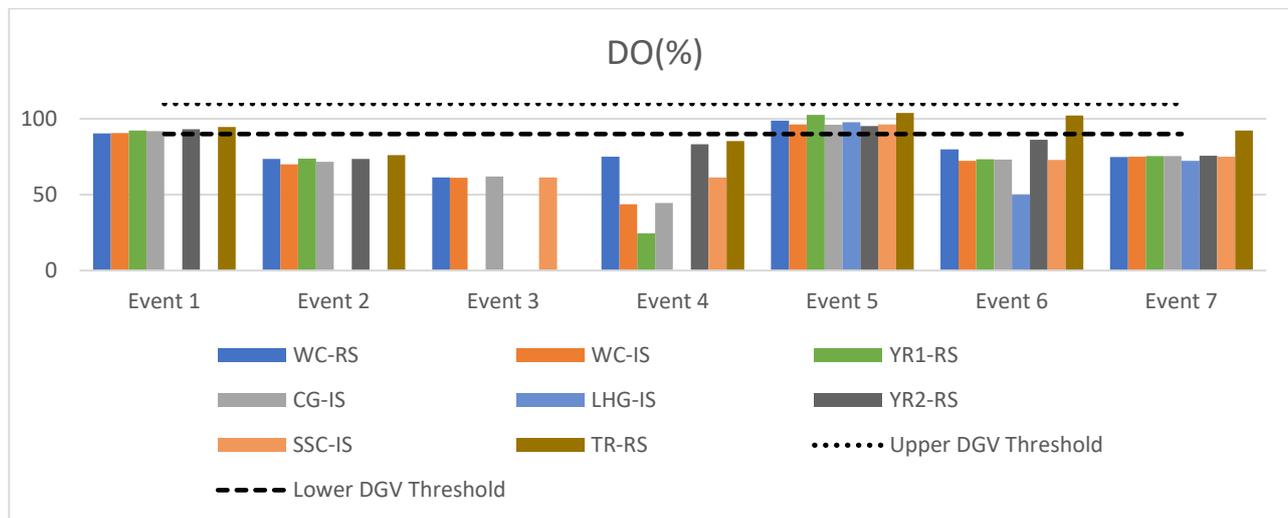


Figure 3-6 Dissolved oxygen (DO%) for Talbingo Reservoir catchment

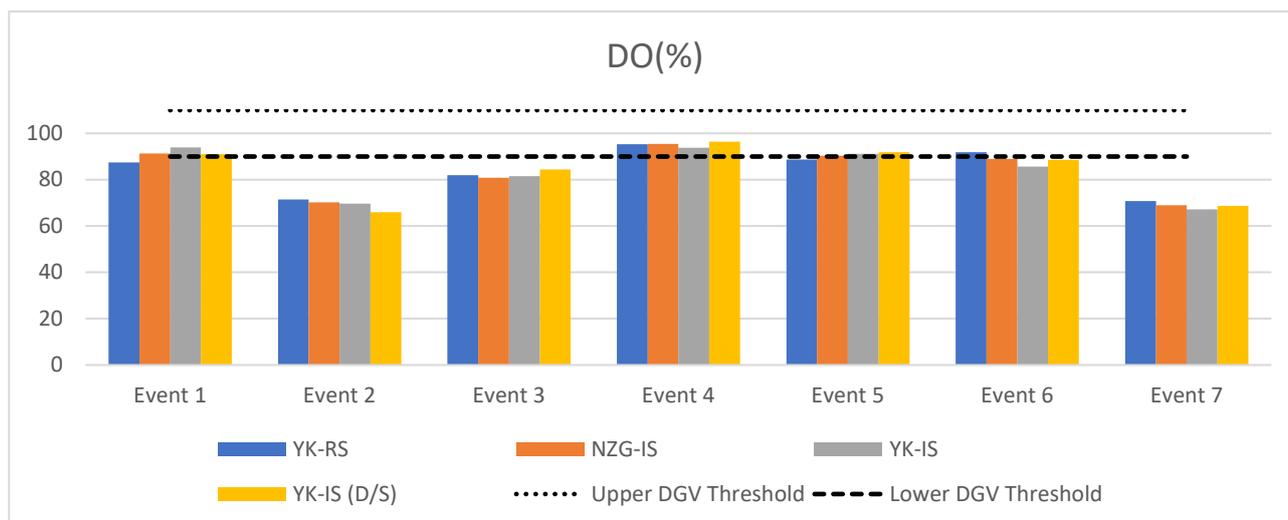


Figure 3-7 Dissolved oxygen (DO%) for Yorkers Creek catchment

The DO (ppm) pattern in the results for Event 7 are lower than those recorded in Event 5 and Event 6. The two highest readings of DO (ppm) were recorded at TR-RS (11.53), refer to Figure 3-8. The pattern of DO (%) in the Yorkers Creek catchment remains similar to previous sampling events, refer Figure 3-9.

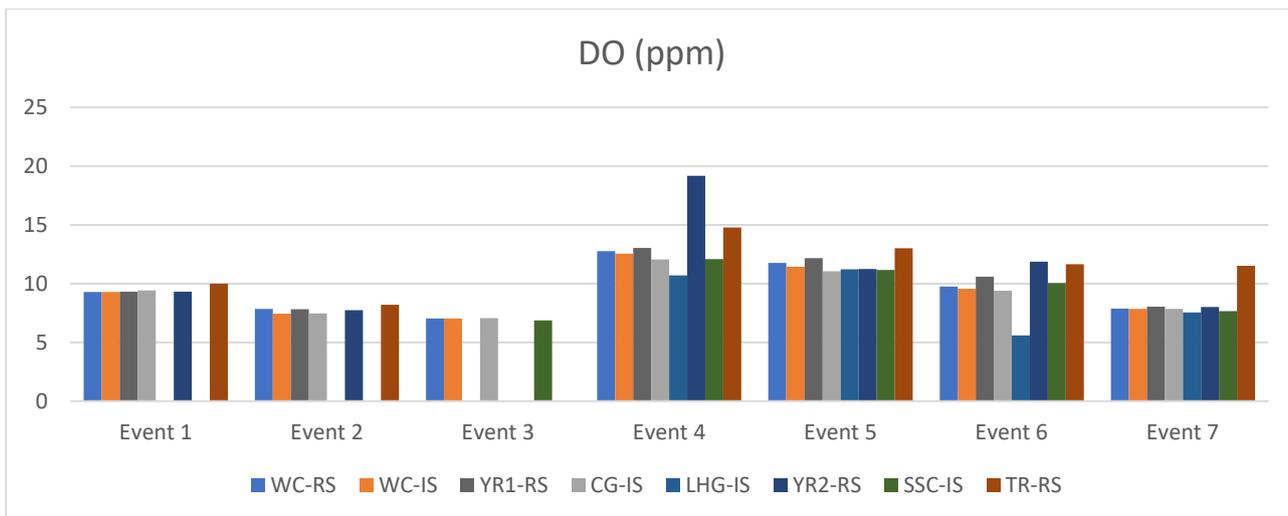


Figure 3-8 Dissolved Oxygen (ppm) for Talbingo Reservoir catchment

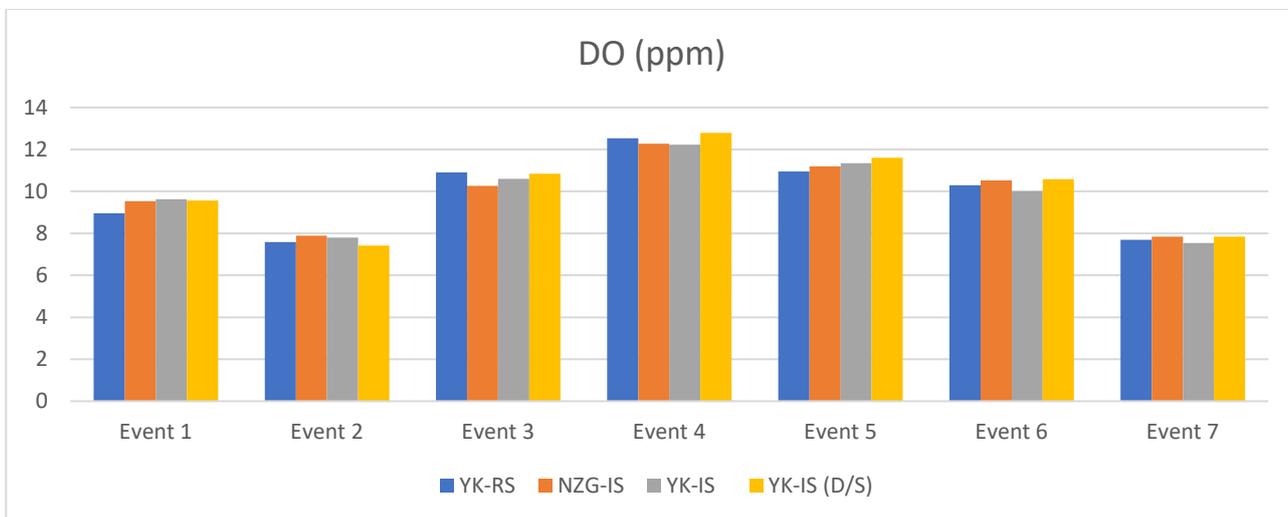


Figure 3-9 Dissolved oxygen (ppm) for Yorkers Creek catchment

The pattern of specific conductance between sites remains similar between Event 6 and Event 7. CG-IS returned a result of 538 μ S/cm for Event 7, which was lower than that recorded during Event 6 (583 μ S/cm). LHG-IS also returned a high reading of 476.2 μ S/cm for Event 7, refer to Figure 3-10. NZG-IS continues to return the highest results for specific conductance in the Yorkers Creek catchment, refer to Figure 3-11.

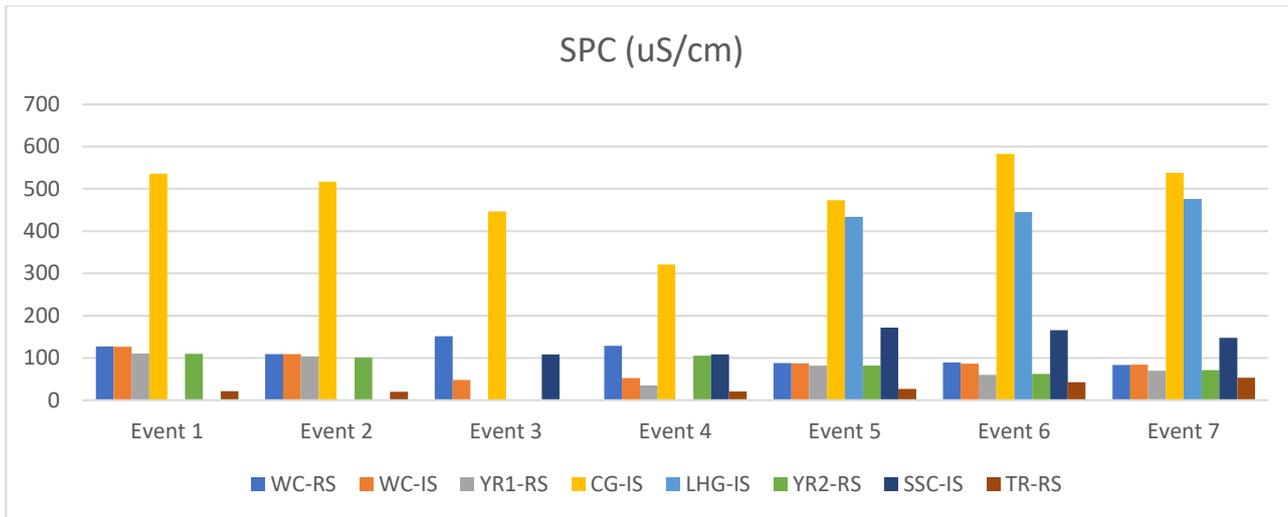


Figure 3-10 Specific Conductance (SPC $\mu\text{S}/\text{cm}$) for Talbingo Reservoir catchment

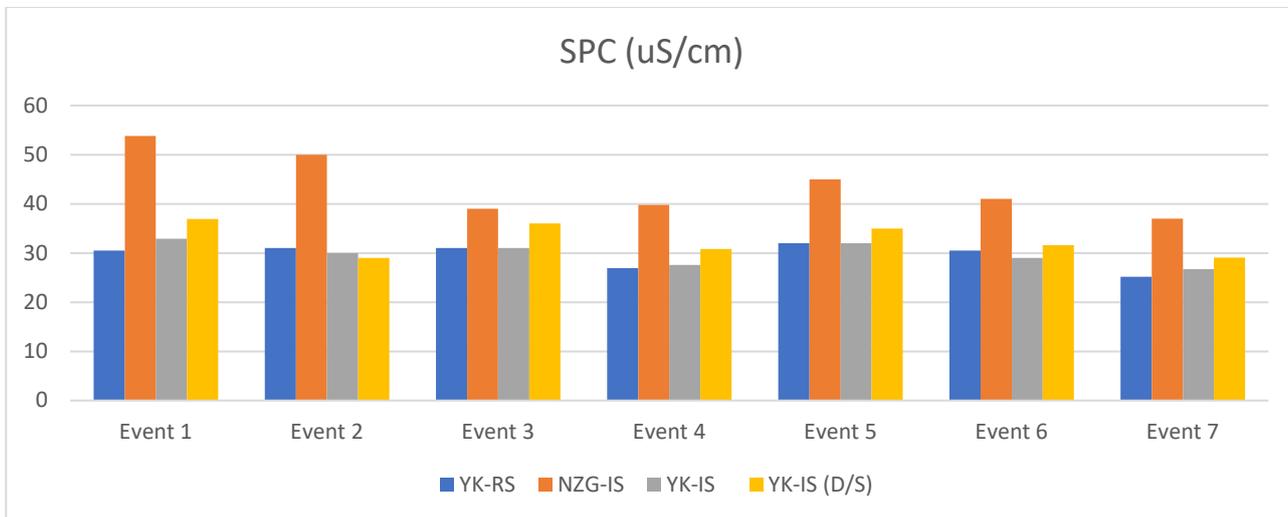


Figure 3-11 Specific Conductance (SPC $\mu\text{S}/\text{cm}$) for Yorkers Creek catchment

Conductivity at CG-IS for Event 7 (420.8 $\mu\text{S}/\text{cm}$) is relatively consistent with results obtained during Event 6 (417.2 $\mu\text{S}/\text{cm}$), refer to Figure 3-12. Conductivity at LHG-IS has increased to 371.3 $\mu\text{S}/\text{cm}$, up from 320.5 $\mu\text{S}/\text{cm}$ (Event 6). Conductivity at CG-IS and LHG-IS are above the upper limit of the DGV range of 350 $\mu\text{S}/\text{cm}$. This is considered likely a result of the geology upstream. The pattern between sites is mostly reflective of the pattern for specific conductance. The conductivity of the samples from the reaches within the Yorkers Creek catchment are all below the lower DGV range of 30 $\mu\text{S}/\text{cm}$, refer Figure 3-11.

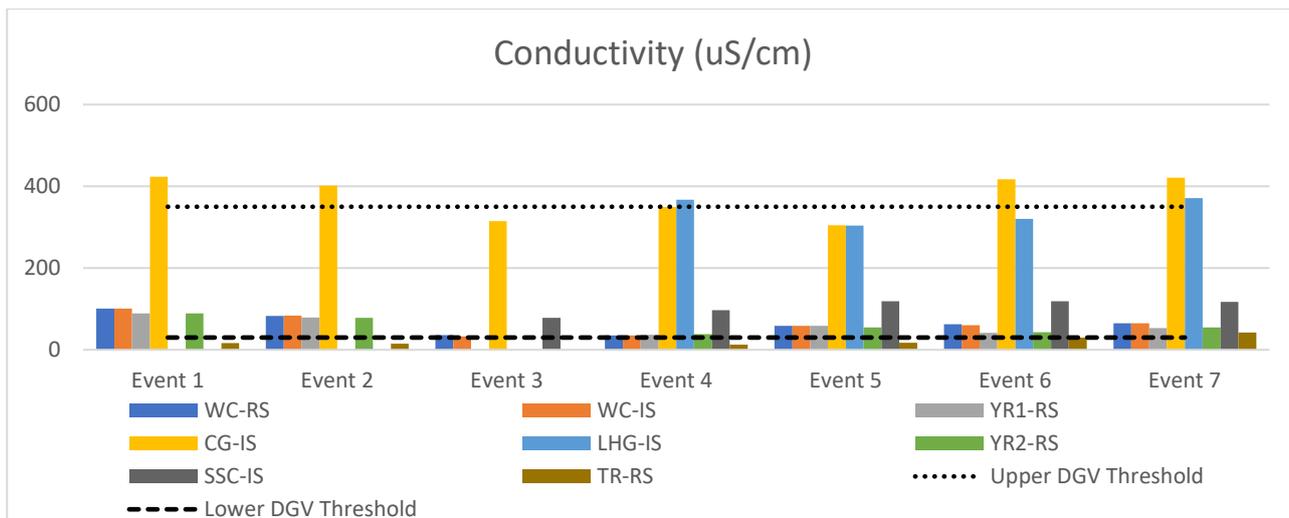


Figure 3-12 Conductivity (µS/cm) for Talbingo Reservoir catchment

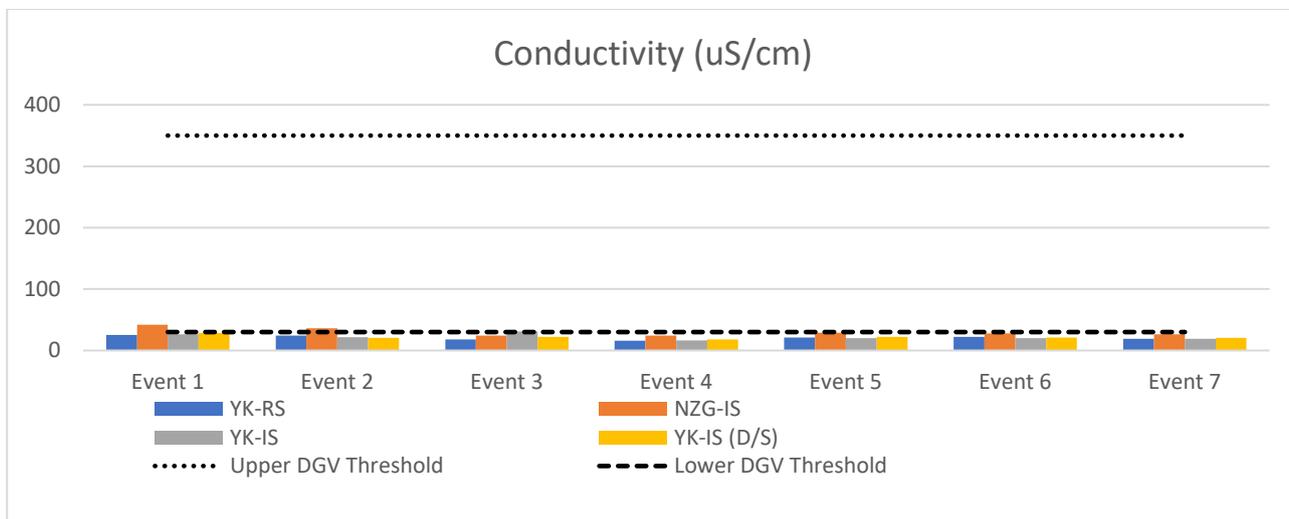


Figure 3-13 Conductivity (µS/cm) for Yorkers Creek catchment

Turbidity values were all below the upper DGV threshold during Event 7. SSC-IS recorded the highest turbidity reading of 8.09 NTU, refer to Figure 3-14. TR-RS had the lowest value for Event 7 (1.01 NTU). TR-RS was the only site with a value below the lower DGV threshold of 2 NTU. Turbidity readings for YK-IS (D/S) within the Yorkers Creek catchment were the highest at 6 NTU, refer to Figure 3-15. Turbidity results for Event 7 show a general decrease in turbidity, when compared to Event 5 and Event 6.

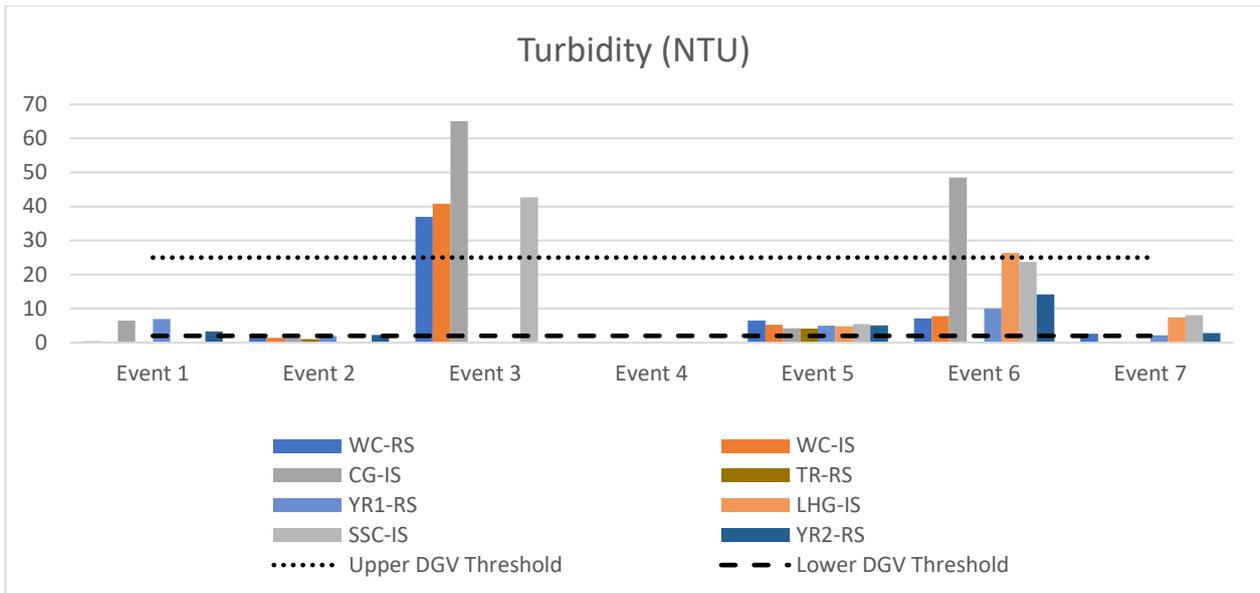


Figure 3-14 Turbidity (NTU) for Talbingo Reservoir catchment

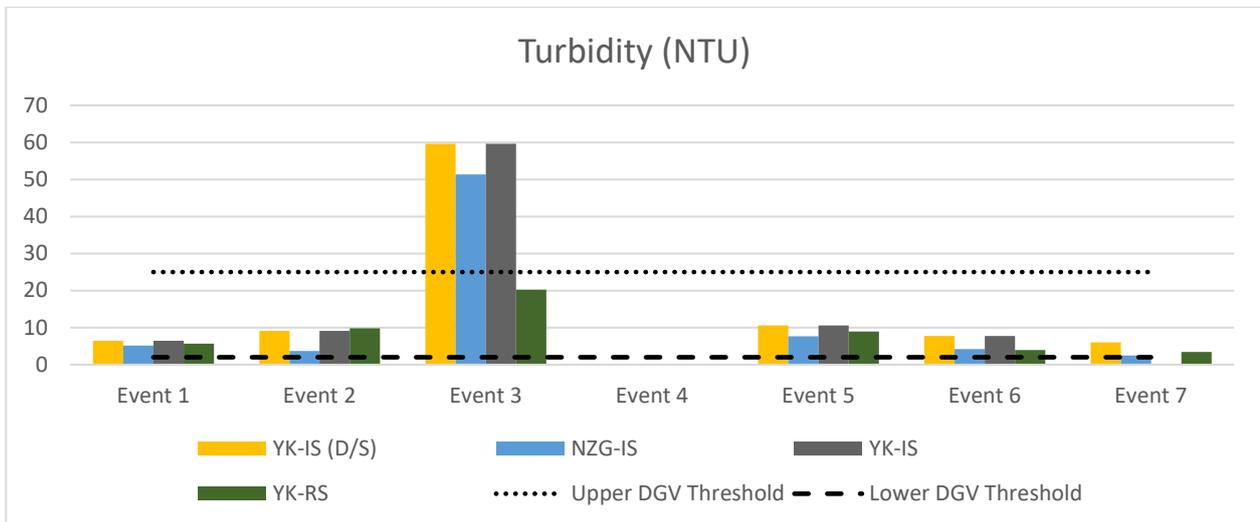


Figure 3-15 Turbidity (NTU) for Yorkers Creek catchment

Results returned for total suspended solids for Event 7 indicate that there has been a general reduction in TSS in the Talbingo Reservoir catchment since Event 6, refer to Figure 3-16. All results were above the 0.2mg/L DGV, except for SSC-IS. Total suspended solids have increased within the Yorkers Creek catchment since Event 5 and Event 6 and were elevated at YK-IS (D/S) (18mg/L) and YK-IS (11mg/L), refer to Figure 3-17.

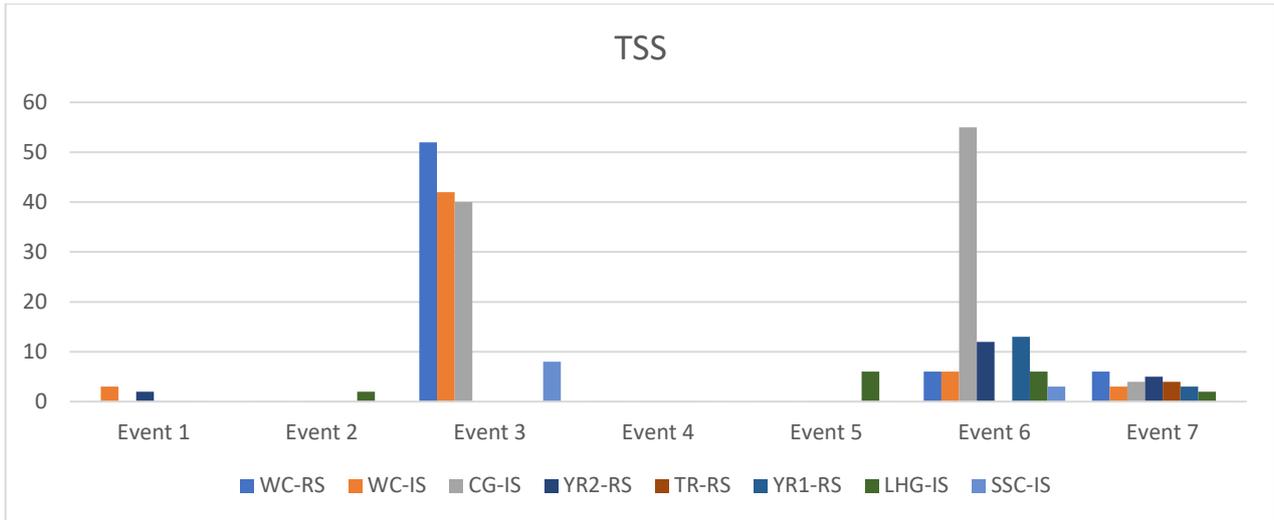


Figure 3-16 Total Suspended Solids for Talbingo Reservoir catchment

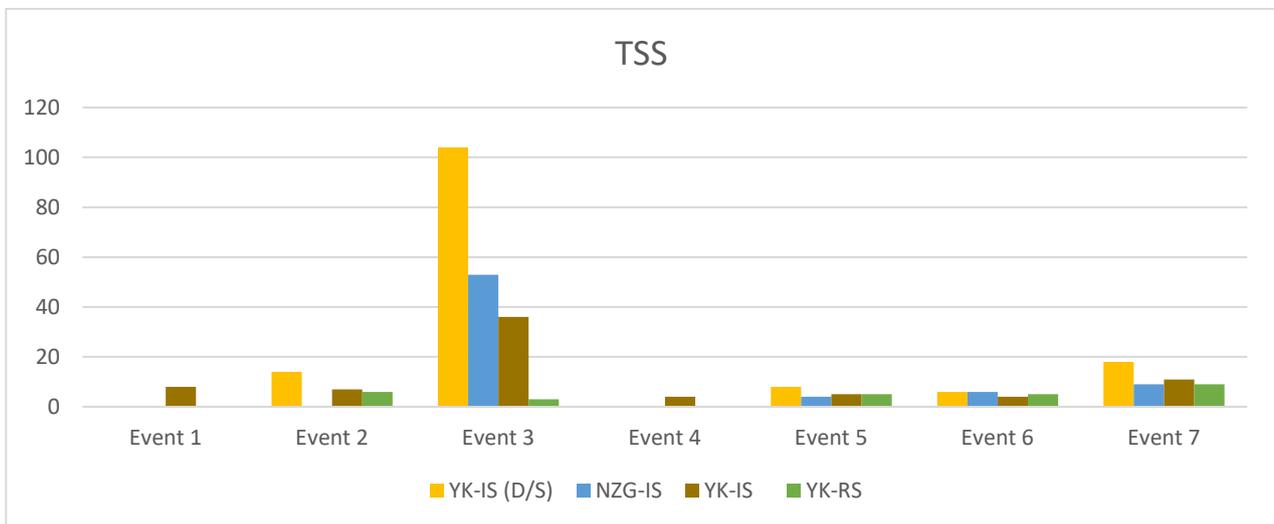


Figure 3-17 Total Suspended Solids for Yorkers Creek catchment

Values of pH for Event 7 have slightly decreased at both catchments, from the values recorded during Event 6. Two of the sites within the Talbingo Reservoir catchment (LGH-IS and CG-IS) had pH readings that exceeded the DGV range of 6.5 to 8 pH units, refer to Figure 3-18. Results for the Yorkers Creek catchment were all within the DGV range of 6.5 to 8 pH units, refer to Figure 3-19.

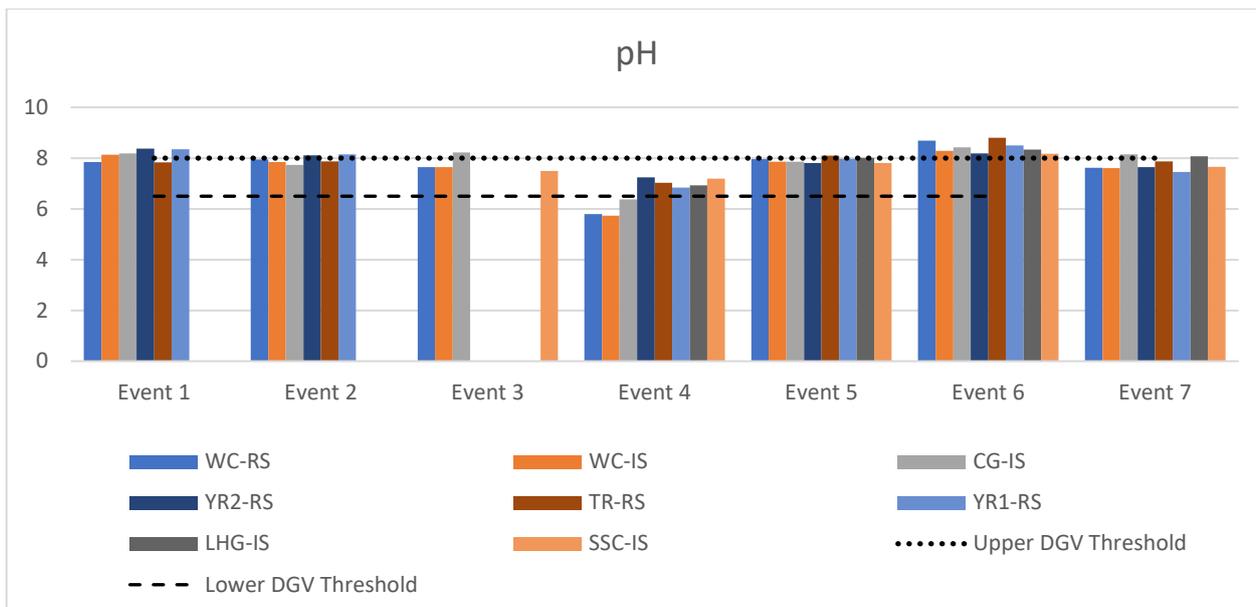


Figure 3-18 Potential of Hydrogen (pH) for the Talbingo Reservoir catchment

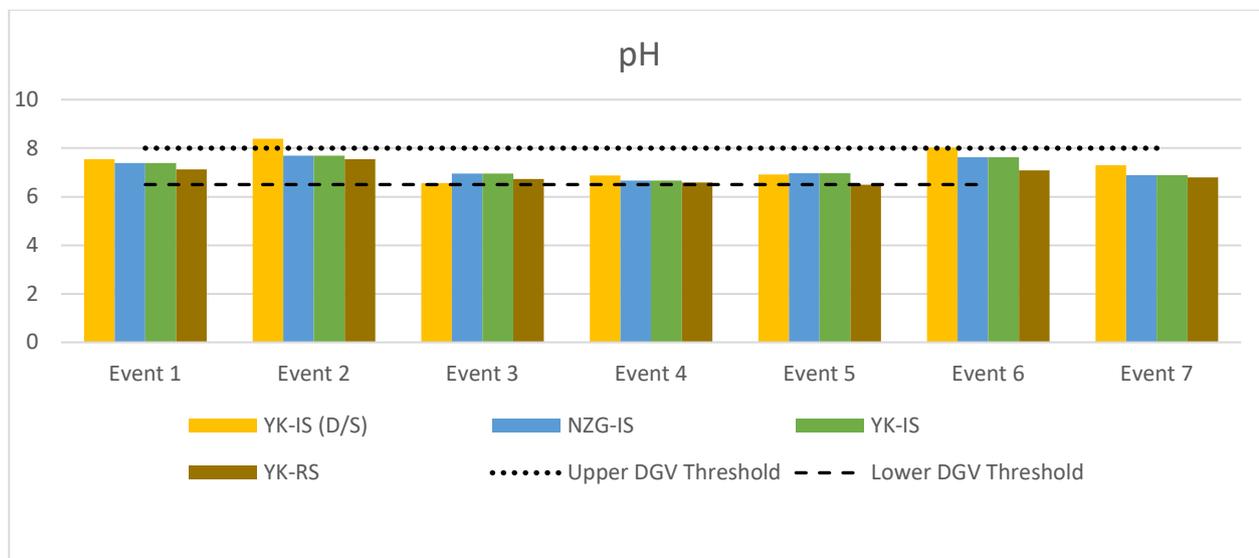


Figure 3-19 Potential of Hydrogen (pH) for the Yorkers Creek catchment

The values for the oxygen redox potential (ORP) during Event 7 have decreased at both catchments, compared with Event 5 and Event 6, refer to Figure 3-20 and Figure 3-21. YR1-RS (111.4mV) registered the highest ORP reading within the Talbingo Reservoir catchment. LHG-IS (39.9mV) returned the lowest result within the catchment.

Yorkers Creek catchment returned similar results, with NZG-IS returning a peak result of 117.9mV. YK-IS (D/S) registered a similar result (108.6mV).

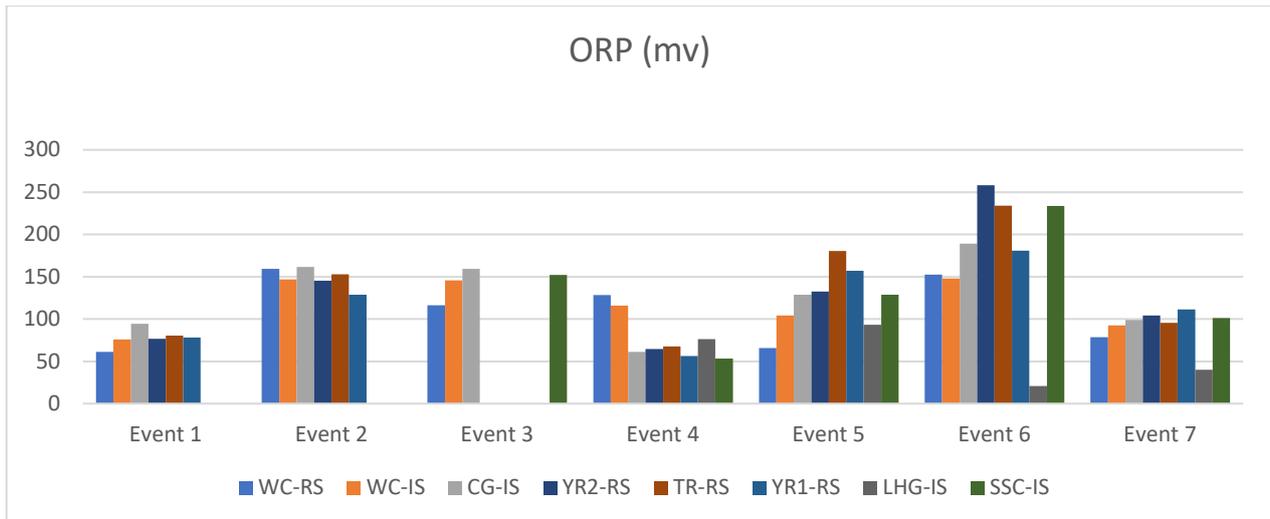


Figure 3-20 Oxygen Redox Potential (ORP) for Talbingo Reservoir catchment

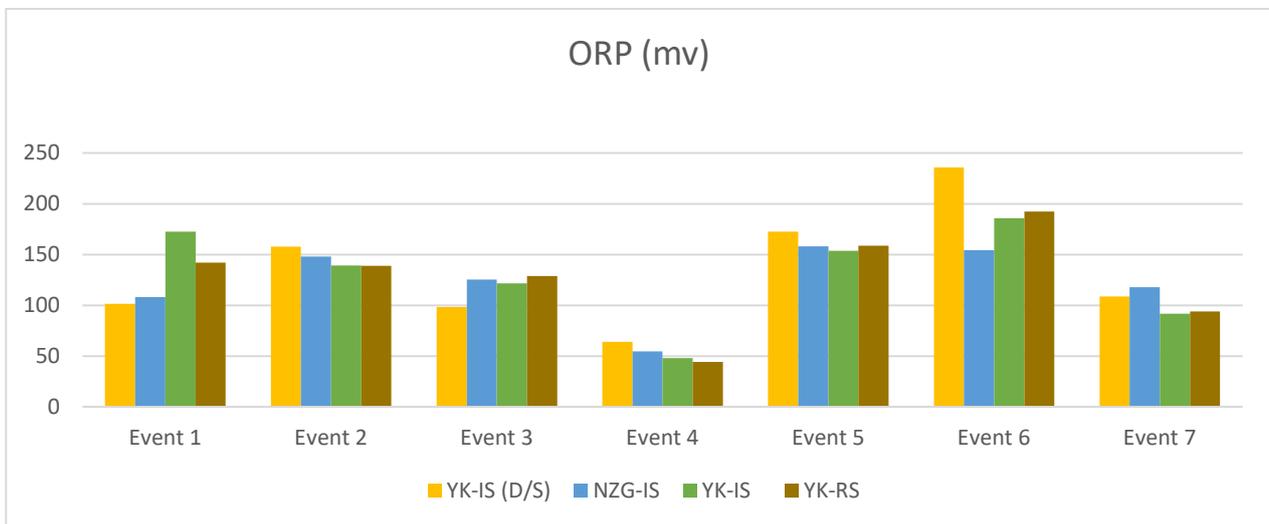


Figure 3-21 Oxygen Redox Potential (ORP) for Yorkers Creek catchment

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 11 October 2022. 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). 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 increased at all sites compared to the water temperatures of Event 7 and at most locations, are the highest they have been since Event 2 sampling. Water quality monitoring results for Event 7 have generally decreased, when compared to the results of Event 6. Total suspended solids decreased within the Talbingo Reservoir catchment and increased within the Yorkers Creek catchment, when compared to the results from Event 6. Conductivity ($\mu\text{S}/\text{cm}$) has remained relatively consistent at both sites between Event 6 and Event 7.

Laboratory results for Event 7 were generally consistent with the results of the previous monitoring events with the majority of analytes reported below the Limit of Reporting. The only result that exceeded the DGV was total suspended solids (0.2mg/L) at WC-RS, WC-IS, CG-IS, YR1-RS, LHG-IS, YR2-RS, TR-RS, YK-IS(D/S), NZG-IS, YK-IS and YK-RS. 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

22-613 Pre-construction WQM		Sheen/ oil/ grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidity (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)
		Sheen/ oil/ grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidity (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)
DOV (Default Guidance Value)		Sheen/ oil/ grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidity (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)
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	0.00001	0.001	0.003	0.005	0.011	0.00015	0.0005	3	0.005	0.00001	12	0.1	0.001
	Event 2	No	12.4	75.5	10.9	109	83.1	7.96	159.4	1.49	0.015	0.00015	0.00005	0.00001	0.001	0.008	0.005	0.005	0.00015	0.0005	0.1	0.005	0.00001	1	1	0.1	0.001
	Event 3	No	8.2	61.3	7.05	151	36	7.64	116.3	36.96	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	50	82	0.001
	Event 4	No	7.3	75.1	12.78	128.9	35.3	8.58	128.4		0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	19	0.1	0.001
	Event 5	No	7.8	98.9	11.76	88	59	7.96	55.8	6.45	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	56	0.1	0.001
	Event 6	No	9.3	73.8	9.74	89.6	62.7	8.08	152.9	7.15	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	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	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	93	6	0.001
	Min			7.30	61.30	7.05	83.50	35.30	5.80	61.20	0.37	0.01	0.00	0.00	0.00	0.00	0.01	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	8.59	159.40	36.96	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	3.00	0.01	0.00	56.00	52.00	0.00
	Mean			10.60	79.15	9.47	110.97	63.06	7.64	108.91	9.17	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	33.57	9.20	0.00
Count			7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
SI Dev			2.75	12.28	2.14	25.55	23.59	0.89	40.70	13.88	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.10	0.00	0.00	22.35	19.98	0.00	
WC-IS	Event 1	No	14.3	90.6	9.28	126.8	100.8	8.14	76	0.32	0.01	0.00015	0.00001	0.00005	0.00001	0.001	0.003	0.005	0.011	0.00015	0.0005	3	0.005	0.00001	12	0.1	0.001
	Event 2	No	12.5	69.0	7.44	109	83.3	7.84	166.8	1.39	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0002	0.00015	0.0005	0.1	0.005	0.00001	44	6	0.001
	Event 3	No	9.3	61.2	7.03	48	33	7.64	145.9	40.77	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.002	0.00001	41	32	0.001
	Event 4	No	7.4	81.7	12.55	123	35	8.73	115.9		0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.002	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	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	48	0.1	0.001
	Event 6	No	9.3	72.36	9.55	86.6	60.3	8.28	148	7.76	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	47	6	0.001
	Event 7	No	13.3	74.1	7.86	83.8	65.1	7.61	82.6	2.41	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	4	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	0.10	0.01	0.00	4.00	0.10	0.00
	Max			14.30	96.40	12.55	126.70	100.80	8.28	148.00	40.77	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	3.00	0.02	0.00	56.00	42.00	0.00
	Mean			10.57	72.15	9.31	94.77	62.38	7.59	114.49	9.65	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	34.29	7.6	0.00
Count			7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
SI Dev			2.75	17.65	2.08	28.17	24.32	0.85	29.16	15.49	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.26	0.01	0.00	24.42	15.26	0.00	
CG-IS	Event 1	No	14.1	91.8	9.43	536	423.6	8.10	94.3	6.47	0.01	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.002	0.00015	0.0005	0.1	0.005	0.00001	317	0.1	0.001
	Event 2	No	13.3	74.5	7.48	517	401.2	7.37	181.4	2.45	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.001	0.00015	0.0005	0.1	0.005	0.00001	293	0.1	0.001
	Event 3	No	9.6	62.1	7.07	447	315	8.22	159.2	65.1	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	275	40	0.001
	Event 4	No	8.6	44.57	12.08	321.3	349	6.37	61.1		0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	266	0.1	0.001
	Event 5	No	8.1	96.1	11.07	473	305	7.86	128.7	4.22	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	293	0.1	0.001
	Event 6	No	10.1	73.2	8.4	583	417.2	8.42	189.7	48.1	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	269	28	0.001
	Event 7	No	13.6	75.5	7.84	538	420.8	8.15	98.8	3.75	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	243	4	0.002
	Min			8.60	44.57	7.07	321.30	305.00	6.37	61.10	1.36	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.10	0.01	0.00	243.00	0.10	0.00
	Max			14.10	96.10	12.08	583.00	423.60	8.42	189.20	65.10	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.10	0.05	0.00	317.00	55.00	0.00
	Mean			11.20	73.65	8.19	487.90	375.97	8.05	127.53	21.57	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.00	282.14	14.20	0.00
Count			7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
SI Dev			2.36	17.42	1.88	85.99	51.79	0.69	45.27	27.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	24.18	23.20	0.00
YR1-RS	Event 1	No	14.9	92.2	9.31	110.7	89.3	8.15	78.3	6.94	0.03	0.00015	0.00001	0.00005	0.00001	0.001	0.006	0.0005	0.003	0.00015	0.0005	0.1	0.005	0.00001	69	0.1	0.001
	Event 2	No	12.7	74.3	7.83	104	82.1	7.84	128.1	1.85	0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1	0.005	0.00001	50	0.1	0.001
	Event 3	No sample																									
	Event 4	No	6.5	24.8	13.05	34.7	28.9	6.84	58.3		0.015	0.00015	0.00001	0.00005	0.00001	0.001	0.005	0.0005	0.0005	0.00015	0.0005	0.1					

APPENDIX B OBSERVATIONS AND FIELD DATA

Event 7. Tues (11) + Wed (12) October.

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)
WC-RS	Month	No	13.2	74.9	7.87	83.5	64.6	7.62	78.7	2.62
	Comment	<p><u>DUP 01</u> fast flowing, no odour, no sheens.</p>								
WC-IS	Month	No	13.3	75.1	7.86	83.8	65.1	7.61	92.6	2.41
	Comment	<p>fast flowing</p>								
CC-IS YK-RS	Month	No	12.5	75.5	8.03	69.6	53.1	7.46	111.4	2.19
	Comment	<p>swollen</p>								
YK-IS CA-IS	Month	No	13.6	75.5	7.84	538	420.8	8.15	98.8	3.75
	Comment	<p>channel further eroded.</p>								

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	13.5	72.4	7.54	476.2	371.3	8.07	39.9	7.45		
	Comment	higher flow than usual.										
YR2-IS -RS	Month	No	12.7	75.9	8.02	71.3	7.66	147.5	54.6	7.65	104.3	2.84
	Comment	swollen.										
SSC-IS	Month	No	14.4	75.0	7.66	147.5	8.02	71.3	117.6	7.66	101.1	8.09
	Comment	milky to water.										
TR-RS	Month	No	14.6	54.6*	5.55*	52.9	42.5	7.87	95.4	1.01		
	Comment	Clear										
YK-IS (D/S)	Month	No	9.5	68.7	7.84	29.1	20.5	7.29	108.6	6.00		
	Comment	Clear										

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	9.7	54.6 69.0	7.84	37.0	26.2	6.89	117.9	2.46
	Comment	deeper than first couple of events.								
YK-IS	Month	No	10.3	67.2	7.54	26.7	19.2	6.74	91.7	4.04
	Comment	Not as turbid looking as usual.								
YK-RS	Month	No	11.7	70.8	7.69	25.2	18.8	6.79	93.8	3.41
	Comment	clear.								

APPENDIX C LABORATORY CERTIFICATES

NGH Environmental

Wednesday, November 9, 2022

Suite 1/39 Fitzmaurice Street

Wagga Wagga NSW 2650

Attention: Nicole Isles



NATA Accredited Laboratory
Number: 9597

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2210-0036

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For all enquiries related to this report please quote document number: 2210-0036

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>
		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0097	WC-RS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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
		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	0.02 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	53 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	6 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0098 WC-IS
11.10.22

NGH Environmental

Wednesday, November 9, 2022

Suite 1/39 Fitzmaurice Street

Wagga Wagga NSW 2650

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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0098	WC-IS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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
		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	0.02 mg/L	LTM-W-030	0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Dissolved Solids	4 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

22Oct-0099 CG-IS
11.10.22

NGH Environmental

Wednesday, November 9, 2022

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Wagga Wagga NSW 2650

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>
		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0099	CG-IS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	<0.002 mg/L	* APHA 4500-CN E	0.002
		Lead (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Mercury	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Nickel (dissolved)	<0.0003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nitrogen, total	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrate/Nitrite as N	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Phosphorus, Total	<0.1 mg/L	LTM-W-014	0.1
		Silver (dissolved)	<0.01 mg/L	LTM-W-030	0.01
		Total Dissolved Solids	<0.0002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Kjeldahl Nitrogen	243 mg/L	LTM-W-035	2
		Total Suspended Solids	<0.2 mg/L	LTM-W-034	2
		Zinc (dissolved)	4 mg/L	APHA 2540 D	0.2
			0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0100 YR1-RS
11.10.22

NGH Environmental

Wednesday, November 9, 2022

Suite 1/39 Fitzmaurice Street

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<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>
		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0100	YR1-RS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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)	0.02 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	3 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0101	LHG-IS 11.10.22
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NGH Environmental

Wednesday, November 9, 2022

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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0101	LHG-IS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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
		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	271 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0102	YR2-RS 11.10.22
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NGH Environmental

Wednesday, November 9, 2022

Suite 1/39 Fitzmaurice Street

Wagga Wagga NSW 2650

Attention: Nicole Isles



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		13-October-2022
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0102	YR2-RS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.00002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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)	0.02 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	67 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

22Oct-0103 SSC-IS
11.10.22

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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0103	SSC-IS 11.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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)	0.25 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	96 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	<2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0104	YR-RS 12.10.22
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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0104	YR-RS 12.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	<0.002 mg/L	* APHA 4500-CN E	0.002
		Lead (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Mercury	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Nickel (dissolved)	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nitrogen, total	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrate/Nitrite as N	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Phosphorus, Total	<0.1 mg/L	LTM-W-014	0.1
		Silver (dissolved)	<0.01 mg/L	LTM-W-030	0.01
		Total Dissolved Solids	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Kjeldahl Nitrogen	52 mg/L	LTM-W-035	2
		Total Suspended Solids	<0.2 mg/L	LTM-W-034	2
		Zinc (dissolved)	4 mg/L	APHA 2540 D	0.2
			<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0105	YK-IS(d/s) 12.10.22
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		13-October-2022
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0105	YK-IS(d/s) 12.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	<0.002 mg/L	* APHA 4500-CN E	0.002
		Lead (dissolved)	0.08 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Mercury	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Nickel (dissolved)	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nitrogen, total	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrate/Nitrite as N	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Phosphorus, Total	<0.1 mg/L	LTM-W-014	0.1
		Silver (dissolved)	<0.01 mg/L	LTM-W-030	0.01
		Total Dissolved Solids	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Kjeldahl Nitrogen	43 mg/L	LTM-W-035	2
		Total Suspended Solids	<0.2 mg/L	LTM-W-034	2
		Zinc (dissolved)	18 mg/L	APHA 2540 D	0.2
			<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0106 NZG-IS
12.10.22

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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0106	NZG-IS 12.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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)	0.03 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	44 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

22Oct-0107 YK-IS
12.10.22

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		13-October-2022

<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0107	YK-IS 12.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0002 mg/L	Analysis by Melbourne (acc no: 992)	0.002
		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)	0.09 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 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	39 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	11 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0108	YK-RS 12.10.22
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		13-October-2022
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	Client	13-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-0108	YK-RS 12.10.22				
		Aluminium (dissolved)	<0.0002 mg/L	APHA 3030 B/3120 B	
		Arsenic	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Cadmium (dissolved)	<0.0003 mg/L	Analysis by Melbourne (acc no: 992)	
		Chromium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.00001 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	<0.002 mg/L	* APHA 4500-CN E	0.002
		Lead (dissolved)	0.12 mg/L	APHA 3030 B/3120 B	0.01
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Mercury	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Nickel (dissolved)	<0.00003 mg/L	Analysis by ALS Melbourne (acc no: 992)	
		Nitrogen, total	<0.001 mg/L	APHA 3030 B/3120 B	0.01
		Nitrate/Nitrite as N	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	2
		Phosphorus, Total	<0.1 mg/L	LTM-W-014	0.1
		Silver (dissolved)	<0.01 mg/L	LTM-W-030	0.01
		Total Dissolved Solids	<0.00002 mg/L	* APHA 3030 E/3120 B	0.002
		Total Kjeldahl Nitrogen	40 mg/L	LTM-W-035	2
		Total Suspended Solids	<0.2 mg/L	LTM-W-034	2
		Zinc (dissolved)	9 mg/L	APHA 2540 D	0.2
			<0.002 mg/L	APHA 3030 B/3120 B	0.002

22Oct-0109 DUP01
12.10.22

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		13-October-2022			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	13-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-0109	DUP01 12.10.22		<0.0002 mg/L	APHA 3030 B/3120 B	
		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
		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
		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-0110	Water Blank 12.10.22		<0.0002 mg/L	APHA 3030 B/3120 B	
		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
		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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		13-October-2022			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	Client	13-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-0110	Water Blank 12.10.22				
		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	13 mg/L	LTM-W-035	2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034	2
		Total Suspended Solids	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.

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

Wednesday, November 9, 2022



NATA Accredited Laboratory
Number: 9597

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2210-0036

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For all enquiries related to this report please quote document number: 2210-0036

Facility:	Order #	Date Analysis Commenced			
		13-October-2022			
Sample Type	Collected By	Date Received			
Water	Client	13-October-2022			
EAL ID	Client ID.	Test	Result (units)	Method Reference	Limit of Reporting
	Date/Time sample taken				

Signed Michael Glazier, Laboratory Manager.

*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*

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 (D/S)	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%
	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%
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%	5.6338028	0%	0%	0%	0%	0%	0%	
Water Blank	Event 1	Nothing above LOR	<0.02	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 2	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 3	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 4	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 5	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 6	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 7	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002
	Event 8	Nothing above LOR	<0.03	<0.0003	<0.00002	<0.00001	<0.0002	<0.002	<0.01	<0.001	<0.001	<0.00003	<0.001	<0.00002	<0.002

$$RPD \% = \frac{|(x_2 - x_1)|}{(x_2 + x_1)/2}$$

How to calculate the Relative Percent Difference (RPD)

The basic equation for RPD is $\frac{|R1 - R2|}{\left(\frac{R1 + R2}{2}\right)} \times 100$,

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	✓	
	Display	✓	
Grill Filter	Intensity	✓	
	Operation (segments)	✓	
PCB	Condition	✓	
	Seal	✓	
Connectors	Condition	✓	
	Sensor	✓	
Sensor	1. pH/ORP	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
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		21.4°C		MultiTherm	21.2°C
3. pH 4		pH 4.00		389384	pH 4.06
4. pH 7		pH 7.00		381241	pH 7.06
5. ORP mV		236.9mV		390802/393728	236.9mV
6. DO		0ppm		379624	0ppm
7. Turbidity		100NTU		386950	100.40NTU

Calibrated by: Alex Buist

Calibration date: 5/10/2022

Next calibration due: 4/11/2022