



NGH

UGL

Pre-construction Water Quality Monitoring Report

Event 12 2023

Project Number: 22-013

3200-0645-RPT-012



Document verification

Project Title: Event 12 2023

Project Number: 22-013

Project File Name: 22-013 Water Quality Monitoring Field and Laboratory Report Event 12 Final

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	27/03/2023	A. Gill	N. Smith	N. Smith
Final V1.0	31/03/2023	A. Gill	N. Smith	N. Smith

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.



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

Table of contents

1. Introduction.....	3
2. Program and methodology.....	3
3. Monitoring event observations and results.....	5
3.1. Event 12	5
3.1.1. Results	7
3.1.2. Quality Assurance / Quality Control.....	26
4. Conclusion	27
5. References	28

Figures

Figure 2-1 WQM locations	4
Figure 3-1 Yarrangobilly River 1 reference site (YR1-RS)	6
Figure 3-2 Sheep Station Creek (SSC-IS).....	6
Figure 3-3 New Zealand Gully impact site (NZG-IS).....	6
Figure 3-4 Temperature for Talbingo Reservoir catchment	9
Figure 3-5 Temperature for Yorkers Creek catchment.....	9
Figure 3-6 Dissolved oxygen (DO%) for Talbingo Reservoir catchment.....	10
Figure 3-7 Dissolved oxygen (DO%) for Yorkers Creek catchment.....	10
Figure 3-8 Dissolved Oxygen (ppm) for Talbingo Reservoir catchment	11
Figure 3-9 Dissolved Oxygen (ppm) for Yorkers Creek catchment.....	11
Figure 3-10 Specific Conductance (SPC μ S/cm) for Talbingo Reservoir catchment.....	12
Figure 3-11 Specific Conductance (SPC μ S/cm) for Yorkers Creek catchment	12
Figure 3-12 Conductivity (μ S/cm) for Talbingo Reservoir catchment.....	13
Figure 3-13 Conductivity (μ S/cm) for Yorkers Creek catchment.....	14
Figure 3-14 Turbidity (NTU) for the Talbingo Reservoir catchment	15
Figure 3-15 Turbidity (NTU) for CG-IS, within the Talbingo Reservoir catchment.....	15
Figure 3-16 Turbidity (NTU) for the Yorkers Creek catchment.....	16
Figure 3-17 Total Suspended Solids for the Talbingo Reservoir catchment.....	17
Figure 3-18 Total Suspended Solids for CG-IS, within the Talbingo Reservoir catchment	17
Figure 3-19 Total Suspended Solids for the Yorkers Creek catchment	18
Figure 3-20 Potential of Hydrogen (pH) for Talbingo Reservoir catchment	19
Figure 3-21 Potential of Hydrogen (pH) for Yorkers Creek catchment	19
Figure 3-22 Oxygen Redox Potential (ORP) for Talbingo Reservoir catchment.....	20
Figure 3-23 Oxygen Redox Potential (ORP) for Yorkers Creek catchment	20

Pre-construction Water Quality Monitoring Report

Event 12 2023

Figure 3-24 Ammonia (mg/L) for the Talbingo Reservoir catchment	21
Figure 3-25 Ammonia (mg/L) for the Yorkers Creek catchment.....	21
Figure 3-26 Nitrogen Oxides (mg/L) for the Talbingo Reservoir catchment.....	22
Figure 3-27 Nitrogen Oxides (mg/L) for the Yorkers Creek catchment.....	22
Figure 3-28 Reactive Phosphorous (mg/L) for the Talbingo Reservoir catchment	23
Figure 3-29 Reactive Phosphorous (mg/L) for the Yorkers Creek catchment	23
Figure 3-30 Total Hardness (CaCO_3) for the Talbingo Reservoir catchment.....	24
Figure 3-31 Total Hardness (CaCO_3) for the Yorkers Creek catchment.....	24
Figure 3-32 Total Kjedahl Nitrogen (TKN) for the Talbingo Reservoir catchment.....	25
Figure 3-33 Total Kjedahl Nitrogen (TKN) for the Yorkers Creek catchment.....	25

Appendices

Appendix A Event Data Table	A-1
Appendix B Observations and Field Data.....	B-1
Appendix C Laboratory Certificates.....	C-1
Appendix D RPD Table.....	D-1
Appendix E Calibration Certificates	E-1

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.

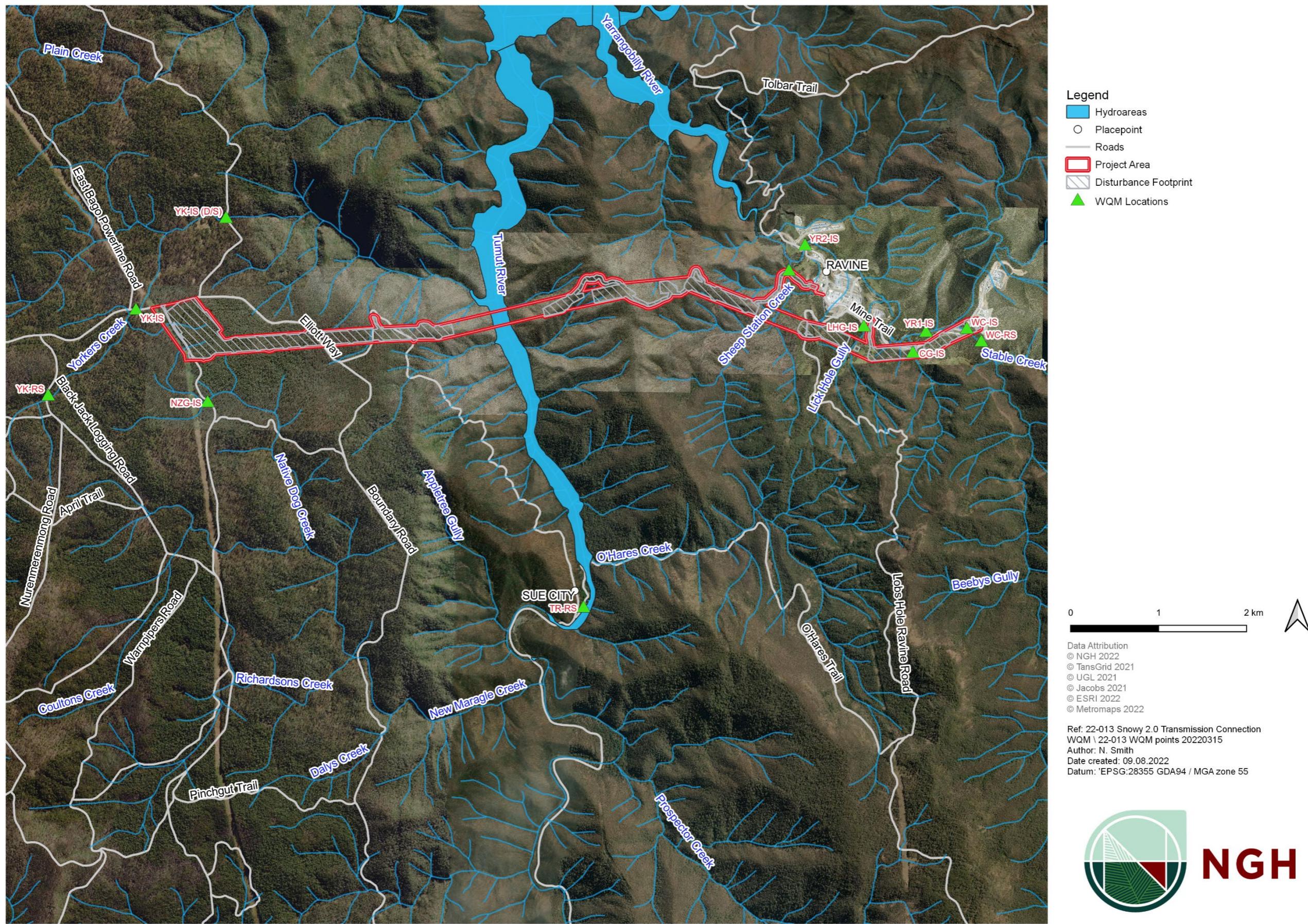


Figure 2-1 WQM locations

3. Monitoring event observations and results

Images for Yarrangobilly River, Sheep Station Creek and New Zealand Gully 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 3-33. Field data and observations are provided in Appendix B.

3.1. Event 12

NGH conducted the first, second and third rounds of sampling in March (Event 1), April (Event 2), May and early June (Event 3), late June (Event 4), July (Event 5), August (Event 6), early October (Event 7), late October (Event 8), November (Event 9), December (Event 10) 2022 and January (Event 11) 2023. Reports for each event were prepared following receipt of the laboratory results (NGH 2022a; 2022b; 2022c; 2022d; 2022e, 2022f, 2022g, 2022h, 2022i, 2022j, 2023a). The results of Event 1 through to Event 11 have been compared in this report to the results of Event 12.

NGH Environmental Scientist, Nicola Smith, conducted the Event 12 monitoring event with a UGL representative on 22 and 23 February 2023. The weather was overcast with showers. Data from the Cabramurra SMHEA automatic weather station on 22 February 2023 (Station ID 072161) indicates that wind speeds were from the east southeast, with speeds of 48 km/hr in the morning and 33 km/hr in the afternoon. Temperatures on the day included a low of 7.2°C and a high of 15.8°C. Data from the Tumbarumba weather station for 23 February 2023 (Station ID 072043) indicates that temperatures ranged from a low of 8.0°C to a high of 27.0°C.

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

Pre-construction Water Quality Monitoring Report

Event 12 2023



Figure 3-1 Yarrangobilly River 1 reference site (YR1-RS)



Figure 3-2 Sheep Station Creek (SSC-IS)



Figure 3-3 New Zealand Gully impact site (NZG-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
TR-RS	Total Nitrogen mg/L	0.25	7	This is notably higher than previous results for Total Nitrogen at this location.
	Reactive phosphorous mg/L	0.015	0.02	
CG-IS	Zinc mg/L	0.0024	0.004	Always returns a high total dissolved solid result.
	Total Dissolved Solids (TDS) mg/L		292	
	Total Suspended Solids (TSS) mg/L	0.2	2	
LHG-IS	Aluminium mg/L	0.027	0.05	Always returns a high total dissolved solid result. Results for Aluminium remain consistent with those recorded for Event 11.
	Total Suspended Solids (TSS) mg/L	0.2	7	
	Total Dissolved Solids (TDS) mg/L		280	
	Zinc mg/L	0.0024	0.004	
	Reactive phosphorous mg/L	0.015	0.03	
WC-RS	Total Suspended Solids (TSS) mg/L	0.2	5	
WC-IS	Zinc mg/L	0.0024	0.02	This is consistent with prior sampling events for this site.
	Reactive phosphorous mg/L	0.015	0.06	
	Total Suspended Solids (TSS) mg/L	0.2	2	
YR1-RS	Aluminium mg/L	0.027	0.03	

Pre-construction Water Quality Monitoring Report

Event 12 2023

Site identification	Analyte	DGV	Result	Comment
YR2-RS	Aluminium mg/L	0.027	0.03	Receives flow from CG-IS and LHG-IS.
YK-IS (D/S)	Aluminium mg/L	0.027	0.28	Located within Bago State Forest and adjacent to an unsealed track. Unknown activities within the State Forest upstream. Sample taken upstream of culvert.
	Iron mg/L	0.3	0.37	
	Total Suspended Solids (TSS) mg/L	0.2	28	
NZG-IS	Aluminium mg/L	0.027	0.12	Located within Bago State Forest.
	Total Suspended Solids (TSS) mg/L	0.2	4	Sample taken upstream of timber supported unsealed track bridge. Banks heavily vegetated, shallow channel.
YK-RS	Aluminium mg/L	0.027	0.36	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.
	Iron mg/L	0.3	0.41	
	Total Suspended Solids (TSS) mg/L	0.2	13	
YK-IS	Aluminium mg/L	0.027	0.30	Located within Bago State Forest and adjacent to Elliott Way (road). Unknown activities within the State Forest upstream.
	Iron mg/L	0.3	0.39	
	Total Suspended Solids (TSS) mg/L	0.2	5	
	Reactive phosphorous mg/L	0.015	0.02	

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

Water temperatures ranged from 13.2 degrees Celsius at YK-IS (D/S) to 22.9 degrees Celsius at YR2-RS.

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

The following time series, Figure 3-4 to Figure 3-23, display physico-chemical water quality through time for monitoring Event 1 (March), Event 2 (April), Event 3 (May/June), Event 4 (June), Event 5 (July), Event 6 (August), Event 7 (early October), Event 8 (late October), Event 9 (November), Event 10 (December), Event 11 (January) and Event 12 (February). Where a DGV is available, these values are shown on the graph and have been included for dissolved oxygen (%), conductivity, pH and turbidity.

No flows were present at SSC-IS for Event 12 at the time of sampling, refer to Figure 3-2 above. No data was available for collection at this location.

Temperatures within the Talbingo Reservoir catchment have generally increased since Event 11, refer to Figure 3-4. TR-RS registered the greatest increase in temperature, from 13.2°C during Event 11 to 19.3°C in Event 12. YK-IS (D/S) was the only site to register a decrease in temperature. Temperatures within the Yorkers Creek catchment have slightly decreased since Event 11, refer to Figure 3-5.

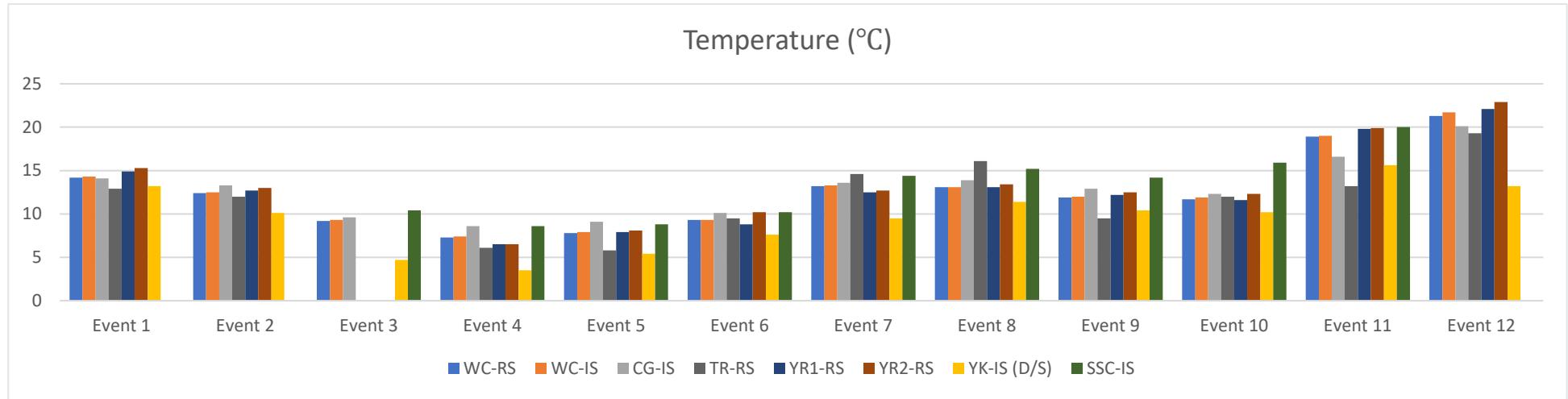


Figure 3-4 Temperature for Talbingo Reservoir catchment

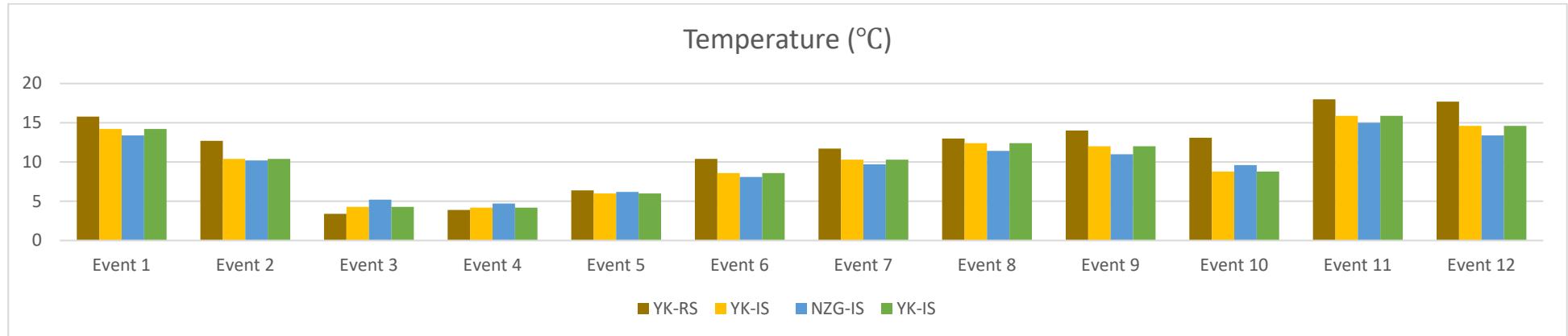


Figure 3-5 Temperature for Yorkers Creek catchment

All DO (%) results for Event 12, except for LHG-IS (84.3%), were within the DGV range (90-110%), refer to Figure 3-6 and Figure 3-7. Results for both catchments were relatively consistent with Event 11.

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

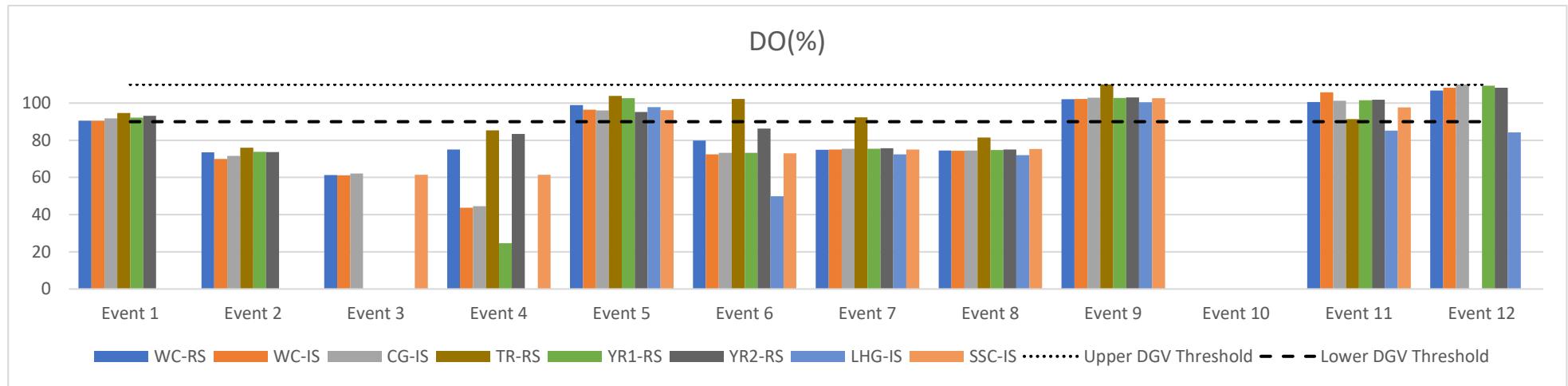


Figure 3-6 Dissolved oxygen (DO%) for Talbingo Reservoir catchment

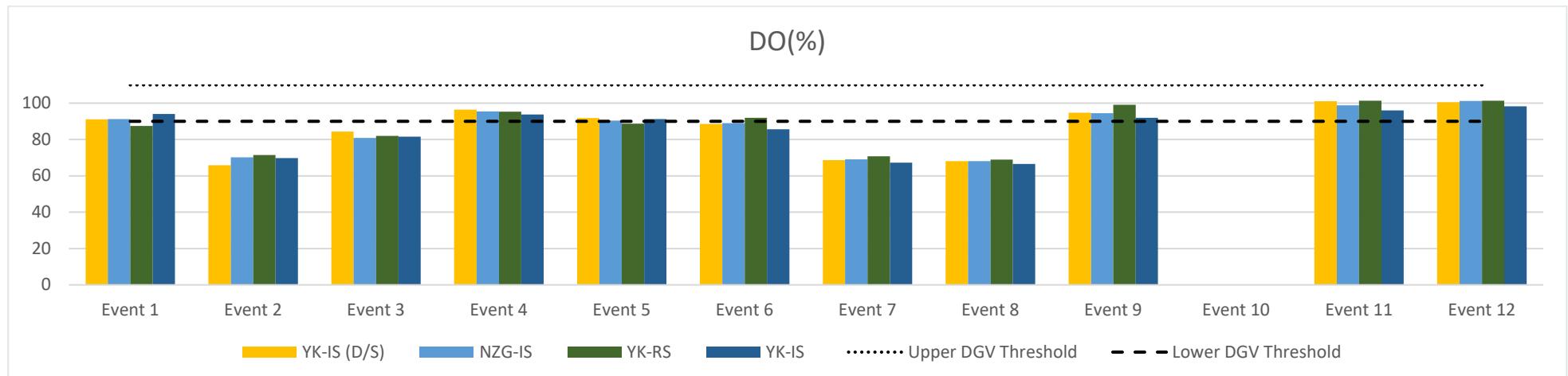


Figure 3-7 Dissolved oxygen (DO%) for Yorkers Creek catchment

The results for DO (ppm) for the Talbingo Reservoir catchment have remained relatively consistent with those recorded for Event 11, refer to Figure 3-8. Results for DO (ppm) within the Yorkers Creek catchment have also increased, refer to Figure 3-9. The highest reading for DO (ppm) was recorded within the Talbingo catchment at CG-IS (9.98 ppm).

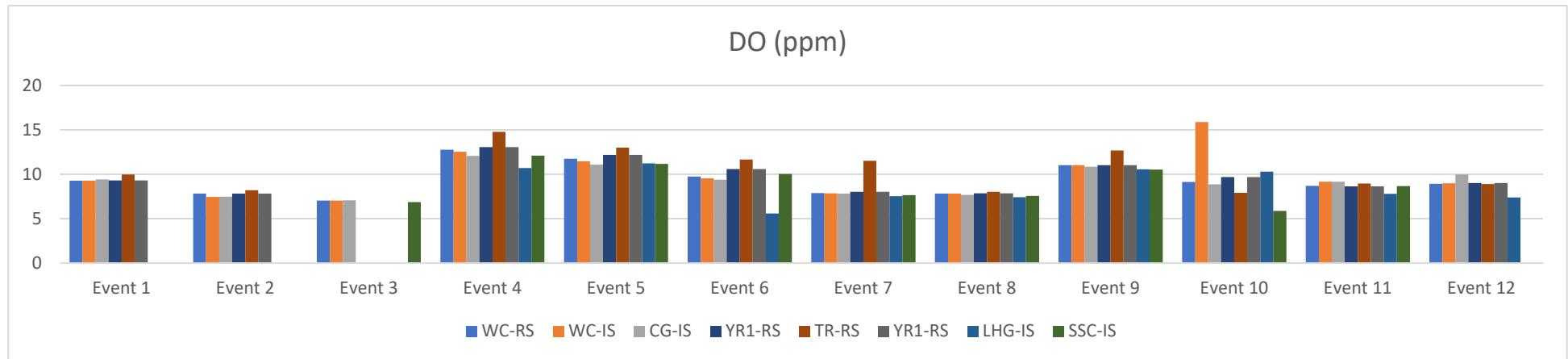


Figure 3-8 Dissolved Oxygen (ppm) for Talbingo Reservoir catchment

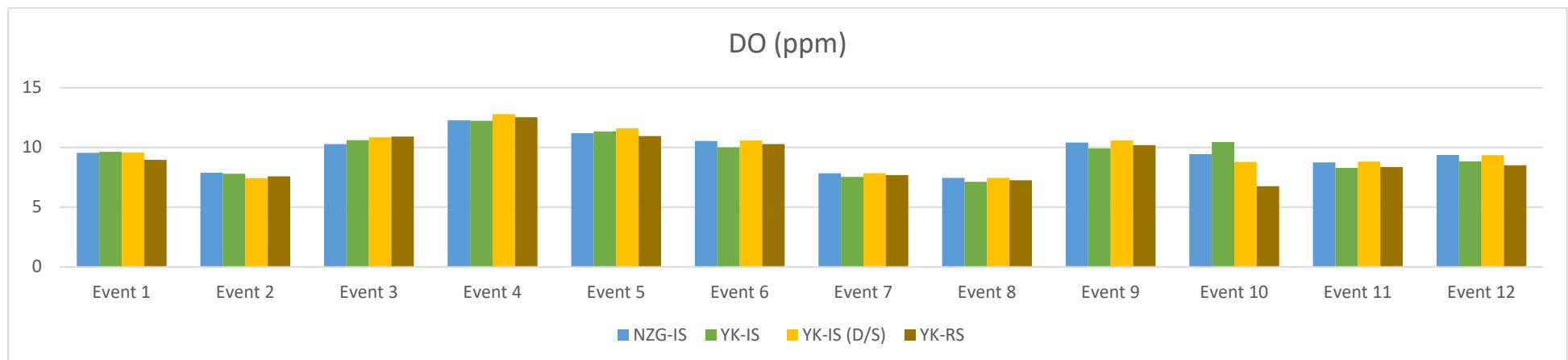


Figure 3-9 Dissolved Oxygen (ppm) for Yorkers Creek catchment

Specific conductance has increased at both catchments, when compared to results from Event 11, refer to Figure 3-10 and Figure 3-11. CG-IS returned a result of 438.4 µS/cm for Event 12, compared with 375.2 µS/cm during Event 11. Specific conductance for LHG-IS (453.4 µS/cm) was also elevated for Event 12.

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

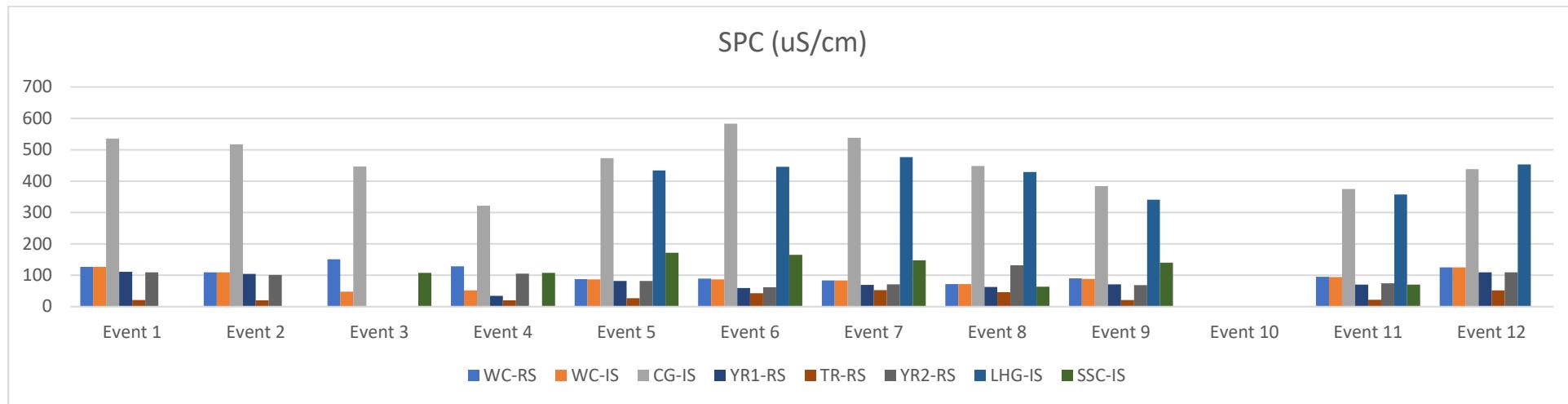


Figure 3-10 Specific Conductance (SPC µS/cm) for Talbingo Reservoir catchment

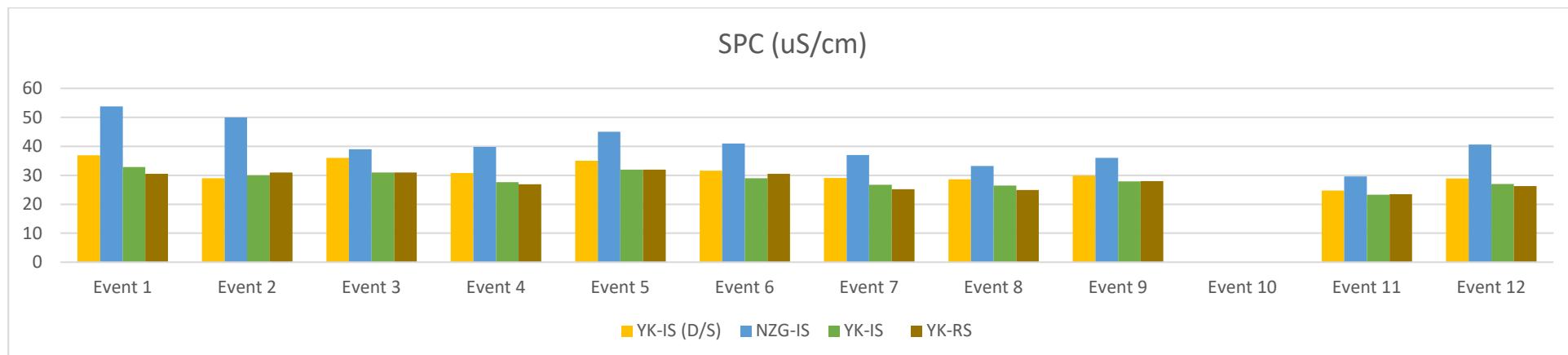


Figure 3-11 Specific Conductance (SPC µS/cm) for Yorkers Creek catchment

Conductivity within the Talbingo Reservoir catchment has increased during Event 12, when compared with results from Event 11, refer to Figure 3-12. Conductivity at CG-IS has increased from 315.2 µS/cm in Event 11 to 397.7 µS/cm, refer to Figure 3-12. Similarly, LHG-IS has a reading of 399.3 µS/cm for Event 12, which has increased from 297 µS/cm during Event 11. 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. Conductivity at NZG-IS (31.6 µS/cm) recorded a slight increase, when compared with results from Event 11 (23.9 µS/cm). Conductivity results from NZG-IS continue to be greater than the conductivity recorded at the Yorkers Creek sites, noting that the result is 1.6 µS/cm above the lower DGV threshold. The pattern between sites is mostly reflective of the pattern for specific conductance.

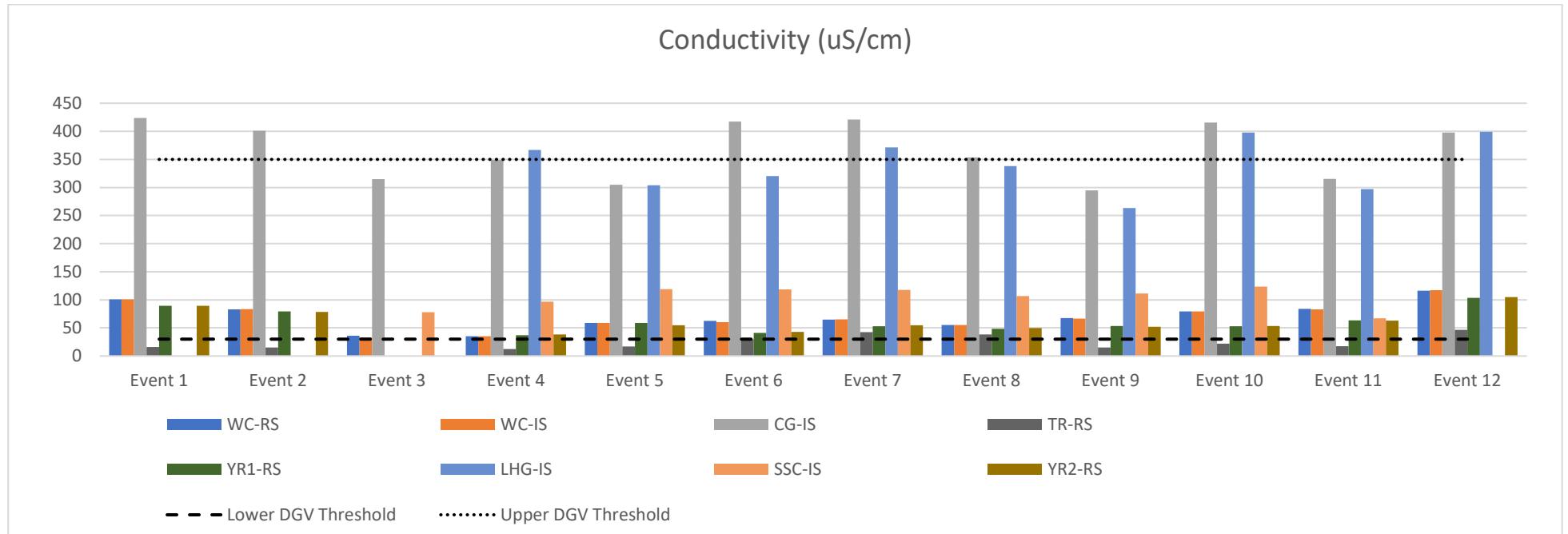


Figure 3-12 Conductivity (µS/cm) for Talbingo Reservoir catchment

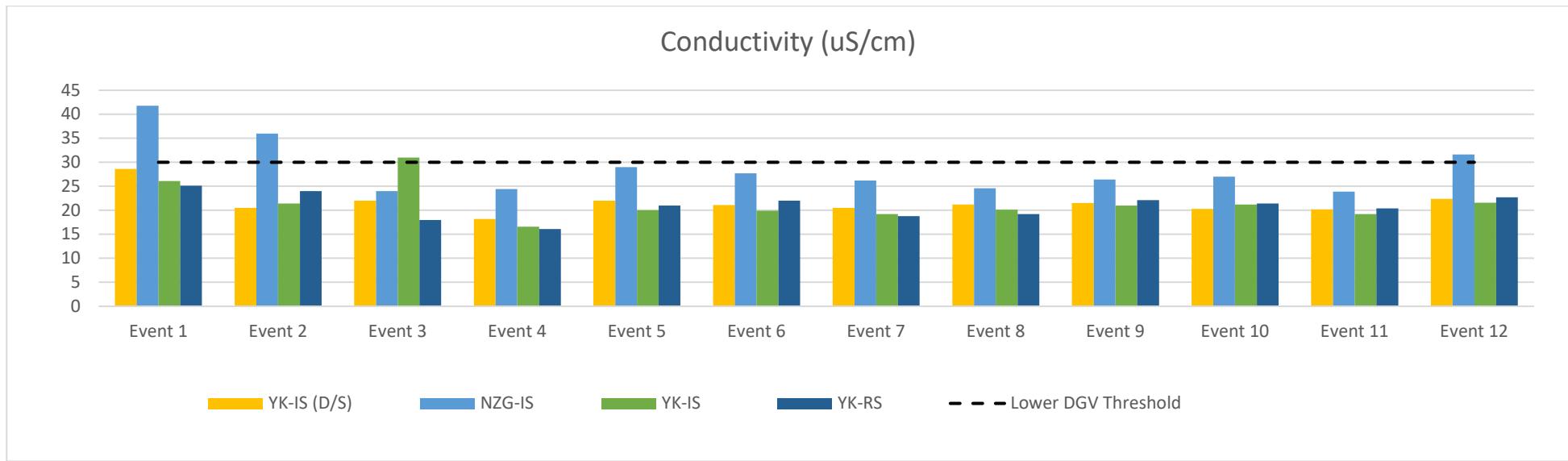


Figure 3-13 Conductivity ($\mu\text{S}/\text{cm}$) for Yorkers Creek catchment

Turbidity values were below the lower DGV threshold (2 NTU) within the Talbingo Reservoir catchment for Event 12. Turbidity readings within the Talbingo Reservoir catchment have notably decreased since Event 8, refer to Figure 3-14 and Figure 3-15. The YSI Pro multiprobe water quality monitor registered a negative result for turbidity (NTU) at WC-RS, WC-IS, CG-IS, YR1-RS, LHG-IS, YR2-RS and TR-RS. A negative result is likely connected to a value around zero. A conservative approach was adopted, and a value of 0.1 NTU was assigned to these sites.

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.

Turbidity readings within the Yorkers Creek catchment have remained relatively consistent, with the exception of YK-IS (D/S), which returned a reading of 20.22 NTU, refer to Figure 3-16.

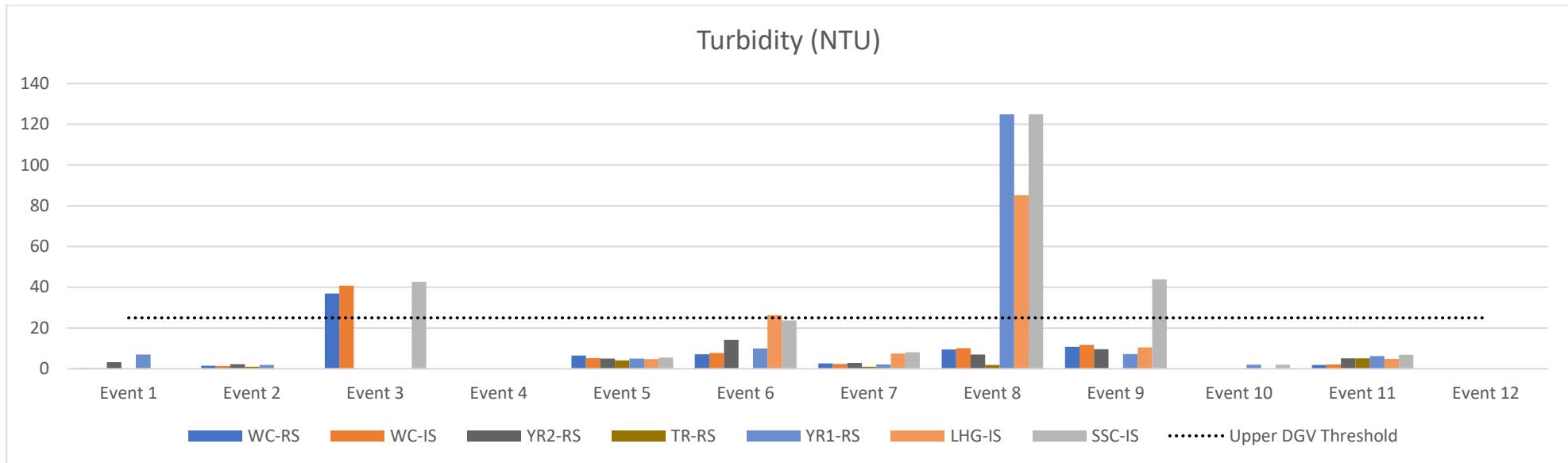


Figure 3-14 Turbidity (NTU) for the Talbingo Reservoir catchment

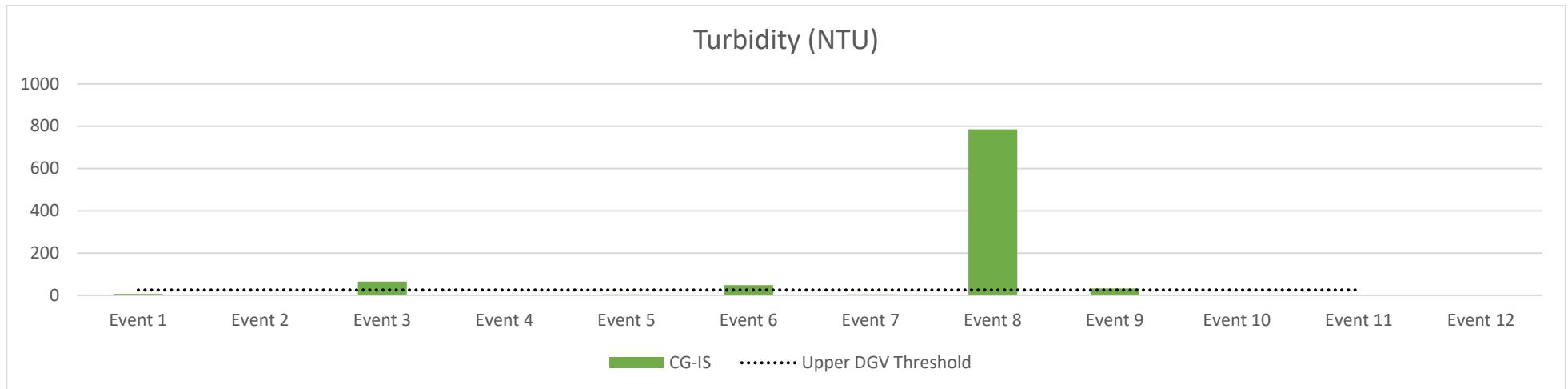


Figure 3-15 Turbidity (NTU) for CG-IS, within the Talbingo Reservoir catchment

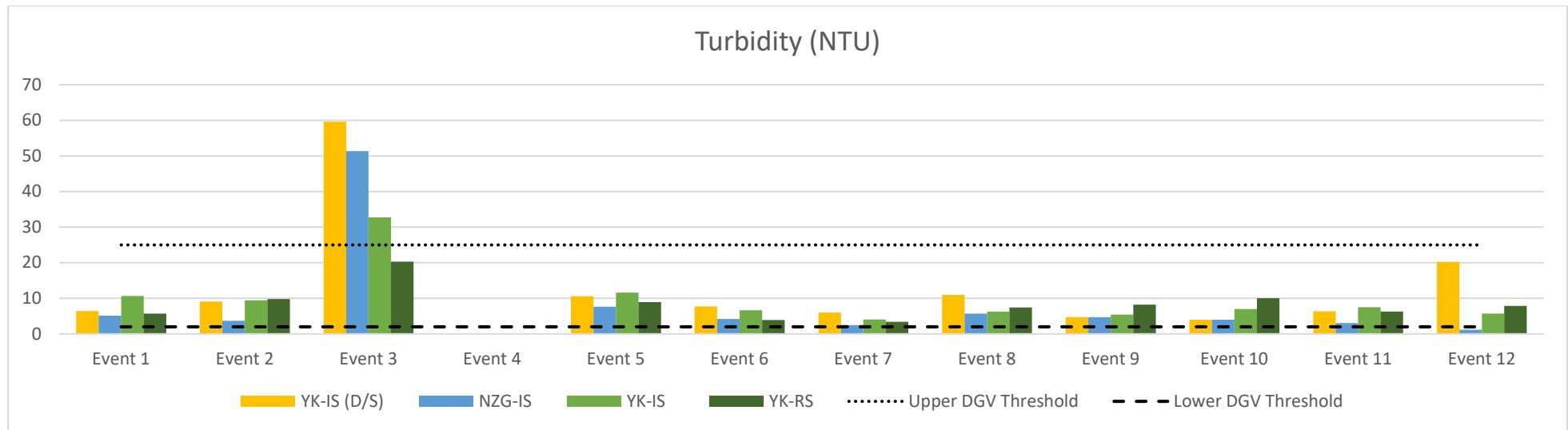


Figure 3-16 Turbidity (NTU) for the Yorkers Creek catchment

Total suspended solids (TSS) have slightly increased at SSC-IS and LHG-IS within the Talbingo Reservoir catchment since Event 11, refer to Figure 3-17. Total suspended solids remain low at CG-IS for Event 12, refer to Figure 3-18. Total suspended solids have increased within Yorkers Creek, with YK-IS (D/S) increasing from 9 mg/L during Event 11 to 28 mg/L during Event 12, refer to Figure 3-19.

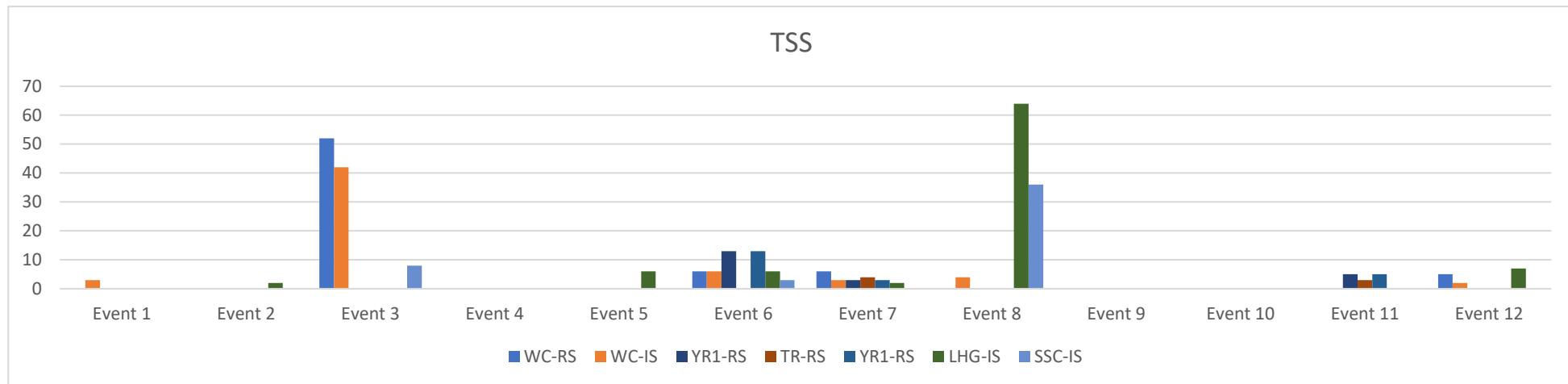


Figure 3-17 Total Suspended Solids for the Talbingo Reservoir catchment

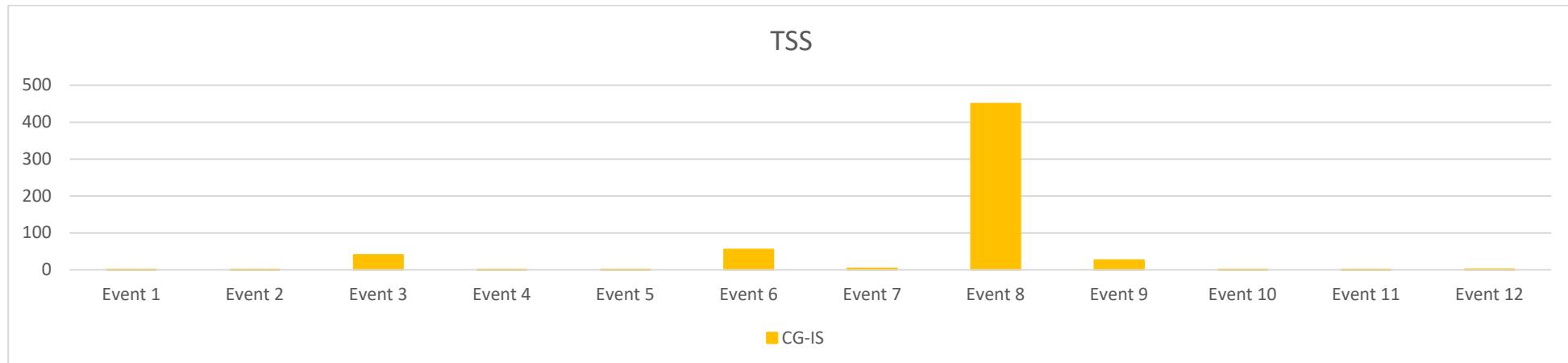


Figure 3-18 Total Suspended Solids for CG-IS, within the Talbingo Reservoir catchment

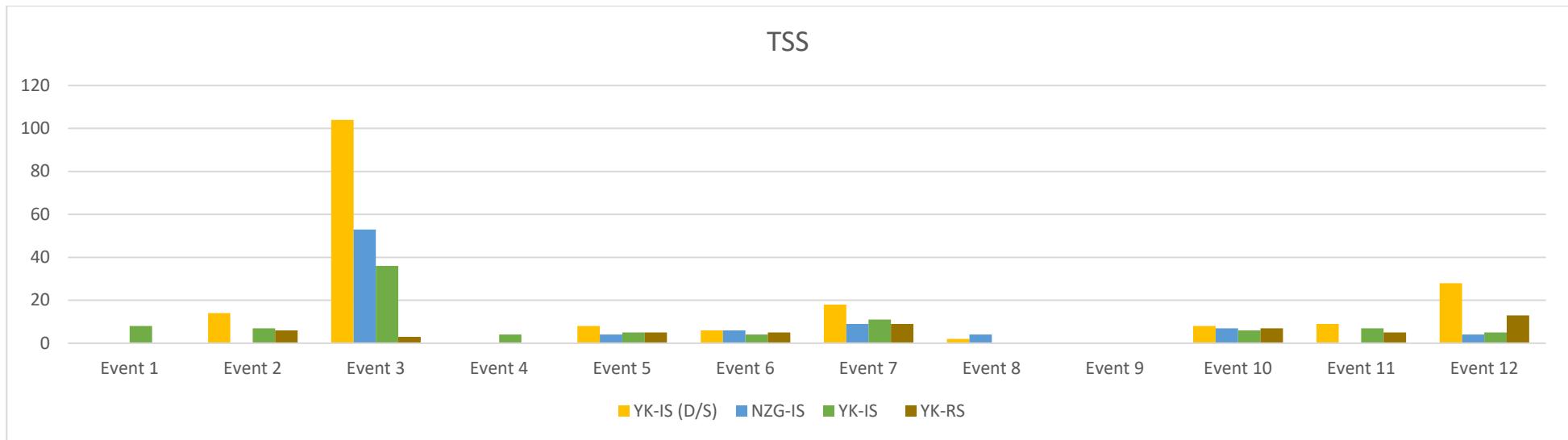


Figure 3-19 Total Suspended Solids for the Yorkers Creek catchment

Values of pH for the Talbingo Reservoir catchment have remained relatively consistent since Event 7. Three sites (WC-RS, WC-IS and YR1-RS) had values of pH that fell above the upper DGV range of 8 pH units, refer to Figure 3-20. There has been a notable increase in pH at TR-RS (7.76 pH units) when compared with Event 11 (6.86 pH units).

Values of pH for the Yorkers Creek catchment have remained relatively consistent since Event 8, refer to Figure 3-21. All readings fell within the DGV range for values of pH (6.5 – 8 pH units).

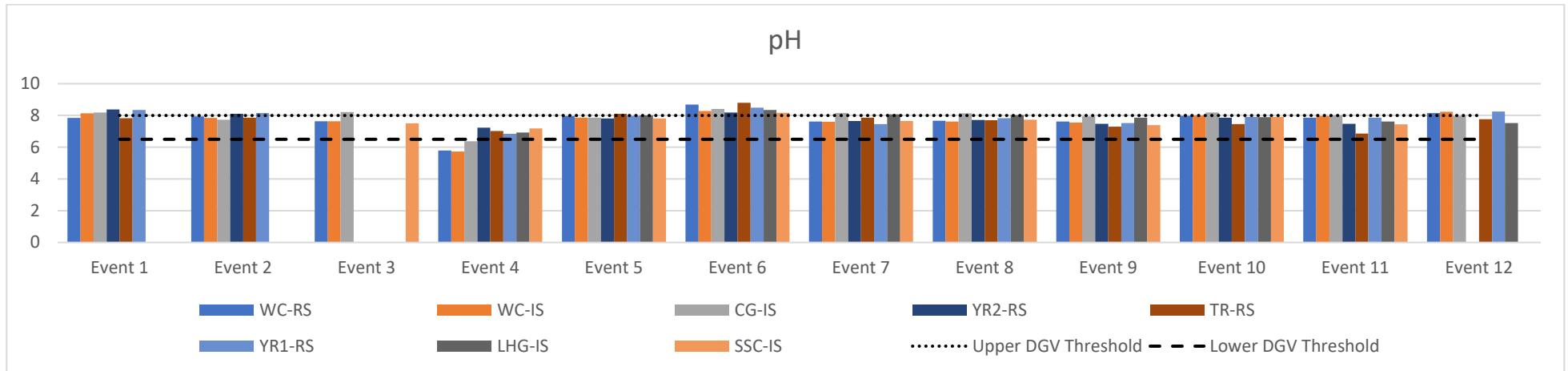


Figure 3-20 Potential of Hydrogen (pH) for Talbingo Reservoir catchment

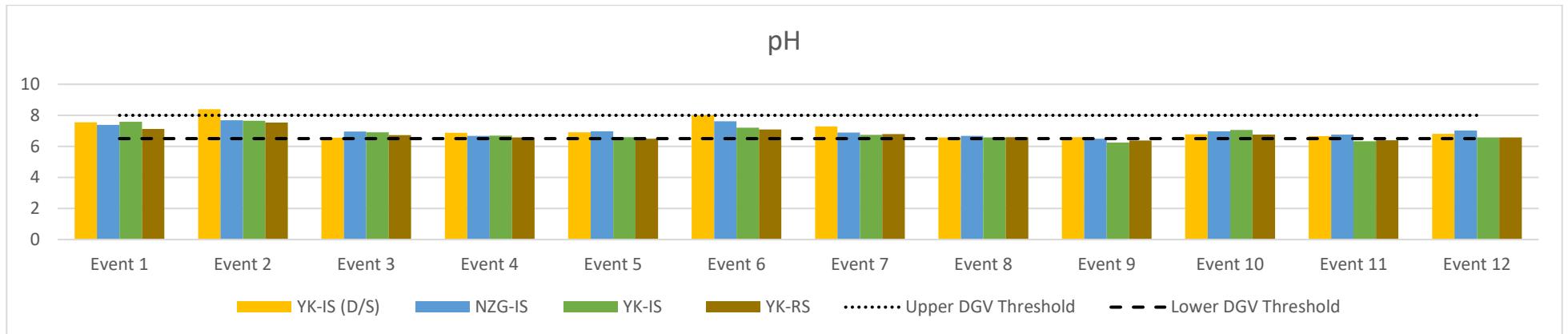


Figure 3-21 Potential of Hydrogen (pH) for Yorkers Creek catchment

The values for oxygen redox potential within the Talbingo Reservoir catchment have remained relatively consistent for Event 12, with the exception of LHG-IS, which recorded a negative value of -19.1 mV, refer to Figure 3-22. Oxygen redox potential has slightly decreased within the Yorkers Creek catchment for all sites other than YK-IS, which registered a notable decrease of 62.5 mV, down from 98.6 mV during Event 11, Oxygen redox potential increased for all sites within the Yorkers Creek catchments, refer to Figure 3-23.

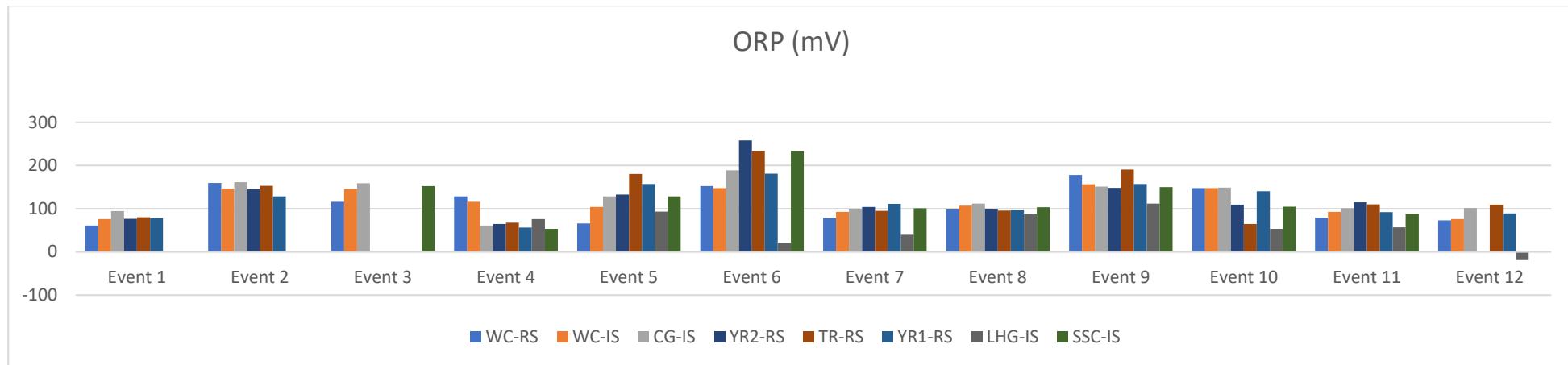


Figure 3-22 Oxygen Redox Potential (ORP) for Talbingo Reservoir catchment

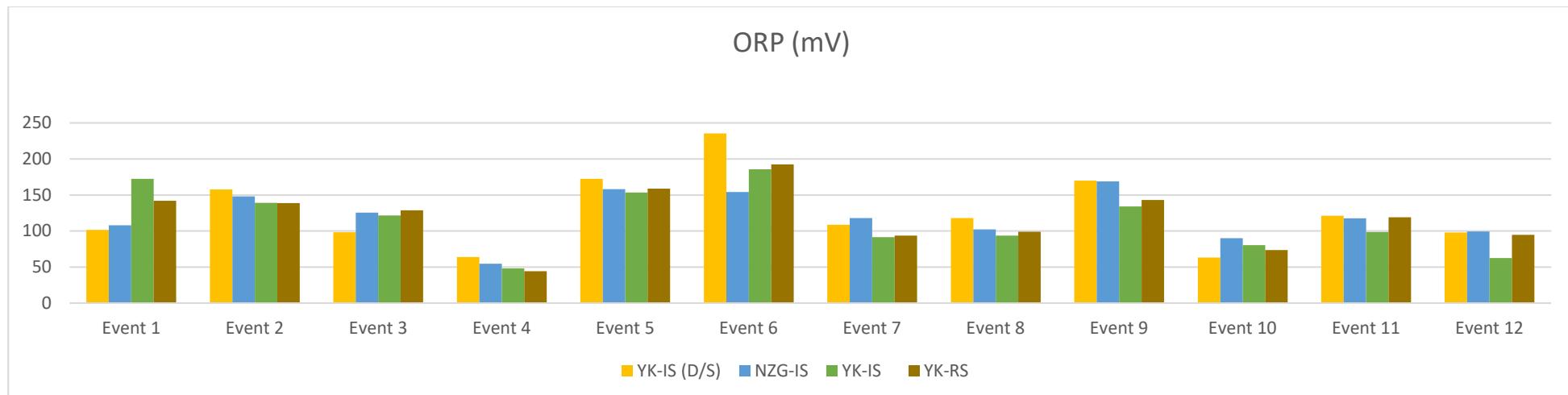


Figure 3-23 Oxygen Redox Potential (ORP) for Yorkers Creek catchment

Ammonia (mg/L) levels were below the limit of reporting for Event 12, refer to Figure 3-24 and Figure 3-25.

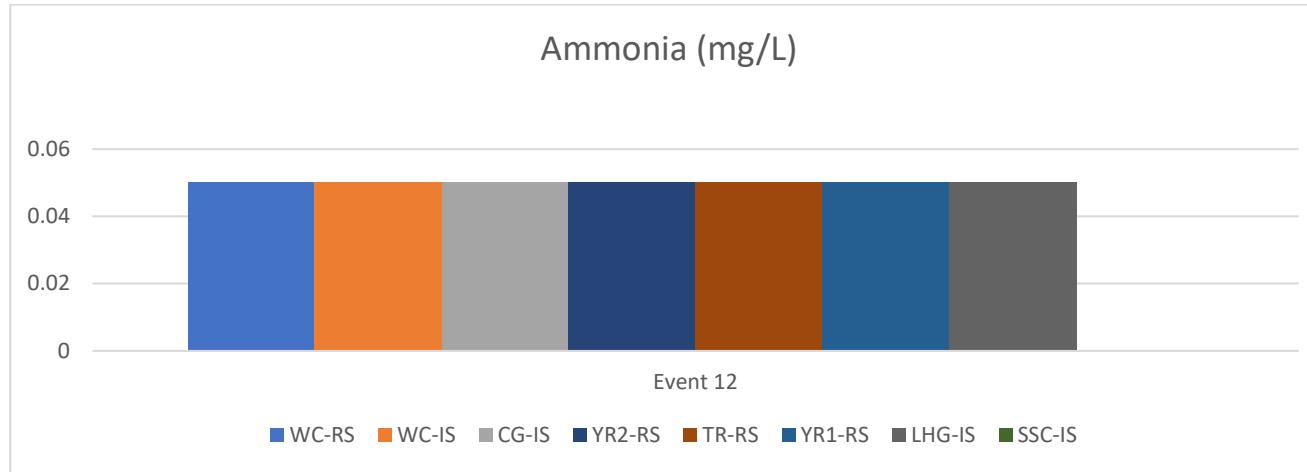


Figure 3-24 Ammonia (mg/L) for the Talbingo Reservoir catchment

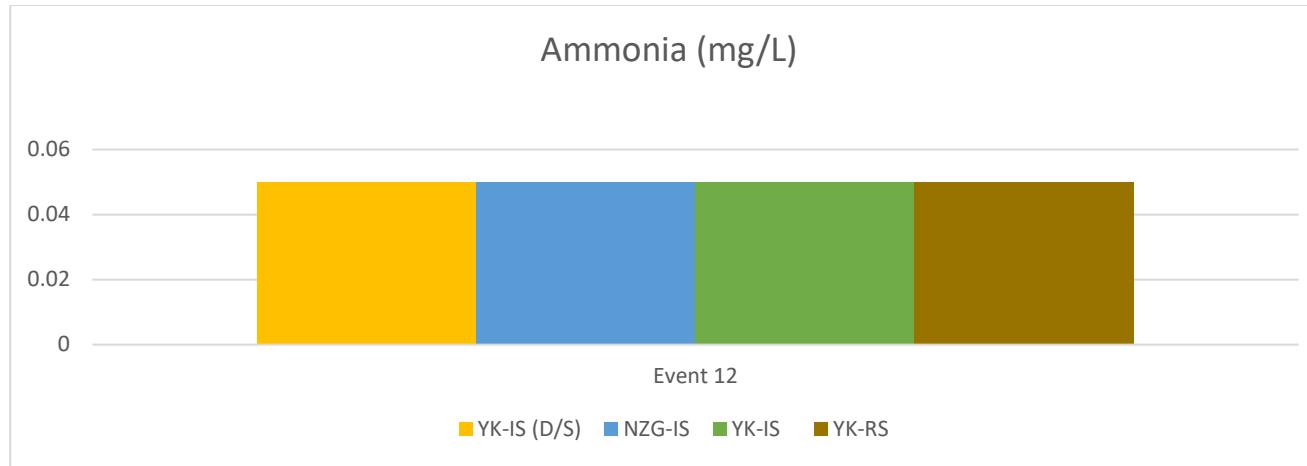


Figure 3-25 Ammonia (mg/L) for the Yorkers Creek catchment

Nitrogen Oxides (mg/L) have remained consistent within the Talbingo Reservoir and Yorkers Creek catchments since Event 4, refer to Figure 3-26 and Figure 3-27.

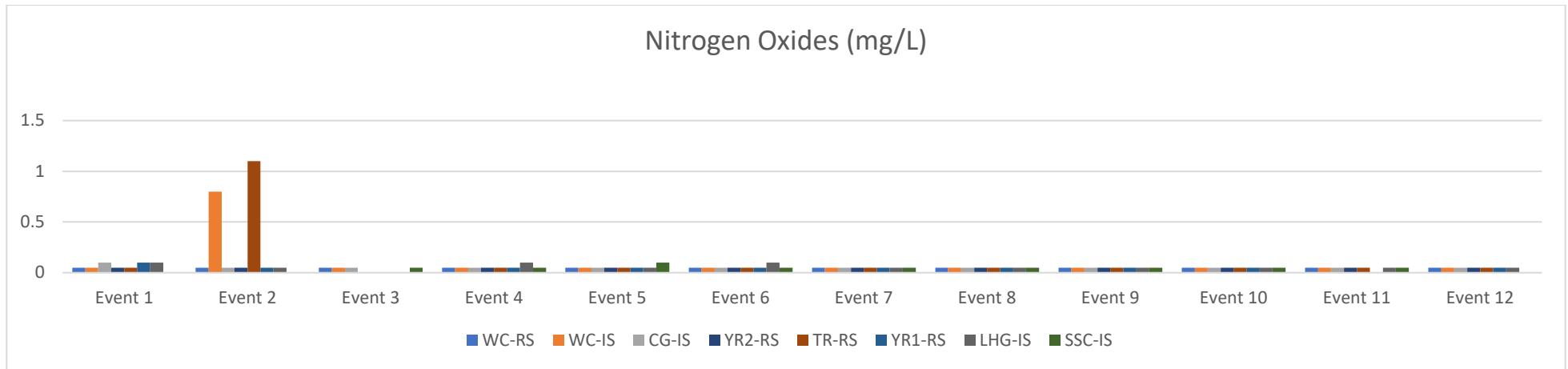


Figure 3-26 Nitrogen Oxides (mg/L) for the Talbingo Reservoir catchment

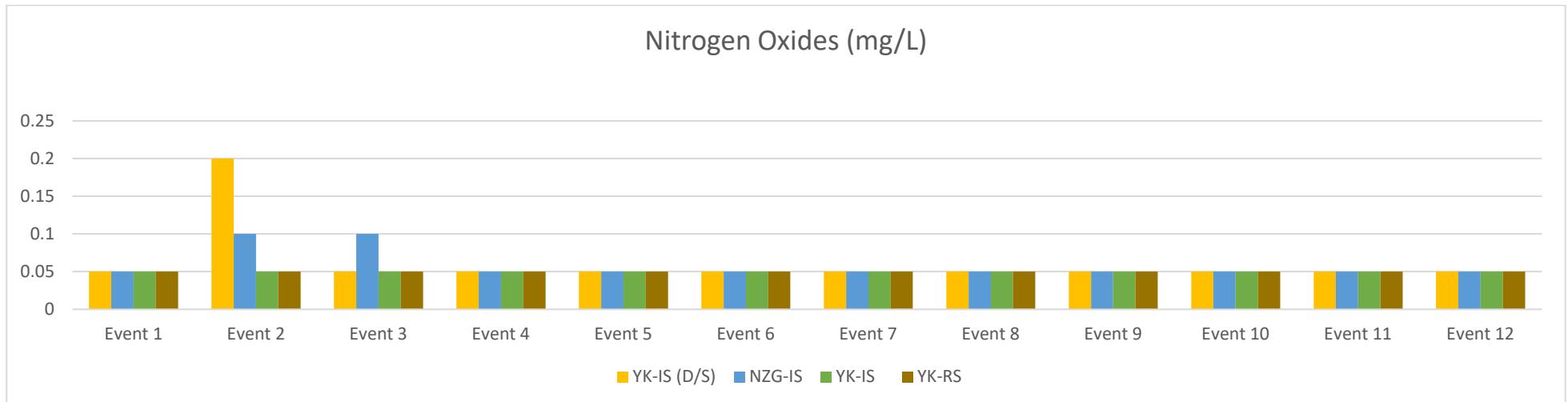


Figure 3-27 Nitrogen Oxides (mg/L) for the Yorkers Creek catchment

Reactive Phosphorous (mg/L) varied across the Talbingo and Yorkers Creek catchments, refer to Figure 3-28 and Figure 3-29. Reactive Phosphorous was highest at WC-IS (0.06 mg/L) within the Talbingo Reservoir catchment.

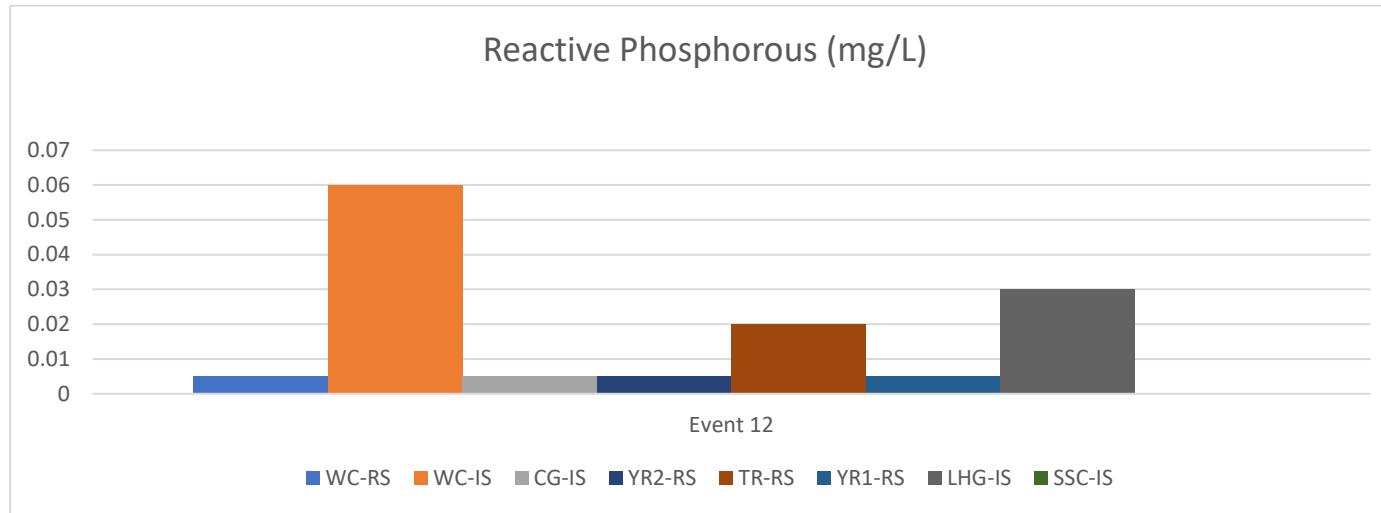


Figure 3-28 Reactive Phosphorous (mg/L) for the Talbingo Reservoir catchment

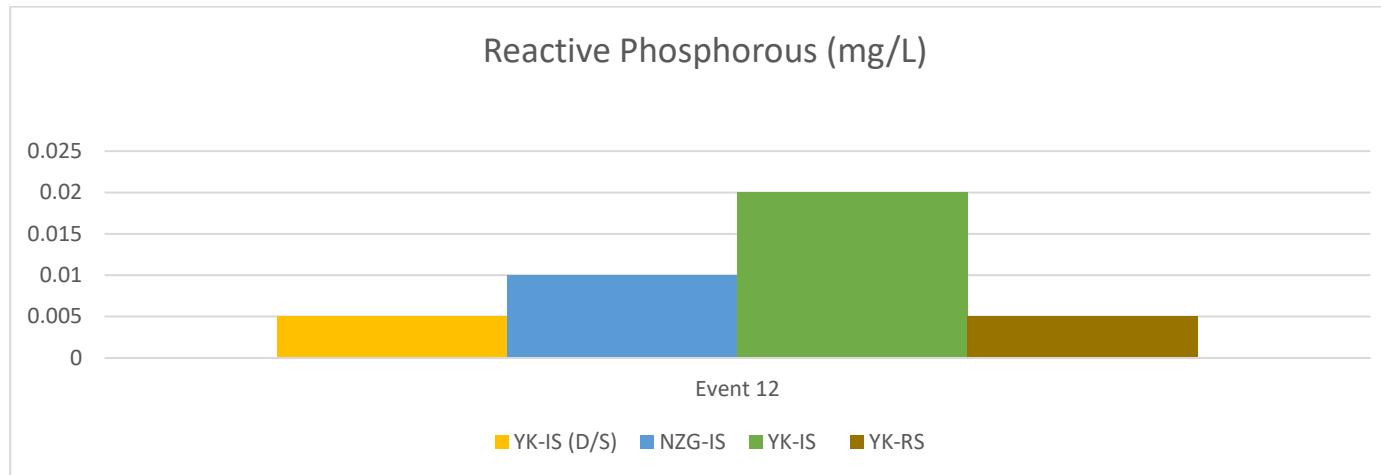


Figure 3-29 Reactive Phosphorous (mg/L) for the Yorkers Creek catchment

Total Hardness (CaCO_3 , mg/L) within the Talbingo Reservoir catchment for Event 12 varied from very soft at YR2-RS (21 mg/L) to hard at LHG-IS (273 mg/L), refer to Figure 3-30. Total Hardness (CaCO_3 , mg/L) within the Yorkers Creek catchment was generally very soft, ranging from 10 – 17 mg/L, refer to Figure 3-31.

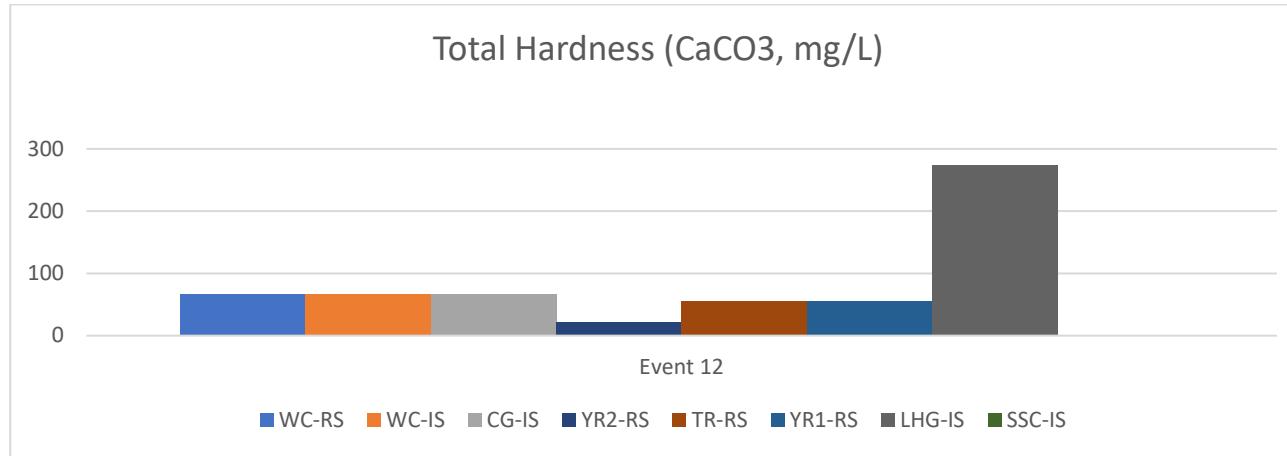


Figure 3-30 Total Hardness (CaCO_3) for the Talbingo Reservoir catchment

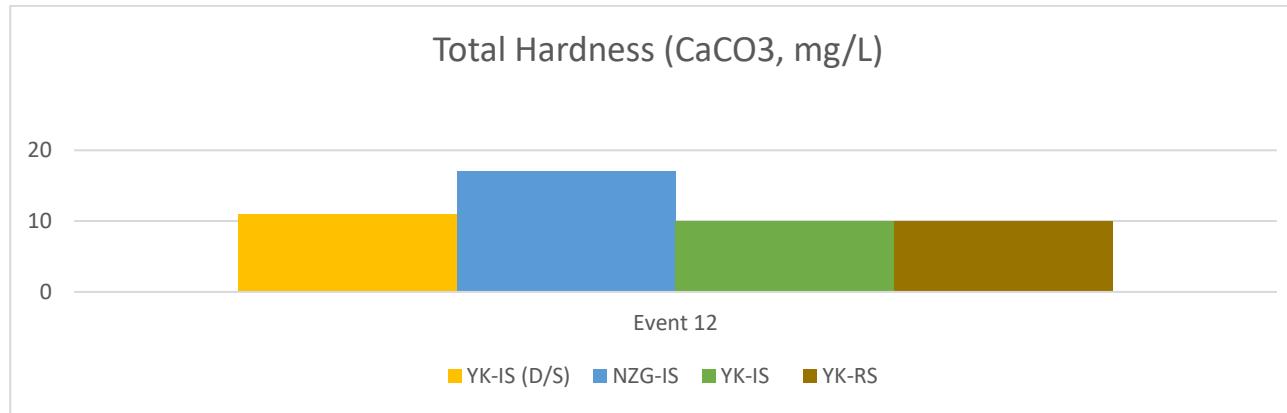


Figure 3-31 Total Hardness (CaCO_3) for the Yorkers Creek catchment

Total Kjedahl Nitrogen (TKN, mg/L) has remained relatively consistent for the Talbingo Reservoir and Yorkers Creek catchments, with the exception of YR2-RS (7 mg/L), which registered a notably higher result for Event 12, when compared to all other monitoring locations, refer to Figure 3-32 and Figure 3-33.

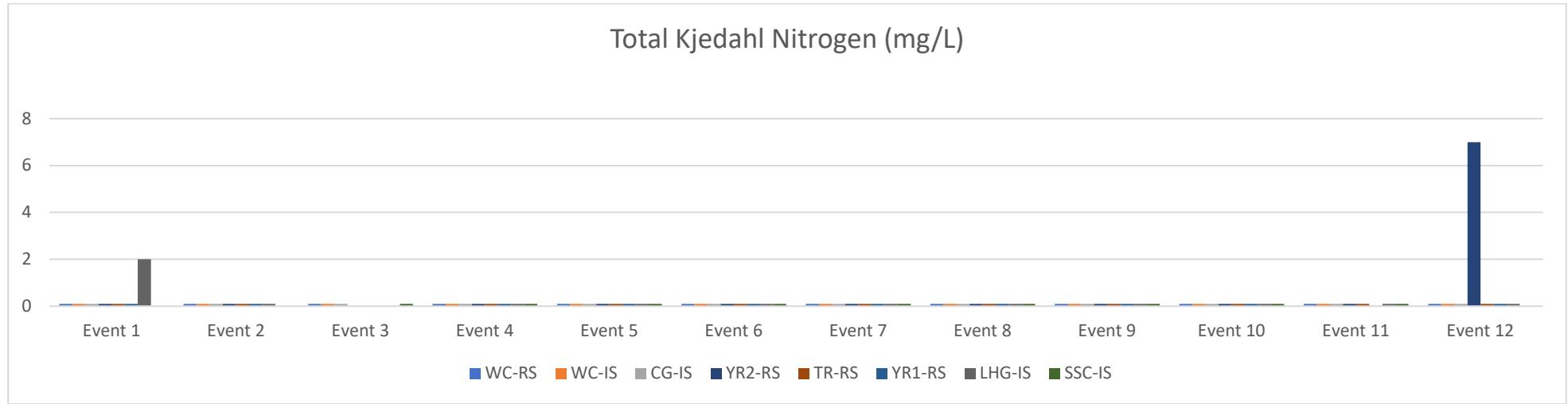


Figure 3-32 Total Kjedahl Nitrogen (TKN) for the Talbingo Reservoir catchment

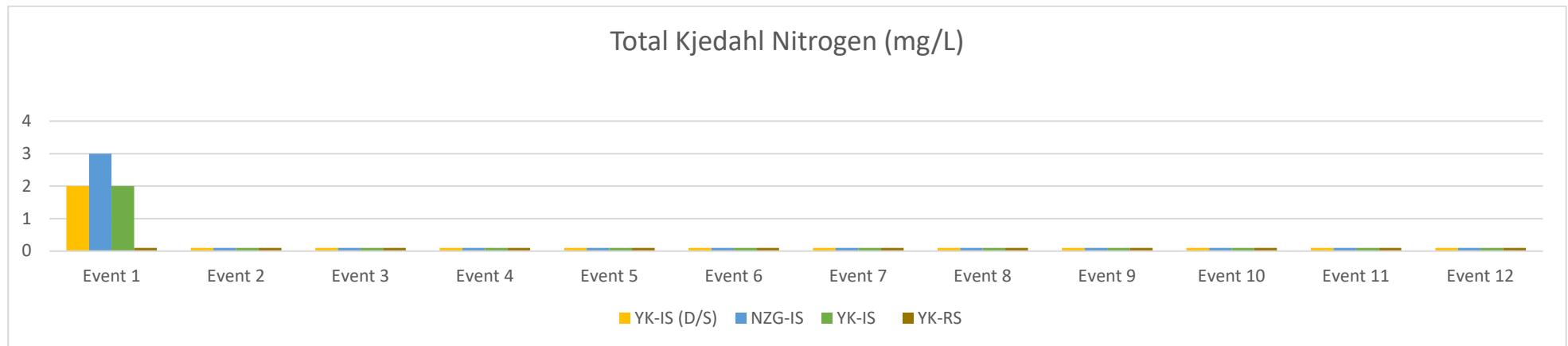


Figure 3-33 Total Kjedahl Nitrogen (TKN) for the Yorkers Creek catchment

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 22 February 2023. DUP01 was analysed for metals and metalloids. The duplicate sample has been compared against the WC-RS sample by Relative Percentage Difference (RPD) and has returned within an acceptable range or less than 30% for inorganic or less than 5 times the laboratory limit of reporting (LOR).
- A water blank was supplied by the laboratory. The water blank sample was analysed for metals and metalloids. There were no exceedances of the sample results above the LORs.

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

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

4. Conclusion

Water temperatures for Event 12 have generally increased across the sites compared to the water temperatures for Event 11. Water quality monitoring results for Event 12 were generally consistent with Event 11.

Results for Event 12 did indicate that there has been a slight decrease in turbidity (NTU) within the Talbingo Reservoir catchment. In comparison, there has been a slight increase in turbidity (NTU) and total suspended solids (TSS) within the Yorkers Creek catchment, with YK-IS (D/S) registering elevated turbidity and TSS readings, when compared to the other WQM locations. There has been a slight increase in conductivity and pH readings across both catchments since Event 11.

Results for Oxidation Redox Potential (ORP) for Event 12 included the first negative value of -19.1 mv (LHG-IS). This could indicate that water chemistry at LHG-IS has changed and that the environment has become reducing.

Results for Total Kjedahl Nitrogen (TKN) were relatively consistent across the catchments, with the exception of YR2-RS, which returned an elevated reading of 7 mg/L for Event 12.

Laboratory results for Event 12 were generally consistent with the results of the previous monitoring events, with the majority of analytes reported below the Limit of Reporting. Results exceeded the DGV for:

- Total suspended solids (0.2 mg/L) at CG-IS, LHG-IS, WC-RS, WC-IS, YK-IS (D/S), NZG-IS, YK-RS, YK-IS
- Iron (0.3 mg/L) at YK-IS (D/S), YK-IS and YK-RS
- Aluminium (0.027 mg/L) at LHG-IS, YR1-RS, YR2-RS, YK-IS (D/S), NZG-IS, YK-RS and YK-IS
- Zinc (0.0024 mg/L) at CG-IS, WC-IS and LHG-IS
- Reactive Phosphorous (0.015 mg/L) at TR-RS, LHG-IS, WC-IS and 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

- Jacobs Pty Ltd. 2020. *Snowy 2.0 Transmission Connection Project EIS*.
- NGH Pty Ltd. 2022. *Pre-construction Water Quality Monitoring Program and Methodology*.
- NGH Pty Ltd. 2022a. *Pre-construction Water Quality Monitoring Report: Event 1 April 2022*.
- NGH Pty Ltd. 2022b. *Pre-construction Water Quality Monitoring Report: Event 2 April 2022*.
- NGH Pty Ltd. 2022c. *Pre-construction Water Quality Monitoring Report: Event 3 May and June 2022*.
- NGH Pty Ltd. 2022d. *Pre-construction Water Quality Monitoring Report: Event 4 June 2022*.
- NGH Pty Ltd. 2022e. *Pre-construction Water Quality Monitoring Report: Event 5 July 2022*.
- NGH Pty Ltd. 2022f. *Pre-construction Water Quality Monitoring Report: Event 6 August 2022*.
- NGH Pty Ltd. 2022g. *Pre-construction Water Quality Monitoring Report: Event 7 October 2022*.
- NGH Pty Ltd. 2022h. *Pre-construction Water Quality Monitoring Report: Event 8 October 2022*.
- NGH Pty Ltd. 2022i. *Pre-construction Water Quality Monitoring Report: Event 9 November 2022*.
- NGH Pty Ltd. 2022j. *Pre-construction Water Quality Monitoring Report: Event 10 December 2022*.
- NGH Pty Ltd. 2023a. *Pre-construction Water Quality Monitoring Report: Event 11 January 2023*.
- TransGrid. 2021a. *Snowy 2.0 Transmission Connection Project Submissions Report*.
- TransGrid. 2021b. *Snowy 2.0 Transmission Connection Project Amendment Report*.

APPENDIX A EVENT DATA TABLE

Sheen/oil/grease		Temp(°C)	Dissolved Oxygen (ppm)	Specific EC (µS/cm)	pH	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)	Zn (mg/L)	Ammonia (mg/L)	Nitrogen Oxides	Reactive Phosphorous	Total Hardness (CaCO ₃)	Total Kjedahl Nitrogen (TKN)	TDS mg/L	TSS (mg/L)				
22413 Pre-construction WQM	DO (Default Guideline Value)	No	-	90-110	-	-	30-50	6.5-8	-	2.25	0.027	0.0008	0.00006	0.00001	0.001	0.004	0.3	0.001	1.2	0.0008	0.008	0.25	0.02	0.0002	0.0024	0.013	0.015	0.015	-	-	0.2	
WC-RS	Event 1	No	14.2	90.5	9.28	126.8	100.7	7.85	81.2	0.37	0.07	0.0019	0.00001	0.00000	0.00000	0.001	0.001	0.03	0.0003	0.011	0.00005	0.005	3	0.005	0.0001	0.001	0.005	0.1	12	0.1		
	Event 2	but on sedi	12.4	73.5	7.64	109	83.1	7.95	159.4	1.49	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.001	0.005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	1	0.1			
	Event 3	No	9.2	81.3	7.05	161	36	7.64	116.3	39.96	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0009	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	50	52			
	Event 4	No	7.3	75.1	12.76	17.8	35.3	5.8	128.4	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	19	0.1				
	Event 5	No	7.8	98.9	11.76	68	59	7.98	65.6	6.45	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	56	0.1			
	Event 6	No	9.3	70.6	9.74	80	62	8.07	8.69	152.6	7.15	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	44	0		
	Event 7	no	13.2	74.9	7.67	83.5	64.6	7.82	78.7	7.62	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	53	6			
	Event 8	no	13.1	74.5	7.84	71.8	55.4	7.67	98.4	9.52	0.079	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.038	0.0001	0.001	0.005	0.1	39	0.1			
	Event 9	No	11.9	102.1	11.02	90	67.5	7.82	176.4	10.72	0.36	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.018	0.005	0.004	0.0005	0.005	0.1	0.02	0.0001	0.001	0.005	0.1	24	0.1		
	Event 10	No	11.7	9.2	9.12	79.5	7.97	147.8	0.05	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.018	0.005	0.004	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	74	0.1				
	Event 11	No	18.9	100.6	8.7	94.9	83.9	7.86	79.1	1.94	0.03	0.0015	0.00001	0.00000	0.0007	0.001	0.02	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	52	0.1			
	Event 12	No	21.3	108.8	8.92	124.9	11.81	8.16	73.1	0.1	0.16	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	66	0.1			
	Min		7.30	61.30	7.05	71.80	35.30	5.80	61.20	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.0	0.005	0.001	0.001	0.005	0.001	60.00	0.10	1.00	0.10	
	Max		21.30	106.80	12.76	151.00	11.10	6.69	178.40	36.98	0.36	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.01	0.00	0.00	0.05	0.005	0.001	0.001	0.005	0.001	66.00	0.10	74.00	52.00	
	Mean		12.53	65.28	9.33	103.31	70.32	7.73	111.60	7.03	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.001	0.001	0.001	0.001	66.00	0.10	34.42	5.82			
	Count		12.00	11.00	12.00	11.00	12.00	12.00	11.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00					
	St. Dev		4.19	15.05	1.74	24.48	23.84	0.68	40.88	10.64	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.04	0.02	0.001	0.001	0.001	0.001	40.00	0.22	#DINoV	0.00	25.57	14.75
WC-IS	Event 1	No	14.3	90.5	9.28	126.7	100.8	8.14	76	0.32	0.07	0.0019	0.00001	0.00000	0.00000	0.0007	0.001	0.03	0.0003	0.011	0.00005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	60	3		
	Event 2	No	12.5	69.9	7.44	109	83.3	7.84	146.8	1.39	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	63	0.1			
	Event 3	No	9.3	70.7	7.05	33	7.81	145.8	1.37	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	42					
	Event 4	No	7.4	42.5	12.55	35	5.73	150.8	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	27	0.1					
	Event 5	No	7.6	43.7	12.55	35	5.73	150.8	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	48	0.1					
	Event 6	No	9.3	70.6	9.06	83.0	60.0	7.88	149	7.78	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	41	0			
	Event 7	No	13.3	75.1	7.68	83.3	65.1	7.61	92.4	2.41	0.015	0.0015	0.00001	0.00000	0.0007	0.001	0.005	0.005	0.0003	0.0005	0.005	0.1	0.005	0.0001	0.001	0.005	0.1	4	3			
	Event 8	No	13.1	74.4	7.82	71.9	59.4	7.62	101.																							

Values coloured blue and italicised are from the Limit of Reporting for Statistical Use (LRSU)

APPENDIX B OBSERVATIONS AND FIELD DATA

~~E12~~ Feb 22 + 23.

22 - sunny, breeze, ~~warm~~. warm ~24°C in hole. Dry.

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 <i>22/02</i>	Month	No	21.3	106.8	8.92	124.9	116.1	8.16	73.1	-2.16
	Comment	DUP01. low flow - clear ~20 °C								
WC-IS <i>22/02</i>	Month	No	21.7	108.2	8.98	125.0	117.1	8.24	76.2	-2.35
	Comment	As above.								
CG-IS <i>22/02</i>	Month	No	20.1	116.9	9.98	438.4	397.7	7.97	101.5	-2.74
	Comment	low flow, clear. ~18°C.								
YR1-RS <i>22/02</i>	Month	No.	22.1	109.4	9.01	109.7	103.7	8.25	89.5	-1.62
	Comment	low flow, clear								

NTUs all
—,
machine?
calibrate?
lab?

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)
	Month	No	22.8 18.8	84.3	7.40	453.4	399.3	7.53	-19.1	-0.87
LHG-IS <i>21/02</i>	Comment	low flow - very low flow, clear, smelly. ~18°C.								
	Month	No	21.9 22.9	108.2	8.79	109.7	105.4	8.02	87.2	-1.48
YR2-RS <i>21/02</i>	Comment	low flow, clear, D/S sample from rapid.								
	Month	DRY	20.							
SSC-IS <i>21/02</i>	Comment	DRY Channel bone dry, refer to photos.								
	Month	No	19.3	102.3	8.91	52.3	46.7	7.76	109.6	-0.65
TR-RS <i>23/02</i>	Comment	level of TR has dropped. Clear, eddy								
	Month	No	13.2	100.5	9.34	28.9	22.4	6.80	97.8	20.22
YK-IS (D/S) <i>23/02</i>	Comment	Extremely cloudy water. low flow.								

23 - sunny, clear, slight breeze, warm.
air.

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 23/02	Month	No.	13.4	101.2	9.38	40.6	31.6	7.02	99.3	1.20
	Comment	Standard low-flow; observed one by horses.								
YK-IS 23/02	Month	No.	14.6	98.3	8.84	27.0	21.6	6.58	62.5	5.72
	Comment	Typical cloudy water. Observed one by horses.								
YK-RS 23/02	Month	No.	17.7	101.3	8.50	26.3	22.7	6.58	94.6	7.89
	Comment	low flow. Horse activity observed.								

⑥ YSI Calibration Guide (online). → "A negative turbidity reading is almost always connected to the 'zero' standard. Despite best practices, it is sometimes impossible to clean the sensors, calibrate up, and sensor guard to a point where the 'zero' standard will not be contaminated by some small amount".

APPENDIX C LABORATORY CERTIFICATES

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 1 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0178	WC-RS 22.02.23	Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	22.1 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO ₃	66 mg/L	LTM-W-038 2
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	2.65 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 2 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0178	WC-RS 22.02.23	Total Suspended Solids	5 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0179	WC-IS 22.02.23	Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	22.2 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO3	66 mg/L	LTM-W-038 2
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	2.59 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	0.06 mg/L	LTM-W-030 0.01

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

 Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 3 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<u>EAL ID</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
23Feb-0179 22.02.23	WC-IS Phosphorus, Total Silver (dissolved) Total Dissolved Solids Total Kjeldahl Nitrogen Total Suspended Solids Zinc (dissolved)	<0.01 mg/L <0.00002 mg/L 80 mg/L <0.2 mg/L 2 mg/L 0.002 mg/L	LTM-W-030 * APHA 3030 B/3120 B LTM-W-035 LTM-W-034 APHA 2540 D APHA 3030 B/3120 B	0.01 0.0000 2 0.2 0.2 0.002
23Feb-0180 22.02.23	CG-IS Aluminium (dissolved) Ammonia as N Arsenic (dissolved) Cadmium (dissolved) Calcium (dissolved) Chromium (dissolved) Copper (dissolved) Cyanide Total Hardness as CaCO3 Iron (dissolved) Lead (dissolved) Magnesium (dissolved) Manganese (dissolved) Mercury (dissolved)	0.04 mg/L <0.1 mg/L <0.0003 mg/L <0.00002 mg/L 87.3 mg/L <0.00001 mg/L <0.002 mg/L <0.002 mg/L 241 mg/L <0.01 mg/L <0.001 mg/L 5.58 mg/L <0.001 mg/L <0.00003 mg/L	APHA 3030 B/3120 B LTM-W-042 APHA 3030 B/3120 B APHA 3030 B/3120 B	0.03 0.1 0.0003 0.0000 2 0.0000 0.002 * APHA 4500-CN E 0.0000 0.01 0.001 2 0.001 0.0000

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 4 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0180	CG-IS 22.02.23	Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	292 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	2 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	0.004 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0181	YR1-RS 22.02.23	Aluminium (dissolved)	0.03 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	19.2 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO3	56 mg/L	LTM-W-038 2
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B 0.01

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

 Accredited for compliance with
 ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 5 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0181	YR1-RS 22.02.23	Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	12 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0182	LHG-IS 22.02.23	Aluminium (dissolved)	0.05 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	100 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

 Accredited for compliance with
 ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 6 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0182	LHG-IS 22.02.23	Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO ₃	273 mg/L	LTM-W-038 2
		Iron (dissolved)	0.13 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	5.58 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.073 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	0.03 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	280 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	7 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	0.004 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0183	YR2-RS 22.02.23	Aluminium (dissolved)	0.03 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 7 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0183	YR2-RS 22.02.23	Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	19.3 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO ₃	56 mg/L	LTM-W-038 2
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.002 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	0.02 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B 0.002

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 8 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0184	TR-RS 23.02.23	Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	5.38 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO ₃	21 mg/L	LTM-W-038 2
		Iron (dissolved)	0.07 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	7.0 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	7.0 mg/L	LTM-W-034 0.2

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 9 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>			
		24-February-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	N. Smith	24-February-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Feb-0184	TR-RS 23.02.23	Total Suspended Solids	<0.2 mg/L	APHA 2540 D	0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
23Feb-0185	YK-IS(d/s) 23.02.23	Aluminium (dissolved)	0.28 mg/L	APHA 3030 B/3120 B	0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042	0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B	0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.0000
		Calcium (dissolved)	2.40 mg/L	APHA 3030 B/3120 B	2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Total Hardness as CaCO3	11 mg/L	LTM-W-038	2
		Iron (dissolved)	0.37 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B	2
		Manganese (dissolved)	0.006 mg/L	APHA 3030 B/3120 B	0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B	0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B	0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014	0.1
		Ortho-Phosphate as P	0.01 mg/L	LTM-W-030	0.01

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**
**Accredited for compliance with
ISO/IEC 17025 - Testing**

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 10 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0185	YK-IS(d/s) 23.02.23	Phosphorus, Total	0.02 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	28 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0186	NZG-IS 23.02.23	Aluminium (dissolved)	0.12 mg/L	APHA 3030 B/3120 B 0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042 0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B 0.0000
		Calcium (dissolved)	3.82 mg/L	APHA 3030 B/3120 B 2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B 0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO3	17 mg/L	LTM-W-038 2
		Iron (dissolved)	0.14 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.003 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 11 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<u>EAL ID</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
23Feb-0186 23.02.23	Nickel (dissolved) Nitrogen, total Nitrate/Nitrite as N Ortho-Phosphate as P Phosphorus, Total Silver (dissolved) Total Dissolved Solids Total Kjeldahl Nitrogen Total Suspended Solids Zinc (dissolved)	<0.001 mg/L <0.2 mg/L <0.1 mg/L <0.01 mg/L <0.01 mg/L <0.00002 mg/L <2 mg/L <0.2 mg/L 4 mg/L <0.002 mg/L	APHA 3030 B/3120 B * APHA 4500-Norg B + 4110 B LTM-W-014 LTM-W-030 LTM-W-030 * APHA 3030 B/3120 B LTM-W-035 LTM-W-034 APHA 2540 D APHA 3030 B/3120 B	0.001 0.2 0.1 0.01 0.01 0.0000 2 0.2 0.2 0.002
23Feb-0187 23.02.23	Aluminium (dissolved) Ammonia as N Arsenic (dissolved) Cadmium (dissolved) Calcium (dissolved) Chromium (dissolved) Copper (dissolved) Cyanide Total Hardness as CaCO₃ Iron (dissolved)	0.30 mg/L <0.1 mg/L <0.0003 mg/L <0.00002 mg/L 2.08 mg/L <0.00001 mg/L <0.002 mg/L <0.002 mg/L 10 mg/L 0.39 mg/L	APHA 3030 B/3120 B LTM-W-042 APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B * APHA 4500-CN E LTM-W-038 APHA 3030 B/3120 B	0.03 0.1 0.0003 0.0000 2 0.0000 0.002 0.002

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

 Accredited for compliance with
 ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 12 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<u>EAL ID</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
23Feb-0187 23.02.23	YK-IS Lead (dissolved) Magnesium (dissolved) Manganese (dissolved) Mercury (dissolved) Nickel (dissolved) Nitrogen, total Nitrate/Nitrite as N Ortho-Phosphate as P Phosphorus, Total Silver (dissolved) Total Dissolved Solids Total Kjeldahl Nitrogen Total Suspended Solids Zinc (dissolved)	<0.001 mg/L <2.00 mg/L 0.007 mg/L <0.00003 mg/L <0.001 mg/L <0.2 mg/L <0.1 mg/L 0.02 mg/L <0.01 mg/L <0.00002 mg/L <2 mg/L <0.2 mg/L 5 mg/L <0.002 mg/L	APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B * APHA 4500-Norg B + 4110 B LTM-W-014 LTM-W-030 LTM-W-030 * APHA 3030 B/3120 B LTM-W-035 LTM-W-034 APHA 2540 D APHA 3030 B/3120 B	0.001 2 0.001 0.0000 0.001 0.2 0.1 0.01 0.01 0.0000 2 0.2 0.2 0.0000 0.002
23Feb-0188 23.02.23	YK-RS Aluminium (dissolved) Ammonia as N Arsenic (dissolved) Cadmium (dissolved) Calcium (dissolved) Chromium (dissolved)	0.36 mg/L <0.1 mg/L <0.0003 mg/L <0.00002 mg/L <2.00 mg/L <0.00001 mg/L	APHA 3030 B/3120 B LTM-W-042 APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B APHA 3030 B/3120 B	0.03 0.1 0.0003 0.0000 2 0.0000

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 13 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<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>
23Feb-0188	YK-RS 23.02.23	Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E 0.002
		Total Hardness as CaCO ₃	10 mg/L	LTM-W-038 2
		Iron (dissolved)	0.41 mg/L	APHA 3030 B/3120 B 0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	0.004 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	0.02 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	13 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002
23Feb-0189	DUP01 22.02.23	Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B 0.03
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B 0.0003

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 14 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>			
		24-February-2023			
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Water	N. Smith	24-February-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			
23Feb-0189	DUP01 22.02.23	Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.0000
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Iron (dissolved)	0.02 mg/L	APHA 3030 B/3120 B	0.01
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Manganese (dissolved)	0.006 mg/L	APHA 3030 B/3120 B	0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B	0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B	0.001
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B	0.0000
		Zinc (dissolved)	0.002 mg/L	APHA 3030 B/3120 B	0.002
23Feb-0190	Water Blank	Aluminium (dissolved)	<0.03 mg/L	APHA 3030 B/3120 B	0.03
		Ammonia as N	<0.1 mg/L	LTM-W-042	0.1
		Arsenic (dissolved)	<0.0003 mg/L	APHA 3030 B/3120 B	0.0003
		Cadmium (dissolved)	<0.00002 mg/L	APHA 3030 B/3120 B	0.0000
		Calcium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B	2
		Chromium (dissolved)	<0.00001 mg/L	APHA 3030 B/3120 B	0.0000
		Copper (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B	0.002
		Cyanide	<0.002 mg/L	* APHA 4500-CN E	0.002
		Total Hardness as CaCO3	<2 mg/L	LTM-W-038	2
		Iron (dissolved)	<0.01 mg/L	APHA 3030 B/3120 B	0.01

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

Thursday, March 23, 2023


**NATA Accredited Laboratory
Number: 9597**

 Accredited for compliance with
 ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084
Page 15 of 16
For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>		
		24-February-2023		
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>		
Water	N. Smith	24-February-2023		
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u> <u>Limit of Reporting</u>
23Feb-0190	Water Blank			
		Lead (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Magnesium (dissolved)	<2.00 mg/L	APHA 3030 B/3120 B 2
		Manganese (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Mercury (dissolved)	<0.00003 mg/L	APHA 3030 B/3120 B 0.0000
		Nickel (dissolved)	<0.001 mg/L	APHA 3030 B/3120 B 0.001
		Nitrogen, total	<0.2 mg/L	* APHA 4500-Norg B + 4110 B 0.2
		Nitrate/Nitrite as N	<0.1 mg/L	LTM-W-014 0.1
		Ortho-Phosphate as P	<0.01 mg/L	LTM-W-030 0.01
		Phosphorus, Total	<0.01 mg/L	LTM-W-030 0.01
		Silver (dissolved)	<0.00002 mg/L	* APHA 3030 B/3120 B 0.0000
		Total Dissolved Solids	<2 mg/L	LTM-W-035 2
		Total Kjeldahl Nitrogen	<0.2 mg/L	LTM-W-034 0.2
		Total Suspended Solids	<0.2 mg/L	APHA 2540 D 0.2
		Zinc (dissolved)	<0.002 mg/L	APHA 3030 B/3120 B 0.002

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

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

Thursday, March 23, 2023



**NATA Accredited Laboratory
Number: 9597**

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 2302-0084

Page 16 of 16

For all enquiries related to this report please quote document number: 2302-0084

<u>Facility:</u>	<u>Order #</u>	<u>Date Analysis Commenced</u>			
Water	N. Smith	24-February-2023			
<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
		Date/Time sample taken			



Signed Michael Glazier, Laboratory Manager.

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

APPENDIX D RPD TABLE

			Al (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Cyanide (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Hg (mg/L)	Ni (mg/L)	Ag (mg/L)	Zn (mg/L)
DUP01	Event 1	DUP01	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		YR1-IS	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 2	DUP01	<0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.001	0.000015	0.0005	0.00001	0.001
		WC-IS	<0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.002	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range except Mn	0%	0%	0%	0%	0%	0%	0%	0%	67%	0%	0%	0%	0%
	Event 3	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.005	0.0005	0.0005	0.000015	0.0005	0.00001	0.001
		YK-IS (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%
	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%	5.63380282	0%	0%	0%	0%	0%	0%
	Event 9	DUP01	0.35	0.00015	0.00001	0.000005	0.0001	0.001	0.06	0.0005	0.003	0.000015	0.0005	0.00001	0.001
		WC-RS	0.36	0.00015	0.00001	0.000005	0.0001	0.001	0.08	0.0005	0.004	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	2.82	0%	0%	0%	0%	0%	28.57	0%	0%	0%	0%	0%	0%
	Event 10	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.09	0.0005	0.005	0.000015	0.0005	0.00001	0.006
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.08	0.0005	0.004	0.000015	0.0005	0.00001	0.019
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	11.76	0%	0%	0%	0%	0%	0%
	Event 11	DUP01	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.02	0.0005	0.005	0.000015	0.0005	0.00001	0.001
		WC-RS	0.03	0.00015	0.00001	0.000005	0.0001	0.001	0.02	0.0005	0.005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Event 12	DUP01	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.02	0.0005	0.006	0.000015	0.0005	0.00001	0.002
		WC-RS	0.015	0.00015	0.00001	0.000005	0.0001	0.001	0.05	0.0005	0.005	0.000015	0.0005	0.00001	0.001
		RPD% - Acceptable Range	0%	0%	0%	0%	0%	0%	60%	0%	85%	0%	0%	0%	33%
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
		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
		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
		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
		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
		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
		Nothing above LOR	<0.03	<0.0003	<0.00002	<0.000									

The basic equation for RPD is

$$RPD = \frac{|R1 - R2|}{\left(\frac{R1 + R2}{2}\right)} \times 100,$$

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

Instrument **YSI Pro DSS**
 Serial No. **21K101477**



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)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. Turbidity	x	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	x	
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. pH 7.00		pH 7.00		389384	pH 7.09
2. pH 4.00		pH 4.00		399527	pH 4.05
3. mV		232.7mV		393734/395763	232.8mV
4. EC		2760 mS		396172	2.756 mS
5. D.O		0.0%		391223	-0.2%
6. Temp		24.1°C		MultiTherm	23.3°C
&. Turbidity		100 NTU		396421	98.72NTU

Calibrated by:

Lebelle Chee

Calibration date: **9/02/2023**

Next calibration due: **8/08/2023**