MAY 2024

MONTHLY CONSTRUCTION WATER QUALITY MONITORING REPORT

May 2024
Project No: 3200-0645
Project: Transgrid Maragle 500/330 kV Substation
Private & Confidential

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ABBREVIATIONS

Acronym	Full Form
°C	degrees Celsius
µS/cm	micro Siemens per centimetre
%	percent
Ag	Silver
Al	Aluminium
ALS	ALS Limited
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
As	Arsenic
Baseline Report	'Baseline Water Quality Report' (NGH, 2024)
$CaCO_3$	Total Hardness
Cd	Cadmium
COA	'Certificate of Analysis' (ALS, 2024a)
COC	'Chain of Custody' (UGL, 2024b)
Cr	Chromium
Cu	Copper
DGV	Default Guideline Values
DO	Dissolved Oxygen
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPL	Environmental Protection Licence
Fe	Iron
Field Sheet	'Water Quality Monitoring Field Data Sheet' (UGL, 2024a)
Hg	Mercury
km	kilometres
KNP	Kosciuszko National Park
kV	kilovolt
mg/L	milligram per litre
Mn	Manganese
mV	millivolt
NATA	National Association of Testing Authorities, Australia
NEM	National Energy Market
NGH	NGH Pty Ltd
Ni	Nickel

ABBREVIATIONS

Acronym	Full Form
NSW	New South Wales
NTU	Nephelometric Turbidity Unit
Pb	Lead
ppm	parts per million
Pty Ltd	Proprietary Limited
QA/QC Assessment	'QA/QC Compliance Assessment to assist with Quality Review' (ALS, 2024b)
QCR	'Quality Control Report' (ALS, 2024c)
RS	Reference Site
Snowy 2.0	Snowy Scheme expansion project (EPBC 2018/8322)
Snowy Hydro	Snowy Hydro Limited
Snowy Scheme	Snowy Mountains Hydro-electric Scheme
SPC	specific conductance
SSGV	Site Specific Guideline Values
SW	surface water
SWQ	surface water quality
TDS	Total Dissolved Solids
The Methodology	'Pre-construction Water Quality Monitoring Program and Methodology' (NGH, 2022)
The Project	Construction of a 330 kV substation and overhead transmission lines between Nurenmerenmong, NSW and Cabramurra, NSW
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
Transgrid	The Trustee for the NSW Electricity Operations Trust
TSS	Total Suspended Solids
UGL	UGL Limited
WQO	water quality objectives
Zn	Zinc

1. BACKGROUND

In 2020 Snowy Hydro Limited (Snowy Hydro) obtained approval (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 (Snowy 2.0).

To connect Snowy 2.0 to the National Energy Market (NEM), a new transmission connection was required. The Trustee for the New South Wales (NSW) Electricity Operations Trust (TransGrid) is constructing a 330 kilovolt (kV) substation and overhead transmission lines (the Project) to facilitate the connection of Snowy 2.0 to the existing electrical transmission network. The Project is located within Kosciuszko National Park (KNP) between Nurenmerenmong and Cabramurra, NSW, approximately 27 kilometres (km) east of Tumbarumba, NSW (Figure 1). UGL Limited (UGL) has been engaged on behalf of Transgrid to undertake the Project.

2. INTRODUCTION

The Project is adjacent to, and forms part of, the Snowy 2.0 project area and is located within KNP, an area of high conservation value. A total of 22 mapped waterways, tributaries of Yarrangobilly River and Tumut River, transect the Project Boundary (Figure 1).

One of the conditions of approval to meet the requirements outlined in the 'Environmental Impact Statement' (EIS) (Jacobs, 2020) and the Project's Environmental Protection Licence (EPL 21753) is to undertake regular surface water quality (SWQ) monitoring to mitigate environmental impacts on SWQ.

Pre-construction SWQ monitoring was undertaken by NGH Pty Ltd (NGH) between March 2022 and February 2024 to determine site specific baseline values for SWQ parameters prior to Project construction works. The pre-construction SWQ monitoring was undertaken using the 'Pre-construction Water Quality Monitoring Program and Methodology' (the Methodology) developed by NGH in 2022 (refer Section 3). Two years of pre-construction SWQ monitoring was analysed and summarised in the 'Baseline Water Quality Report' (Baseline Report) (NGH, 2024). The results were used to determine seasonal Site Specific Guideline Values (SSGV) for ongoing SWQ monitoring during the construction phase.

Construction for the Project commenced in March 2024. Construction SWQ monitoring will be undertaken by UGL on a monthly basis as per the revised methodology outlined in Section 3 to identify potential changes to SWQ that may be associated with the Project. SW samples from the construction SWQ monitoring would be analysed and presented in monthly Construction Water Quality Monitoring Reports.

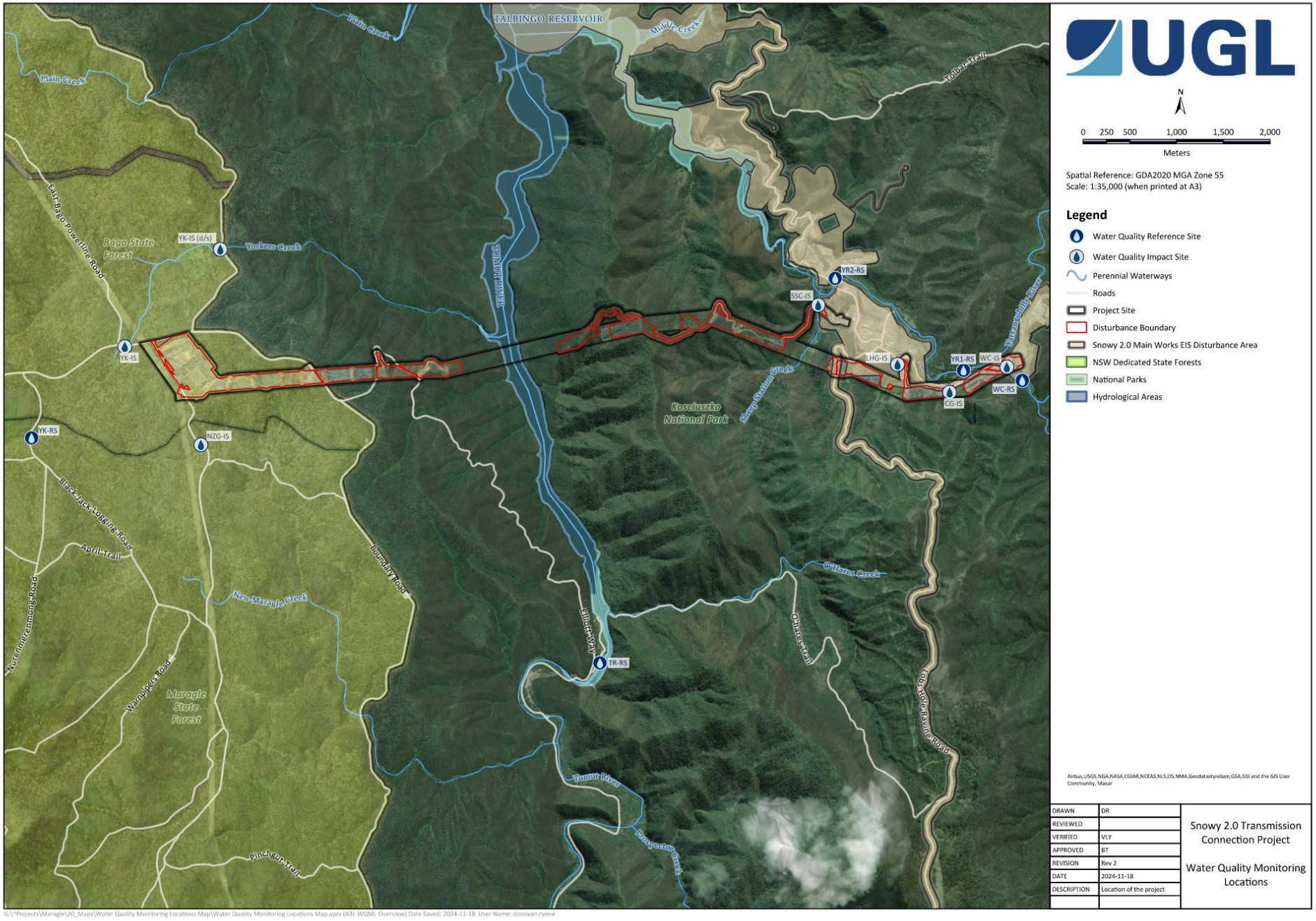


FIGURE 1 LOCALITY OF THE PROJECT AND SWQ MONITORING LOCATIONS

3. METHODOLOGY

The Methodology was prepared by NGH in 2022 to support the pre-construction SWQ monitoring for the Project. The Methodology detailed the water quality objectives (WQO) for the Project, identified the monitoring locations and outlined the methodology for surface water (SW) sampling during the pre-construction phase. The Methodology (NGH, 2022) took into account the Project location within an area of high conservation value where the WQO for physical and chemical stressors, as outlined in the 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' (ANZG) (ANZG, 2018), includes no change in biodiversity beyond natural variability and where possible, there should also be no change in water/sediment chemical and physical properties, including toxicants.

Monitoring locations are outlined in Table 1. Figure 2 and Figure 3 show the water quality monitoring locations in relation to the Project and Snowy 2.0.

The Methodology (NGH, 2022) has been revised for construction SWQ monitoring by taking into account the seasonal SSGV set out in the Baseline Report (NGH, 2024) (refer to Section 4.2).

Construction SWQ monitoring would be analysed against the seasonal SSGV where available and appropriate. The Default Guideline Values (DGV) for Upland Rivers (ANZG, 2018) would be applied to water quality parameters that were not assessed in the Baseline Report (NGH, 2024) or where a guideline range is more appropriate. Table 2 outlines the seasonal SSGV and DGV used to compare construction SWQ to pre-construction SWQ.

Table 1 Water quality monitoring locations outlined in the Methodology (NGH, 2022)

WATER QUALITY MONITORING LOCATIONS					
ID	**Waterway**	**Site Type**	**Catchment**	**Latitude**	**Longitude**
WC-RS	Wallace Creek	Reference	Yarrongabilly River	-35.794258	148.415253
WC-IS	Wallace Creek	Impact		-35.792982	148.413404
CG-IS	Cave Gully	Impact		-35.795495	148.406665
YR1-IS	Yarrangobilly River	Impact		-35.793358	148.408277
LHG-IS	Lick Hole Gully	Impact		-35.792890	148.400445
YR2-IS	Yarrangobilly River	Impact		-35.784656	148.392921
SSC-IS	Sheep Station Creek	Impact		-35.793243	148.391046
TR-RS	Talbingo Reservoir	Reference	Talbingo Reservoir	-35.822094	148.365690
YK-RS	Yorkers Creek	Reference	Yorkers Creek	-35.801126	148.297979
YK-IS (D/S)	Yorkers Creek	Impact		-35.782684	148.320040
NZG-IS	New Zealand Gully	Impact		-35.801575	148.318051
YK-IS	Yorkers Creek	Impact		-35.792209	148.308878

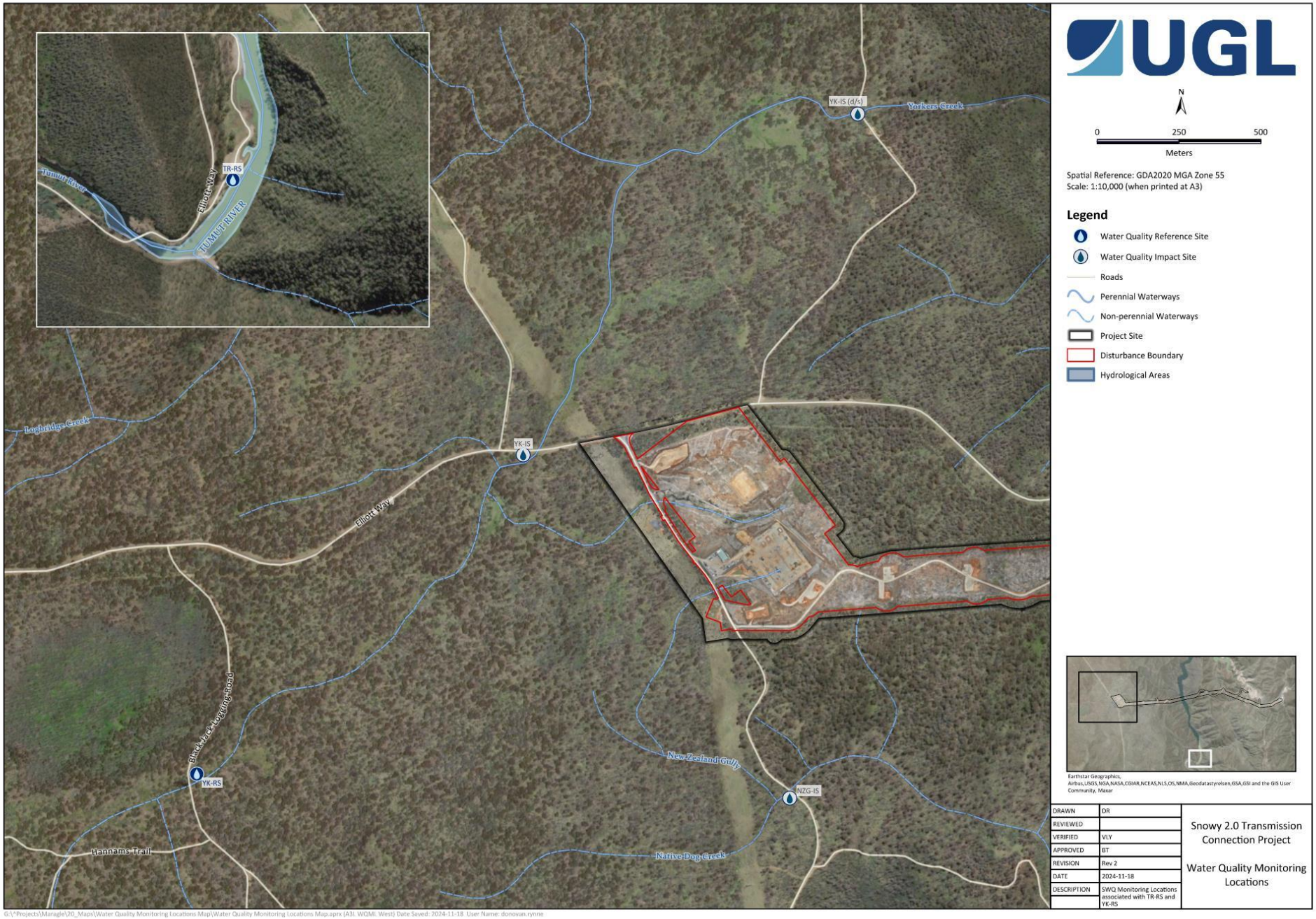


FIGURE 2 WATER QUALITY MONITORING LOCATIONS ASSOCIATED WITH REFERENCE SITE YR-RS AND TR-RS IN RELATION TO THE PROJECT

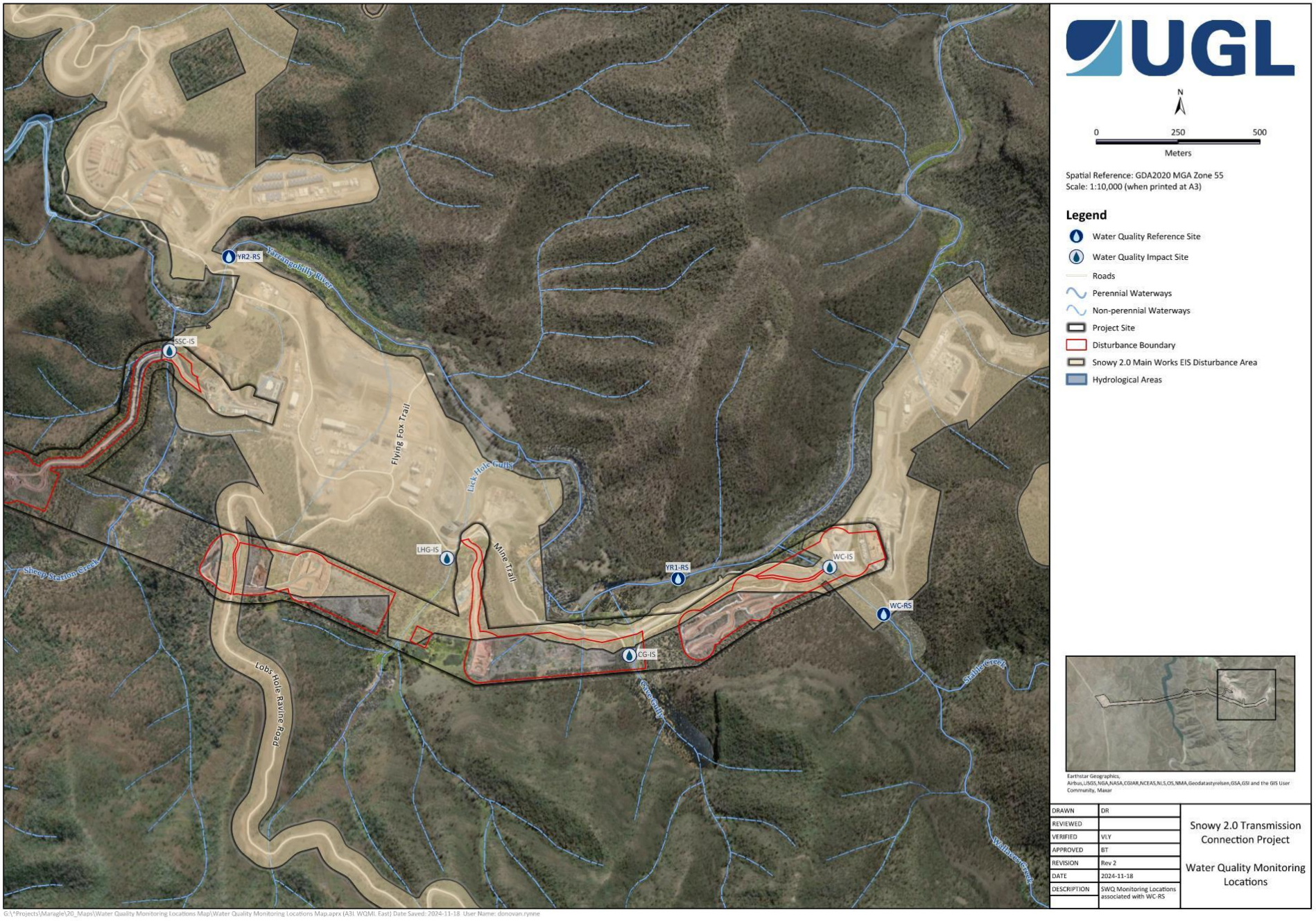


FIGURE 3 WATER QUALITY MONITORING LOCATIONS ASSOCIATED WITH REFERENCE SITE WC-RS IN RELATION TO THE PROJECT

Table 2 Seasonal SSGV (NGH, 2024) and DGV (ANZG, 2018) for water quality parameters

SURFACE WATER QUALITY GUIDELINE VALUES								
Parameter	**Unit**	**WC-RS**		**TR-RS**		**YK-RS**		**DGV**
		SSGV (Summer/Autumn)	**SSGV (Winter/Spring)**	**SSGV (Summer/Autumn)**	**SSGV (Winter/Spring)**	**SSGV (Summer/Autumn)**	**SSGV (Winter/Spring)**	
Temperature	°C*	-	-	-	-	-	-	-
Dissolved Oxygen (DO) ***	%#	96.2	89.7	91.3	95.5	89.6	88.7	90-110
DO	ppm+	9.08	10.28	8.79	11.53	8.35	10.2	-
Specific Electrical Conductivity (EC)***	SPC^ µS/cm^^	115	88	24	38.7	31	27.9	30-350
EC***	µS/cm	93.2	60.85	20.3	26.2	24	20.5	30-350
pH***	-	7.85	7.62	7.59	7.59	6.79	6.61	6.5-8
Redox	mV##	79.1	98.4	91.2	95.4	94.6	106.1	-
Turbidity***	NTU**	0.37	5.12	0.09	1.56	9	7.87	2-25
Dissolved Aluminium (Al)	mg/L++	0.03	0.04	0.03	0.015	0.36	0.32	0.027
Dissolved Arsenic (As)	mg/L	0.003	0.0003	0.003	0.0003	0.003	0.0003	0.0008
Dissolved Cadmium (Cd)	mg/L	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.0006
Dissolved Chromium (Cr)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Dissolved Copper (Cu)	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001
Cyanide	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.004
Dissolved Iron (Fe)	mg/L	0.03	0.02	0.04	0.02	0.41	0.23	0.3
Dissolved Lead (Pb)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Dissolved Manganese (Mn)	mg/L	0.002	0.002	0.003	0.002	0.005	0.003	1.2
Dissolved Mercury (Hg)	mg/L	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00006

SURFACE WATER QUALITY GUIDELINE VALUES

Parameter	Unit	WC-RS		TR-RS		YK-RS		DGV
		SSGV (Summer/Autumn)	SSGV (Winter/Spring)	SSGV (Summer/Autumn)	SSGV (Winter/Spring)	SSGV (Summer/Autumn)	SSGV (Winter/Spring)	
Dissolved Nickel (Ni)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.008
Total Nitrogen (TN)	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.25
Total Phosphorus (TP)	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Dissolved Silver (Ag)	mg/L	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Dissolved Zinc (Zn)	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.0024
Ammonia	mg/L	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Nitrogen Oxides	mg/L	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Reactive Phosphorous	mg/L	0.02	0.015	0.02	0.015	0.02	0.02	0.015
Total Hardness ($CaCO_3$)	mg/L	47	30	7.5	8	1	7	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.2	0.2	0.1	0.2	0.1	0.2	-
Total Dissolved Solids (TDS)	mg/L	52	39	12.5	15	30	10	-
Total Suspended Solids (TSS)	mg/L	0.2	1	0.2	0.2	3	0.2	0.2
Total Al[@]	mg/L	-	-	-	-	-	-	0.027
Total As[@]	mg/L	-	-	-	-	-	-	0.0008
Total Cd[@]	mg/L	-	-	-	-	-	-	0.0006
Total Cr[@]	mg/L	-	-	-	-	-	-	0.00001
Total Cu[@]	mg/L	-	-	-	-	-	-	0.001
Total Pb[@]	mg/L	-	-	-	-	-	-	0.001
Total Mn[@]	mg/L	-	-	-	-	-	-	1.2
Total Ni[@]	mg/L	-	-	-	-	-	-	0.008

SURFACE WATER QUALITY GUIDELINE VALUES

Parameter	Unit	WC-RS		TR-RS		YK-RS		DGV
		SSGV (Summer/Autumn)	SSGV (Winter/Spring)	SSGV (Summer/Autumn)	SSGV (Winter/Spring)	SSGV (Summer/Autumn)	SSGV (Winter/Spring)	
Total Ag[@]	mg/L	-	-	-	-	-	-	0.00002
Total Zn[@]	mg/L	-	-	-	-	-	-	0.0024
Total Fe[@]	mg/L	-	-	-	-	-	-	0.3
Total Hg[@]	mg/L	-	-	-	-	-	-	0.00006

** ℃ = degrees Celsius* *[#] % = percent* *[##] mV = millivolt* *[+] ppm = parts per million* *[^] SPC = specific conductance* *[++] mg/L = milligram per litre*

*** NTU = Nephelometric Turbidity Unit* *[^^] µS/cm = micro Siemens per centimetre* *[@] parameter not analysed by NGH* **** assessed against DGV where guideline range is more appropriate for the parameter*

4. BASELINE WATER QUALITY

4.1. Water Quality Objectives

Water quality objectives are outlined in Section 2.1 of the Baseline Report (NGH, 2024).

4.2. Site Specific Guideline Values

In accordance with the ANZG (ANZG, 2018), SSGV for the three Reference Sites (RS) (WC-RS, TR-RS and YK-RS) were derived from the results collected during the 24 month pre-construction SWQ monitoring period. The SSGV reflect the seasonality observed in the baseline data and are characterised by the drier months of Summer/Autumn (November to May) and wetter months of Winter/Spring (June to October) in accordance with the 'Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) methodology and derivatives developed to 2018 of the ANZG (ANZG, 2018).

Table 2 outlines the seasonal SSGV provided in the Baseline Report (NGH, 2024).

5. MAY 2024 MONITORING

SW sampling was undertaken at 12 monitoring locations on 28 and 29 May 2024. Two monitoring location, CG-IS and SSC-IS, were not sampled as the waterways were dry at the time.

In accordance with the methodology outlined in Section 3, SW samples were either measured in situ using a calibrated YSI ProDSS Sonde Multiparameter Digital Water Quality Meter (refer to Appendix D) or analysed by National Association of Testing Authorities, Australia (NATA) accredited ALS Limited (ALS) laboratory. However, the following parameters were not measured:

- DO (ppm) (DO% has been measured)
- EC (µS/cm) (Specific conductance (µS/cm) has been measured)
- Redox (mV)

The 'Water Quality Monitoring Field Data Sheet' (Field Sheet) (UGL, 2024a) is provided in Appendix A. The 'Certificate of Analysis' (COA) (ALS, 2024a), 'QA/QC Compliance Assessment to assist with Quality Review' (QA/QC Assessment) (ALS, 2024b), 'Quality Control Report' (QCR) (ALS, 2024c) are attached in Appendix B.

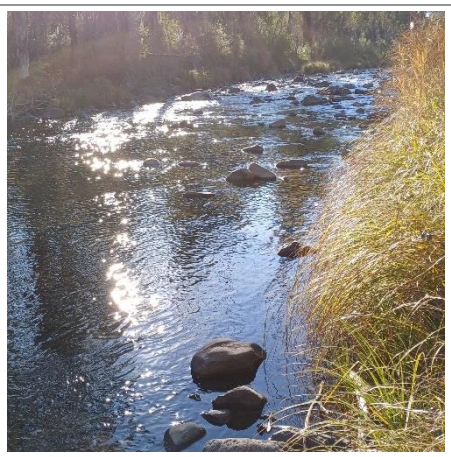
5.1. Observations

Field observations during sampling are summarised in Table 3.

Table 3 Field observations during sampling

FIELD OBSERVATIONS		
Date	28.05.2024 and 29.05.2024	
Weather	The warmest maximum temperature observed for the month of May occurred on the first day of sampling (28/05/2024), reaching a high of 15.3 °C (DTN, 2024). Temperature was relatively warm on the second day of sampling, with a maximum recorded temperature of 11.4 °C. The month of May saw minimal rainfall, with only 0.4 mm recorded throughout the entire month – 0.2 mm on 10 May, and 0.2 mm on the 18 May (DTN, 2024). Weather on both days presented sunny conditions with clear skies.	
ID	**Observations**	**Photo**
WC-RS	• Clear shallow waters, relatively fast flowing • Vegetation along one bank • Debris/sticks along the other bank	

FIELD OBSERVATIONS

Date	28.05.2024 and 29.05.2024	
Weather	The warmest maximum temperature observed for the month of May occurred on the first day of sampling (28/05/2024), reaching a high of 15.3 °C (DTN, 2024). Temperature was relatively warm on the second day of sampling, with a maximum recorded temperature of 11.4 °C. The month of May saw minimal rainfall, with only 0.4 mm recorded throughout the entire month – 0.2 mm on 10 May, and 0.2 mm on the 18 May (DTN, 2024). Weather on both days presented sunny conditions with clear skies.	
ID	**Observations**	**Photo**
WC-IS	• Clear shallow waters, relatively fast flowing • Strong weed/vegetation growth on northern bank • Small amount of debris and fine sediment visible	
CG-IS	• Creek dry, no water present	
YR1-IS	• Clear shallow waters, fast flowing	

FIELD OBSERVATIONS

Date	28.05.2024 and 29.05.2024	
Weather	The warmest maximum temperature observed for the month of May occurred on the first day of sampling (28/05/2024), reaching a high of 15.3 °C (DTN, 2024). Temperature was relatively warm on the second day of sampling, with a maximum recorded temperature of 11.4 °C. The month of May saw minimal rainfall, with only 0.4 mm recorded throughout the entire month – 0.2 mm on 10 May, and 0.2 mm on the 18 May (DTN, 2024). Weather on both days presented sunny conditions with clear skies.	
ID	**Observations**	**Photo**
LHG-IS	• High silt deposition • Relatively clear with slight milky colour • Vegetation growing in and around gully • Low flow rate	
YR2-IS	• Deep water channel, high flow rate • Clear water	
SSC-IS	• Creek completely dry, no water present	

FIELD OBSERVATIONS

Date	28.05.2024 and 29.05.2024	
Weather	The warmest maximum temperature observed for the month of May occurred on the first day of sampling (28/05/2024), reaching a high of 15.3 °C (DTN, 2024). Temperature was relatively warm on the second day of sampling, with a maximum recorded temperature of 11.4 °C. The month of May saw minimal rainfall, with only 0.4 mm recorded throughout the entire month – 0.2 mm on 10 May, and 0.2 mm on the 18 May (DTN, 2024). Weather on both days presented sunny conditions with clear skies.	
ID	**Observations**	**Photo**
TR-RS	• Clear water, large volume with gradual surface flow • Small bits of rock and dirt suspended on the surface	
YK-IS (D/S)	• Clear water, shallow depth, with some fine sediment sediment on the base • Thick vegetation cover on either banks • Debris in and around banks	
NZG-IS	• Thick vegetation cover on either banks • Relatively clear water, slight milky colouration • Fine sediment visible on either banks and on the bottom of the gully • Hoof marks on bank several meters up from the sampling point	

FIELD OBSERVATIONS

Date	28.05.2024 and 29.05.2024	
Weather	The warmest maximum temperature observed for the month of May occurred on the first day of sampling (28/05/2024), reaching a high of 15.3 °C (DTN, 2024). Temperature was relatively warm on the second day of sampling, with a maximum recorded temperature of 11.4 °C. The month of May saw minimal rainfall, with only 0.4 mm recorded throughout the entire month – 0.2 mm on 10 May, and 0.2 mm on the 18 May (DTN, 2024). Weather on both days presented sunny conditions with clear skies.	
ID	**Observations**	**Photo**
YK-IS	• Fine sediment evident on banks and bottom of Creek, with mud present on the banks • Sticks/debris along Creek • Low water levels, fine sediment moving with gradual flow of water • Muddy on the banks	
YK-RS	• Minimal volume, sandy loam on base of Creek • Grasses/vegetation on either bank • Fine sediment evident in water flow, and debris in and around banks	

5.2. Results

The results from the construction SWQ monitoring program have been reported for each respective catchment: Yarrangobilly River, Talbingo Reservoir, and Yorkers Creek.

- **Yarrangobilly River catchment** monitoring includes the reference site at Wallace Creek and impact sites at Yarrangobilly River, Wallace Creek, Cave Gully, Lick Hole Gully, and Sheep Station Creek.
- **Yorkers Creek catchment** monitoring includes the reference site at Yorkers Creek and impact sites at Yorkers Creek and New Zealand Gully.
- **Talbingo Reservoir** features a reference site located upstream within the reservoir, serving as an overall reference for monitoring sites in the Yarrangobilly River and Yorkers Creek catchments.

This reference site provides a baseline for the SWQ monitoring program.

The SWQ monitoring results for key physical and chemical parameters, along with site-specific trigger values, are detailed in Section 5.2.1. Results for dissolved and total metals, including site-specific trigger values, are covered in Sections 5.2.2 and 5.2.3. Upon review of the data, observations were noted between the reference and impact sites.

The complete table of results is attached in Appendix C.

5.2.1. Key Physical and Chemical Parameters

See below for results of key physical and chemical parameters.

Temperature

In May 2024, temperatures within the Yarrangobilly catchment showed a significant drop from the previous month, ranging from 2.1 °C to 7.0 °C, refer to Figure 4. Temperatures within the Talbingo Reservoir decreased from 12.3 °C in April 2024 to 10.1 °C in May 2024, refer to Figure 5. Within the Yorkers Creek catchment, temperatures ranged from 3.1 °C to 4.7 °C during May 2024, as illustrated in, refer to Figure 6.

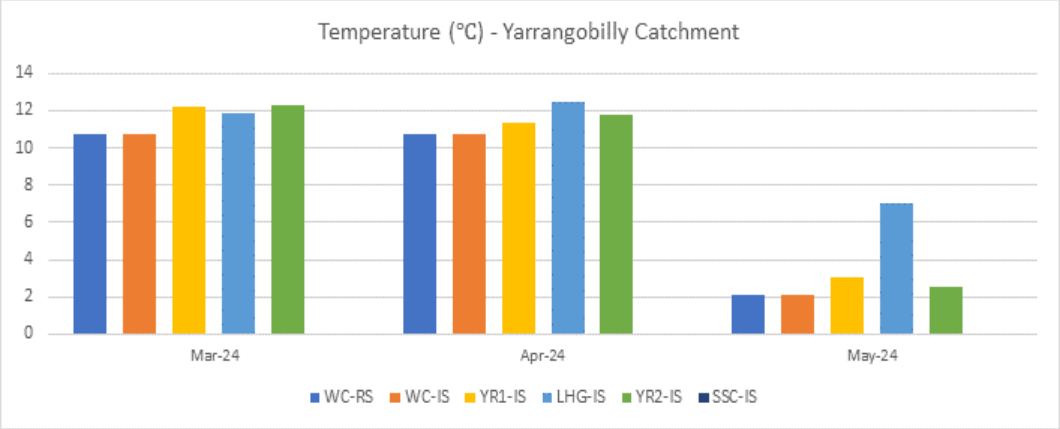


FIGURE 4 : TEMPERATURE FOR YARRANGOBILLY CATCHMENT

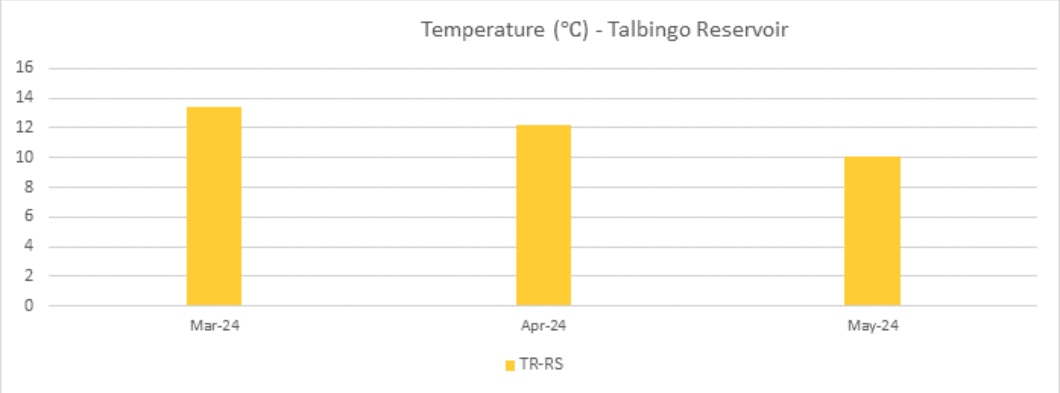


FIGURE 5: TEMPERATURE FOR TALBINGO RESERVOIR

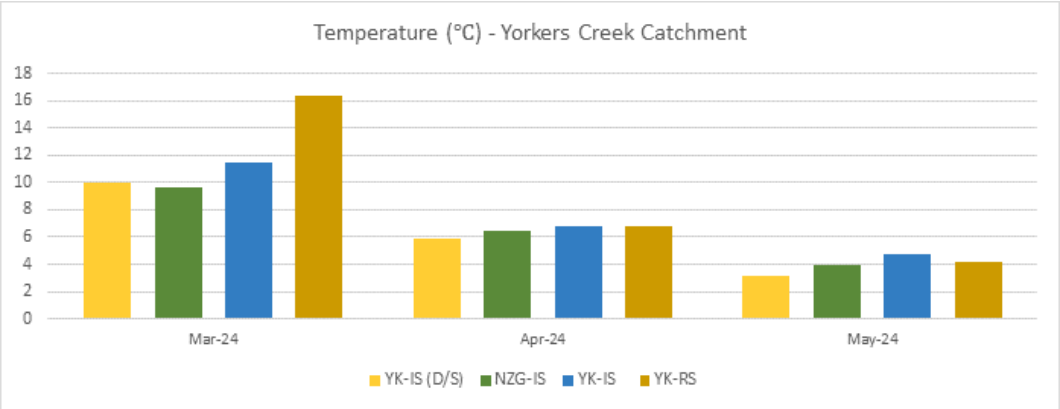


FIGURE 6: TEMPERATURE FOR YORKERS CREEK CATCHMENT

pH

pH values across all catchments decreased compared to April 2024. In the Yarrangobilly catchment, the reference site (YK-RS) slightly exceeded the SSGV range (6.5 to 8.0) with a pH of 8.05 in May 2024, while the impact sites remained within the guideline range, refer Figure 7. Talbingo Reservoir (TR-RS) recorded pH levels within the SSGV, Figure 8. In the Yorkers Creek catchment, site YK-IS was slightly below the lower pH range at 6.43, refer Figure 9..

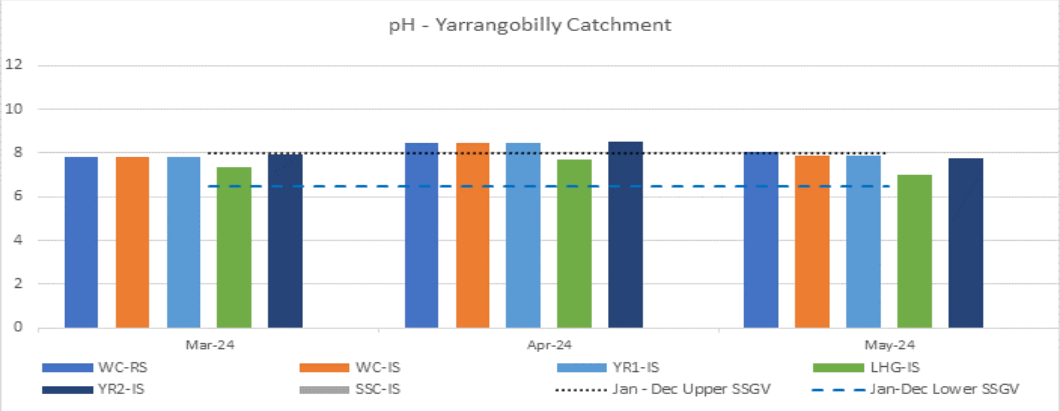


FIGURE 7: PH FOR YARRANGOBILLY CATCHMENT

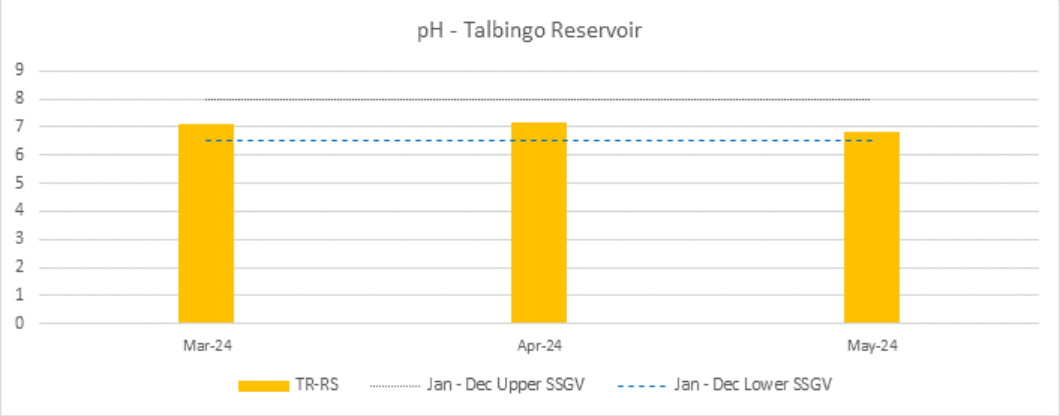


FIGURE 8: PH FOR TALBINGO RESERVOIR

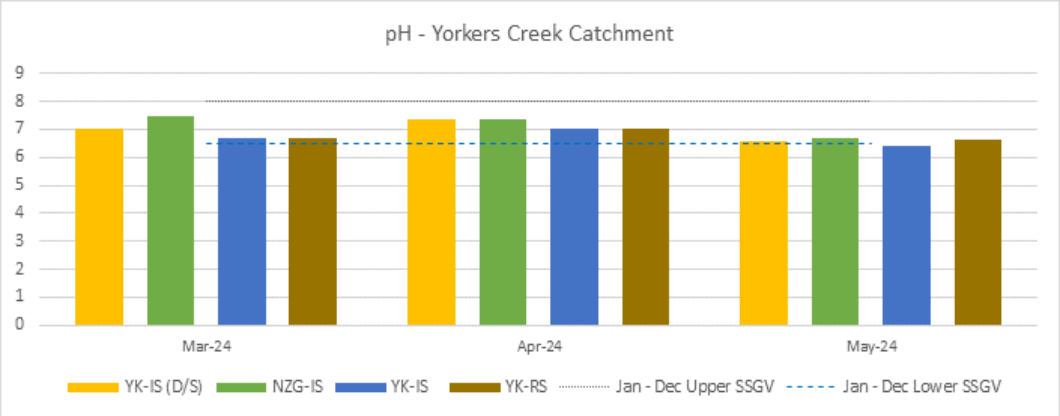


FIGURE 9: PH FOR YORKERS CREEK CATCHMENT

Dissolved Oxygen

DO (%) results in the Yarrangobilly catchment were within the SSGV range, except for LHG-IS, which showed an increase from April levels, reaching 63.3%, refer Figure 10. In the Talbingo Reservoir, DO% increased to 91.5% in May 2024, aligning with the SSGV, refer Figure 11. Meanwhile, all DO% results for the Yorkers Creek catchment remained below the SSGV, consistent with baseline monitoring for this period, refer Figure 12.

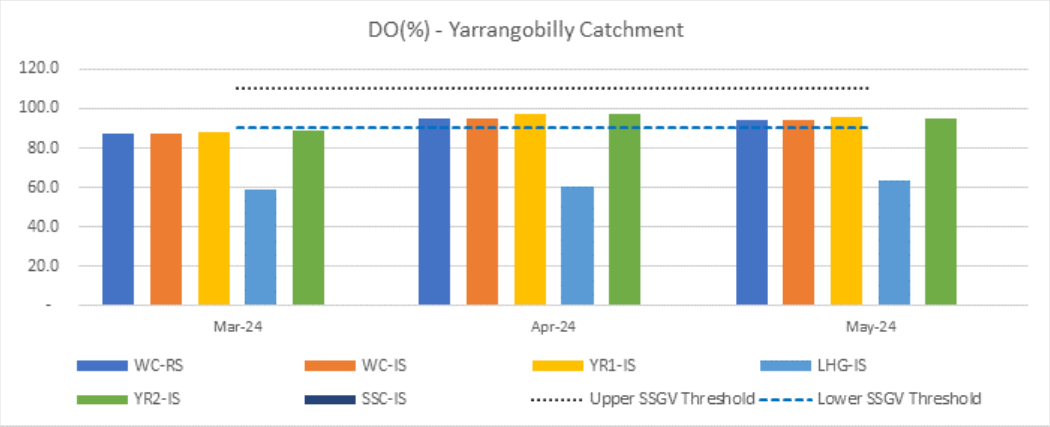


FIGURE 10: DO FOR YARRANGOBILLY CATCHMENT

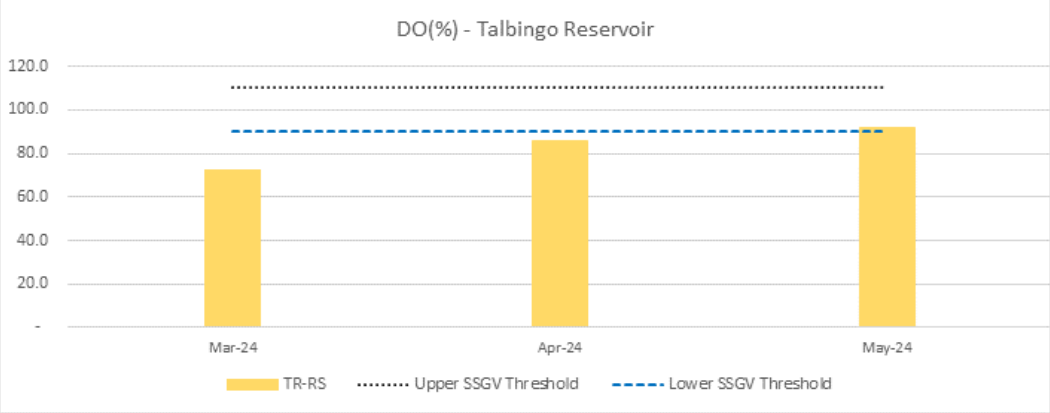


FIGURE 11: DO FOR TALBINGO RESERVOIR

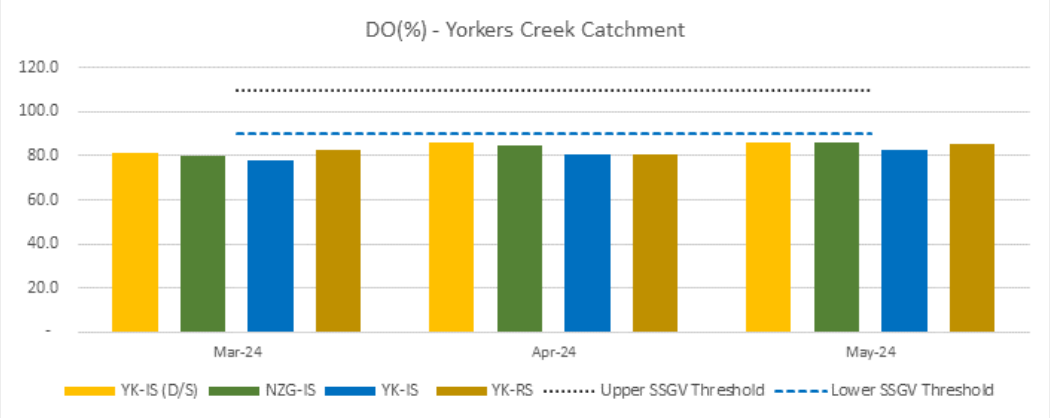


FIGURE 12: DO FOR YORKERS CREEK CATCHMENT

Specific Conductance

SPC (µS/cm) results for the Yarrangobilly catchment indicate that all sites exceeded the Dec-May SSGV (115 µS/cm), with the reference site (WC-RS) recording the highest value at 145.6 µS/cm. An exception was observed at LHG-IS, which recorded a significantly higher value of 618 µS/cm, consistent with baseline data, refer Figure 13. In contrast, Talbingo Reservoir exhibited much lower levels, recording 30.2 µS/cm, which is broadly consistent with the Dec-May SSGV (24 µS/cm), refer Figure 14. Specific conductance in the Yorkers Creek catchment also remained consistently above the Dec-May SSGV (31 µS/cm), including the reference site (YK-RS), which recorded 34.7 µS/cm in May 2024, refer to Figure 15.

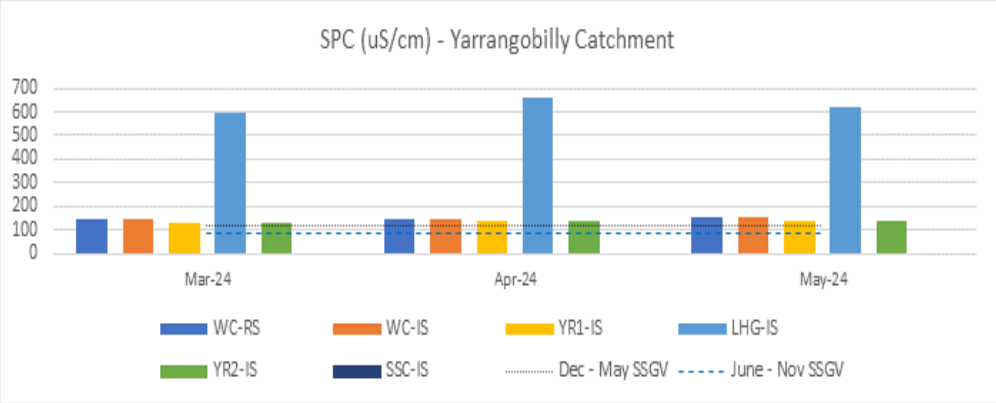


FIGURE 13: SPC FOR YARRANGOBILLY CATCHMENT

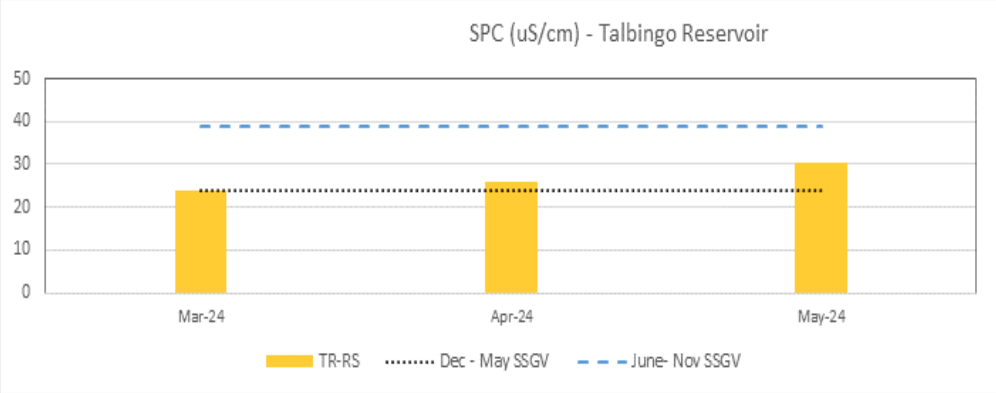


FIGURE 14: SPC FOR TALBINGO RESERVOIR

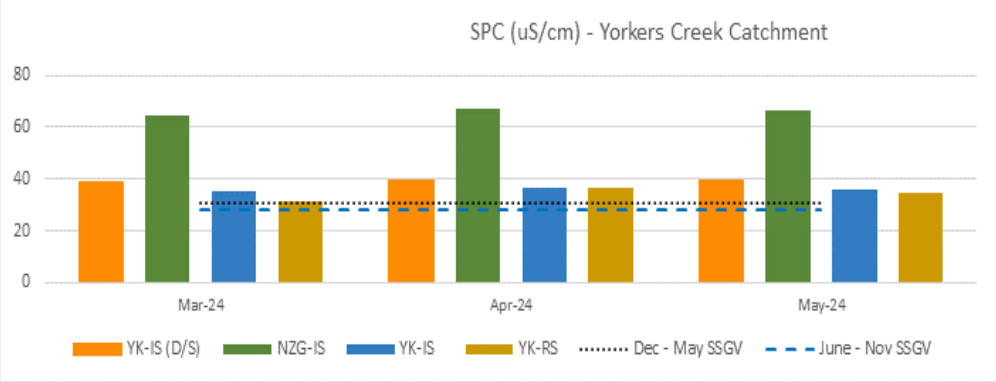


FIGURE 15: SPC FOR YORKERS CREEK CATCHMENT

Turbidity

Turbidity (NTU) slightly exceeded the Dec – May SSGV in the Yarrangobilly catchment and Talbingo Reservoir, refer Figure 16 to Figure 17. In contrast, turbidity within the Yorkers Creek catchment remained within the SSGV guidelines for both the reference and impact sites, refer Figure 18.

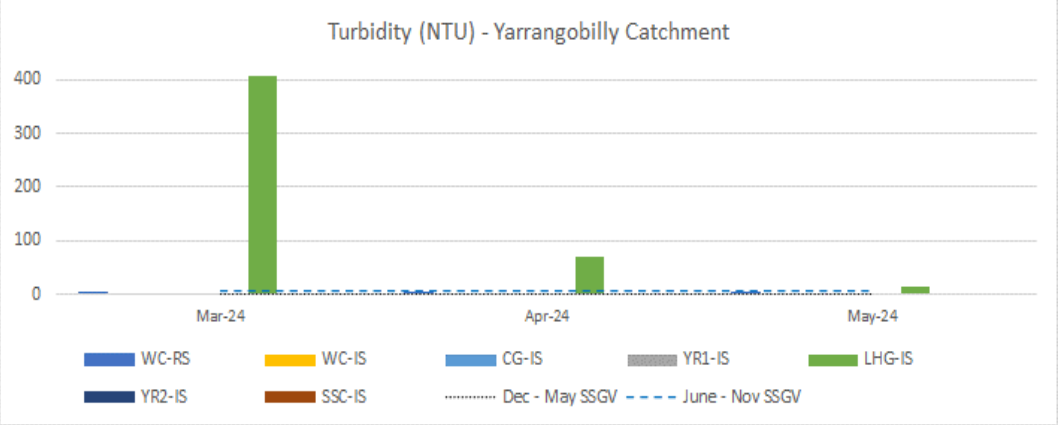


FIGURE 16: TURBIDITY FOR YARRANGOBILLY CATCHMENT

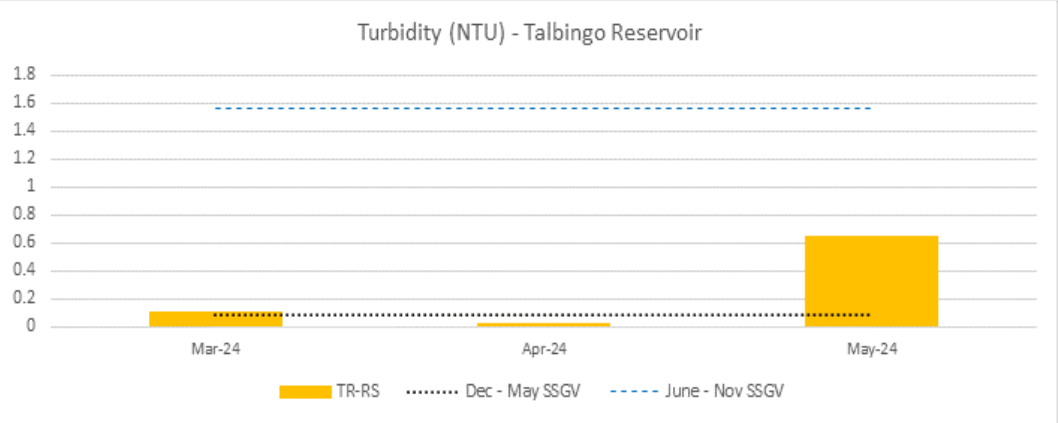


FIGURE 17: TURBIDITY FOR TALBINGO RESERVOIR

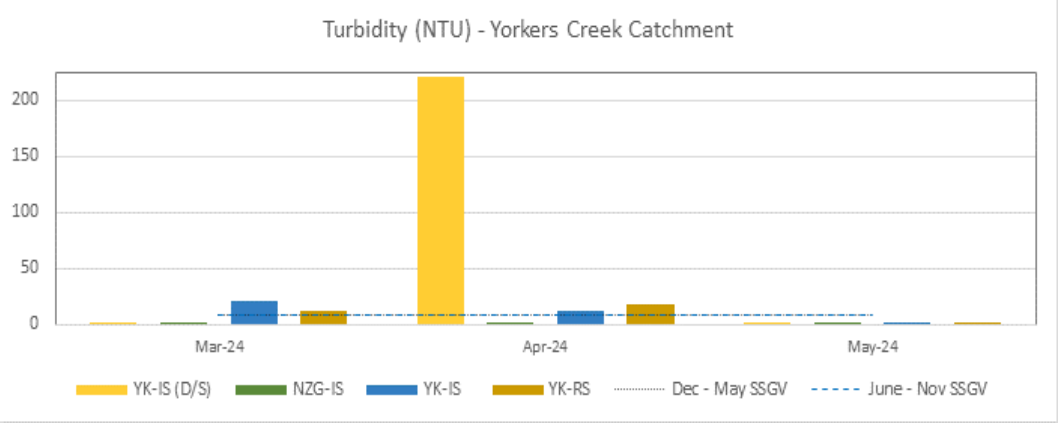


FIGURE 18: TURBIDITY FOR YORKERS CREEK CATCHMENT

Total Suspended Solids

TSS (mg/L) in the Yarrangobilly catchment exceeded the Dec-May SSGV (0.2 mg/L), with all sites recording above 5.0 mg/L. Although above the SSGV, values at LHG-IS and WC-IS were noticeably lower than in April, refer Figure 19. In Talbingo Reservoir, TSS also exceeded the Dec-May SSGV, recording 5.0 mg/L, which was higher than the April results, refer to Figure 20. Within the Yorkers Creek catchment, all sites surpassed the Dec-May SSGV (3.0 mg/L). YK-IS (D/S) recorded the highest value at 9 mg/L, while the remaining sites reported 5 mg/L, refer to Figure 21.

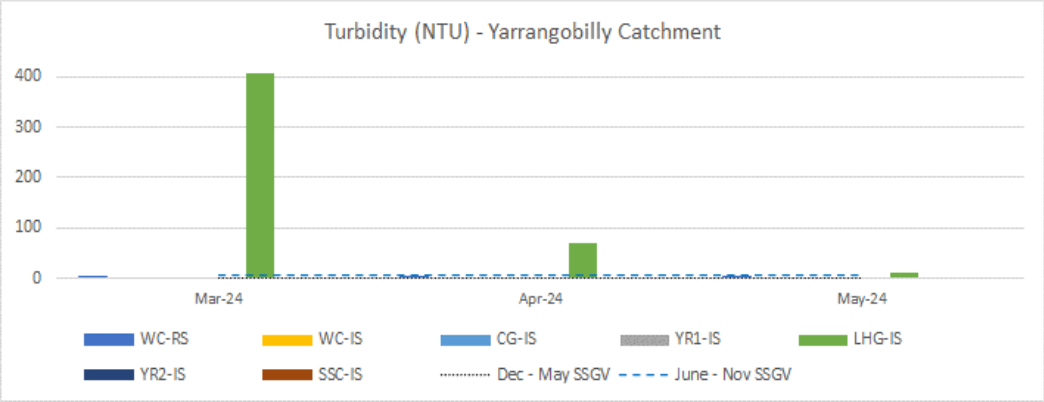


FIGURE 19: TSS FOR YARRANGOBILLY CATCHMENT

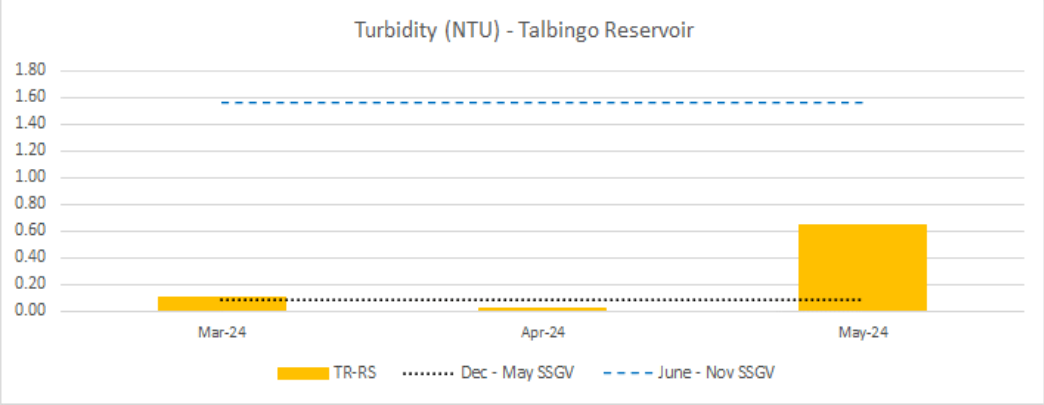


FIGURE 20: TSS FOR TALBINGO RESERVOIR

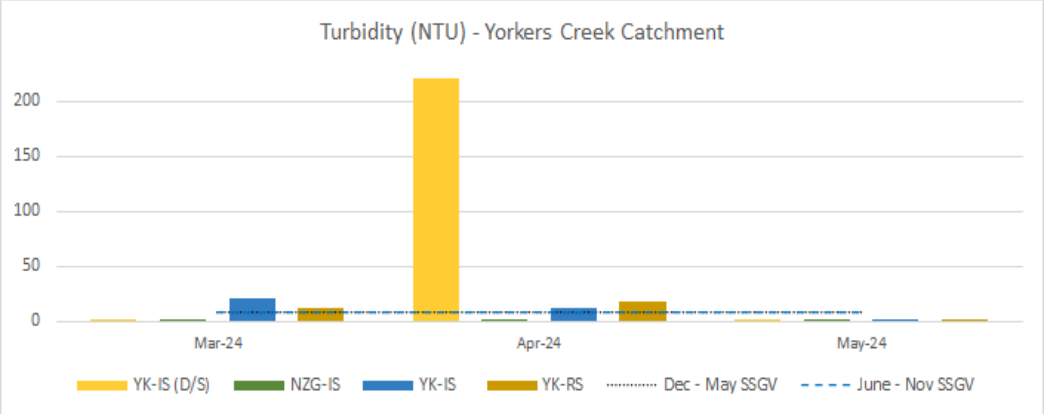


FIGURE 21: TSS FOR YORKERS CREEK CATCHMENT

Ammonia

Ammonia (mg/L) levels exceeded the SSGV (0.013 mg/L) at the Yarrangobilly reference site (WC-RS) and were significantly higher at LHG-IS (0.04 mg/L) and YR2-IS (0.02 mg/L), refer Figure 22. At Talbingo Reservoir, ammonia levels decreased to 0.02 mg/L in May 2024, down from 0.03 mg/L in April, but remained above the SSGV, refer Figure 23. In the Yorkers Creek catchment, ammonia levels exceeded the LOR at all sites except the reference site (YK-RS), which recorded 0.03 mg/L, also above the SSGV, refer Figure 24.

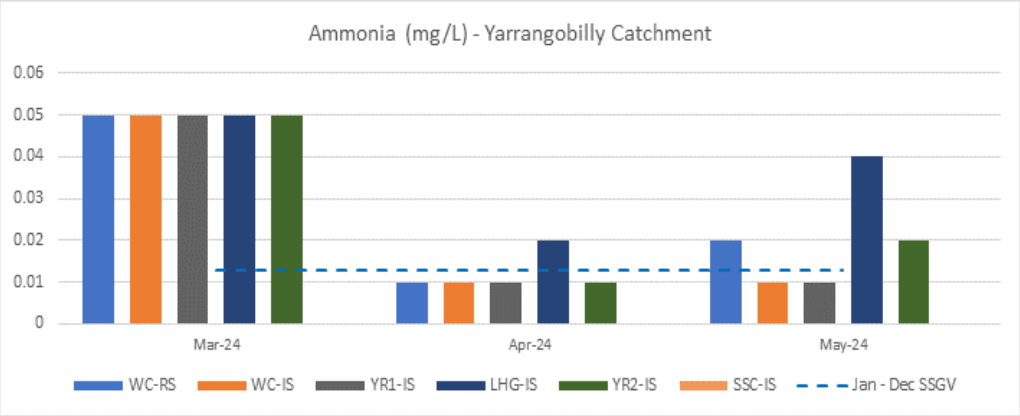


FIGURE 22: AMMONIA FOR YARRANGOBILLY CATCHMENT

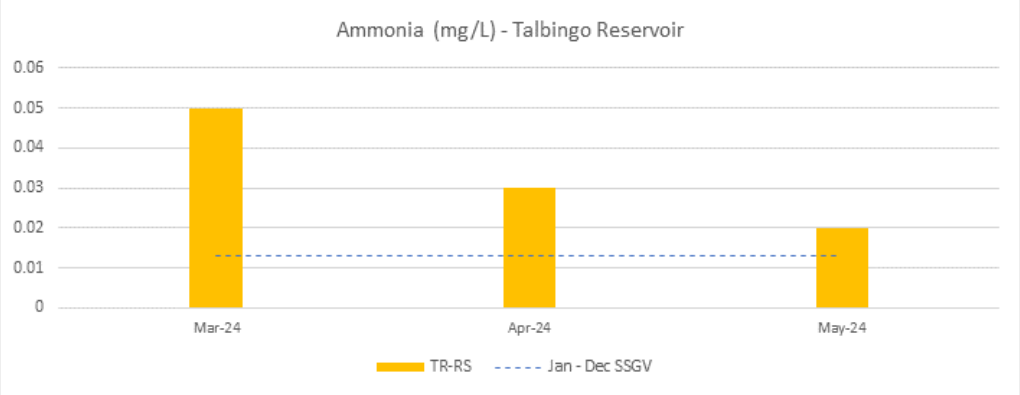


FIGURE 23: AMMONIA FOR TALBINGO RESERVOIR

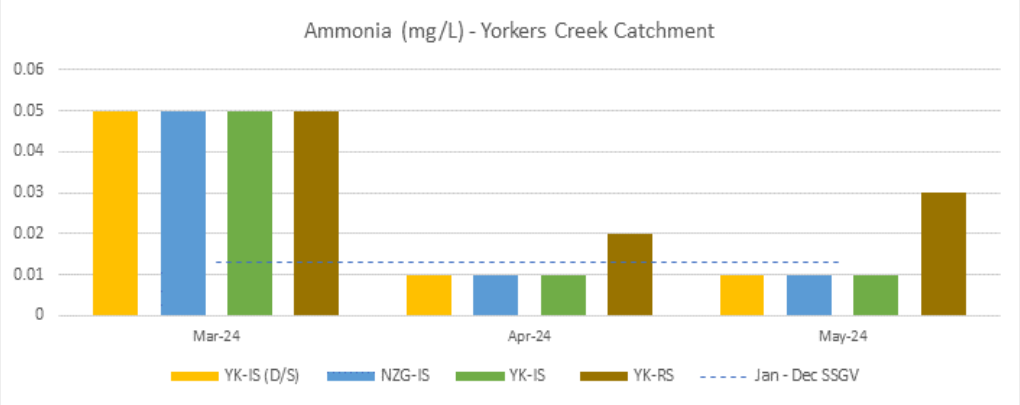


FIGURE 24: AMMONIA FOR YORKERS CREEK CATCHMENT

Nitrogen Oxides

Nitrogen Oxides (mg/L) were below the LOR at WC-RS and YR2-IS, while other impact sites exceeded the Jan-Dec SSGV (0.015 mg/L). WC-IS showed a significant reduction, recording 0.31 mg/L in May compared to 2.42 mg/L in April. In contrast, YK-IS (D/S) experienced a notable increase to 0.53 mg/L, up from 0.03 mg/L in April, refer to Figure 25 to Figure 27.

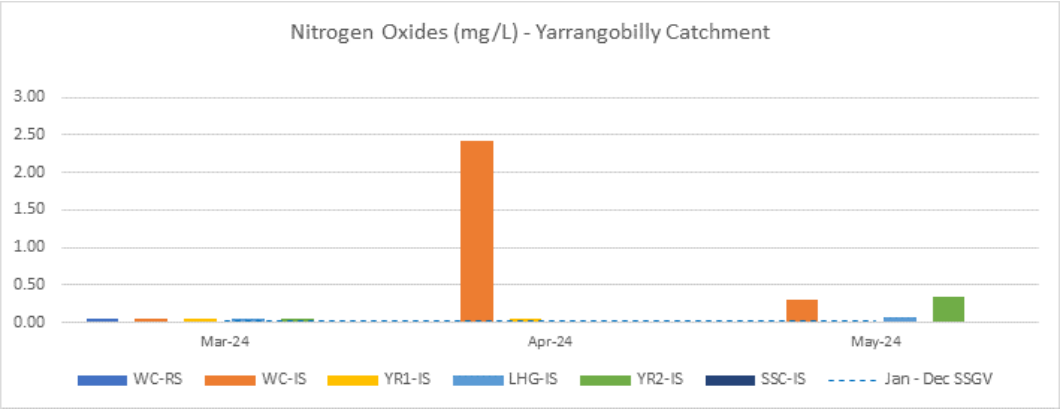


FIGURE 25: NITROGEN OXIDES FOR YARRANGOBILLY CATCHMENT

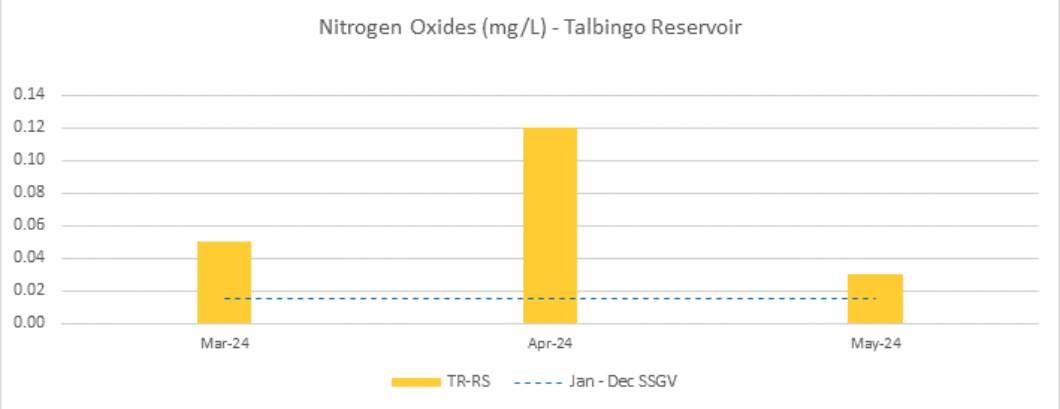


FIGURE 26: NITROGEN OXIDES FOR TALBINGO RESERVOIR

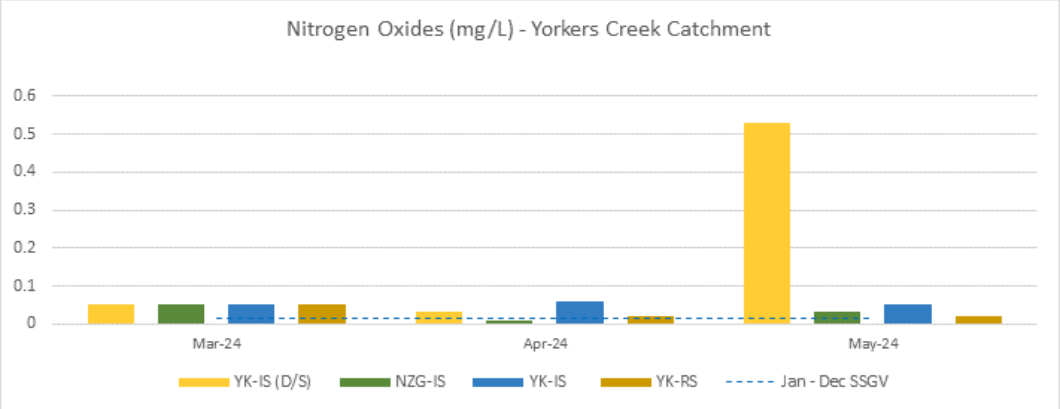


FIGURE 27: NITROGEN OXIDES FOR YORKERS CREEK CATCHMENT

Total Kjeldahl Nitrogen

In the Yarrangobilly catchment, TKN (mg/L) was below the LOR at most sites, except for LHG-IS and YR2-IS, which exceeded the Jan-Dec SSGV (0.2 mg/L) with values of 0.4 mg/L and 0.5 mg/L, respectively, refer Figure 28. Both the Talbingo Reservoir (TR-RS) and the Yorkers Creek reference site (YK-RS) exceeded the Dec-May SSGV (0.1 mg/L), along with two impact sites, YK-IS (D/S) and NZG-IS, refer to Figure 29 and Figure 30.

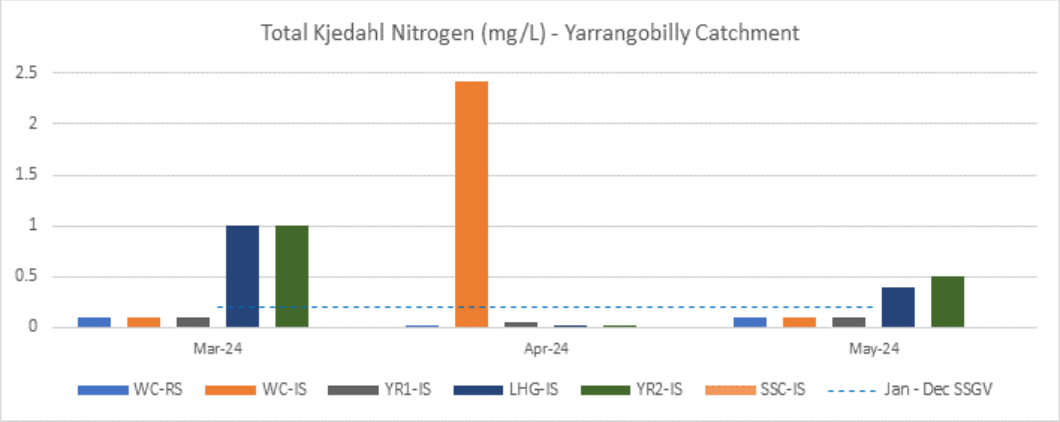


FIGURE 28: TOTAL KJELDAHL NITROGEN FOR YARRANGOBILLY CATCHMENT

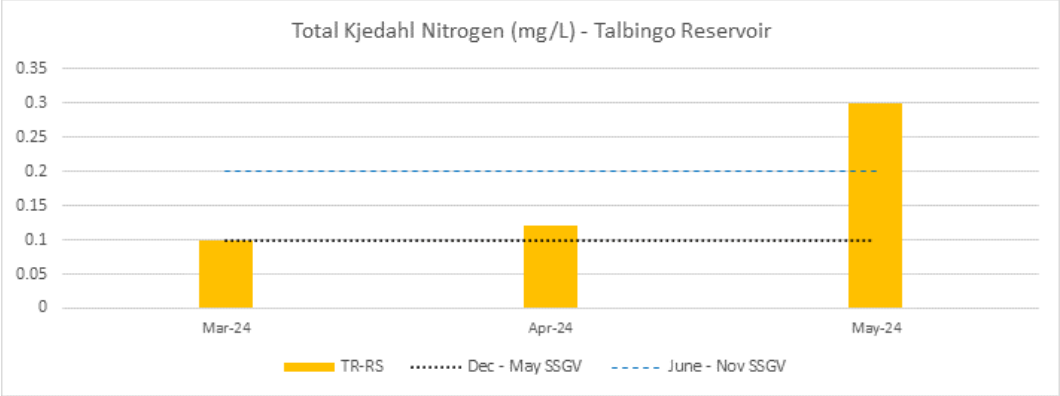


FIGURE 29: TOTAL KJEHAHL NITROGEN FOR TALBINGO RESERVOIR

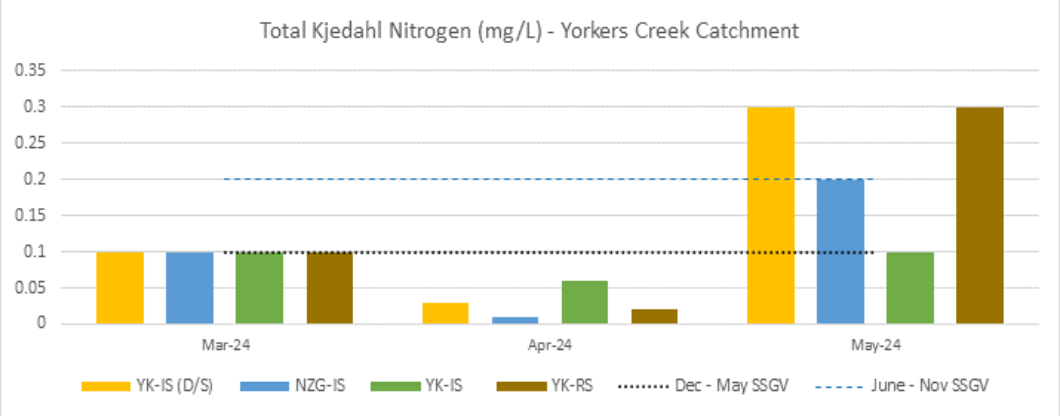


FIGURE 30: TOTAL KJELDAHL NITROGEN FOR YORKERS CREEK CATCHMENT

Total Hardness

$CaCO_3$ (mg/L) results exceeded the Dec-May SSGV at both reference and impact sites within the Yarrangobilly catchment (SSGV: 47 mg/L) and Yorkers Creek catchment (SSGV: 1 mg/L). LHG-IS recorded a notably high value of 365 mg/L, consistent with previous months. In contrast, Talbingo Reservoir remained below the Dec-May SSGV (7.5 mg/L) with a recorded value of 5 mg/L, refer Figure 31 to Figure 33.

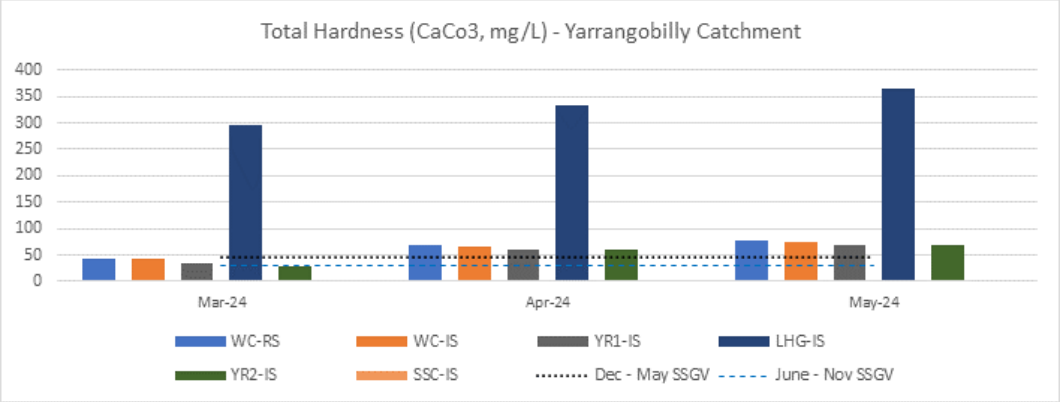


FIGURE 31: TOTAL HARDNESS FOR YARRANGOBILLY CATCHMENT

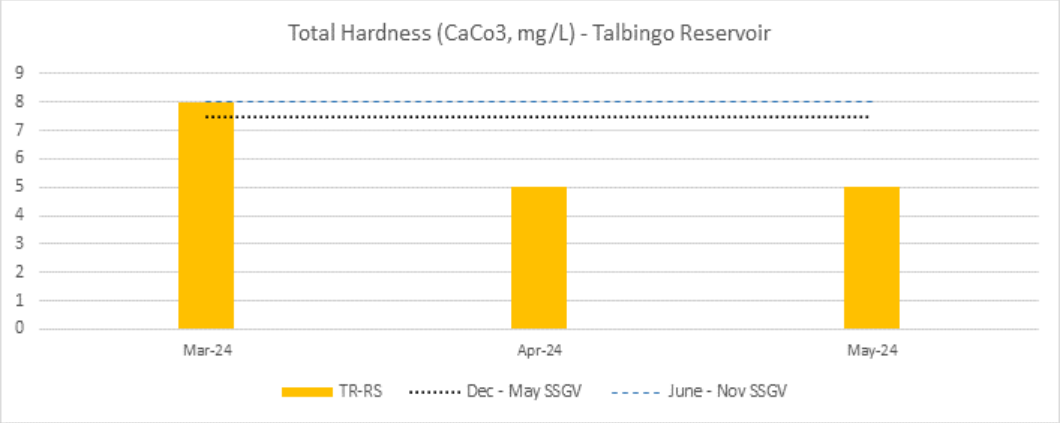


FIGURE 32: TOTAL HARDNESS FOR TALBINGO RESERVOIR

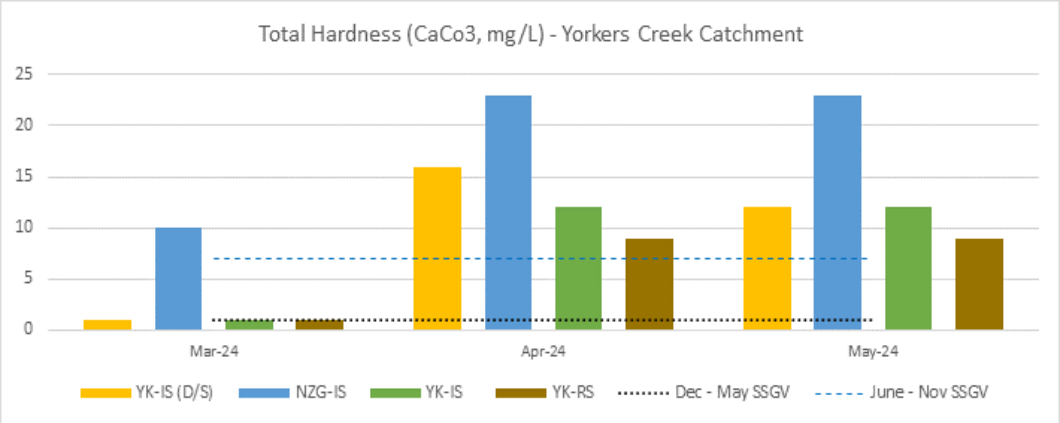


FIGURE 33: TOTAL HARDNESS FOR YORKERS CREEK CATCHMENT

Total Nitrogen

Most TN (mg/L) values exceeded the Jan-Dec SSGV (0.2 mg/L) across all sites, except for WC-RS (0.1 mg/L) and YR1-IS (0.1 mg/L) in the Yarrangobilly catchment. Additionally, NZG-IS and YK-IS recorded values equal to the SSGV. Notably, YK-IS (D/S) in the Yorkers Creek catchment was significantly higher than the SSGV, with a value of 0.8 mg/L., refer Figure 37 to Figure 39.

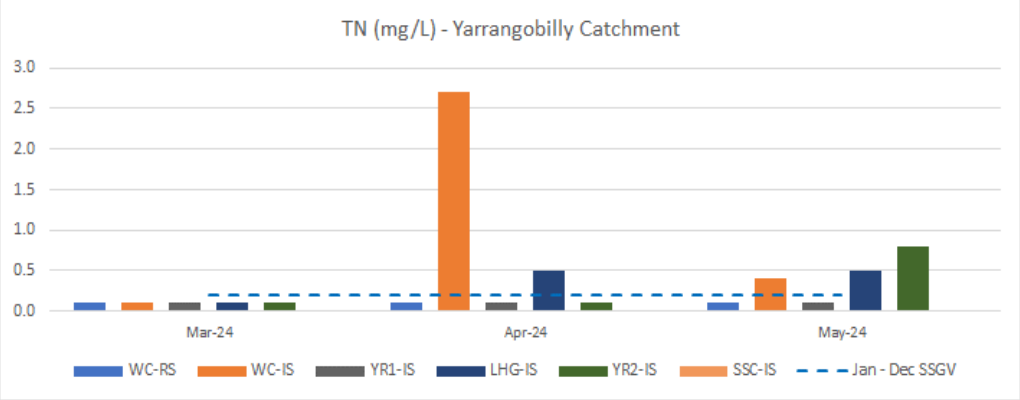


FIGURE 34: TOTAL NITROGEN FOR YARRANGOBILLY CATCHMENT

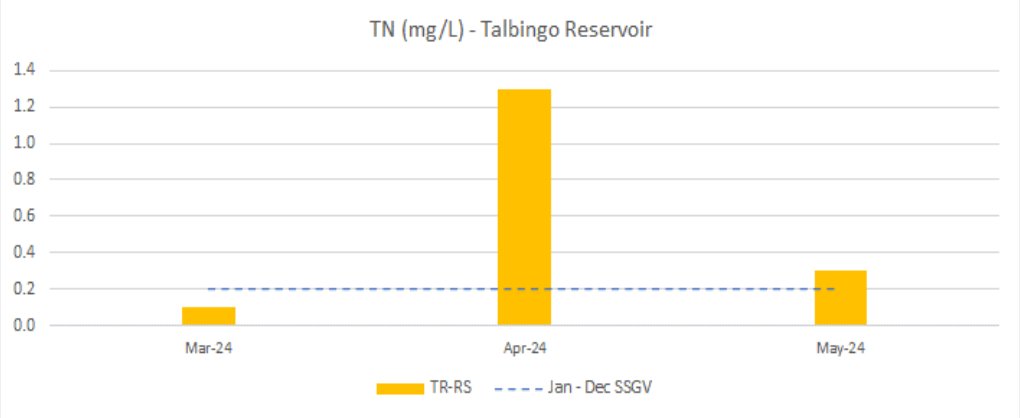


FIGURE 35: TOTAL NITROGEN FOR TALBINGO RESERVOIR

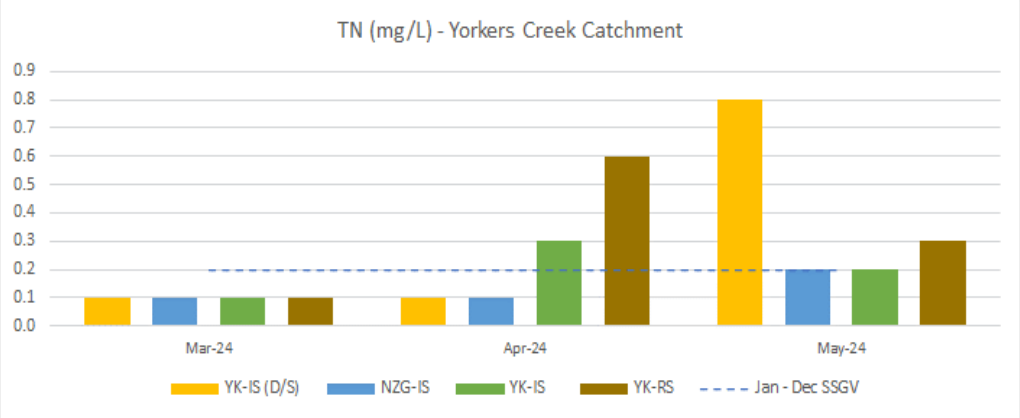


FIGURE 36: TOTAL NITROGEN FOR YORKERS CREEK CATCHMENT

Total Phosphorous

TP (mg/L) values exceeded the Jan-Dec SSGV (0.02 mg/L) in Talbingo Reservoir (0.03 mg/L) and across all sites in the Yorkers Creek catchment, with a range of 0.03 - 0.06 mg/L. In the Yarrangobilly catchment, LHG-IS and YR2-IS recorded values of 0.05 mg/L and 0.02 mg/L, respectively. Refer Figure 37 to Figure 39.

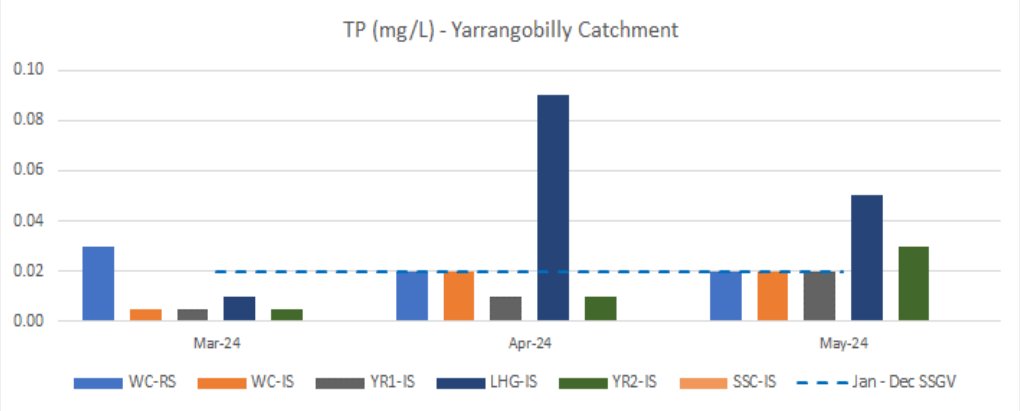


FIGURE 37: TOTAL PHOSPHOROUS FOR YARRANGOBILLY CATCHMENT

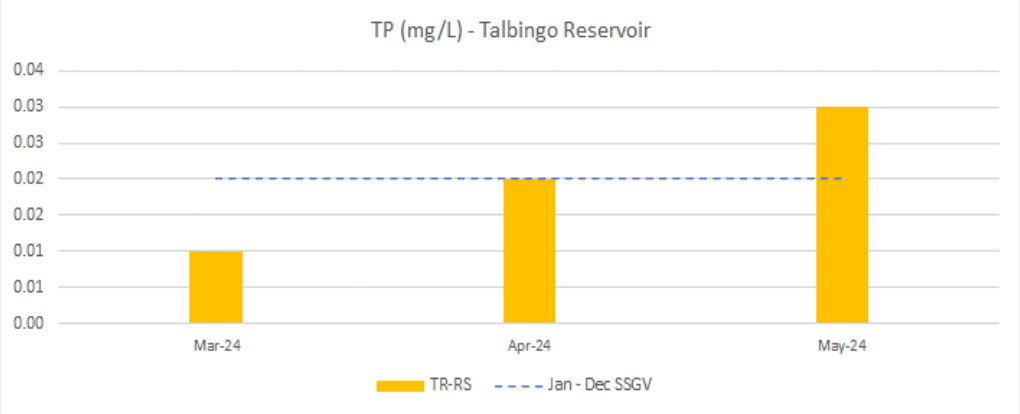


FIGURE 38: TOTAL PHOSPHOROUS FOR TALBINGO RESERVOIR

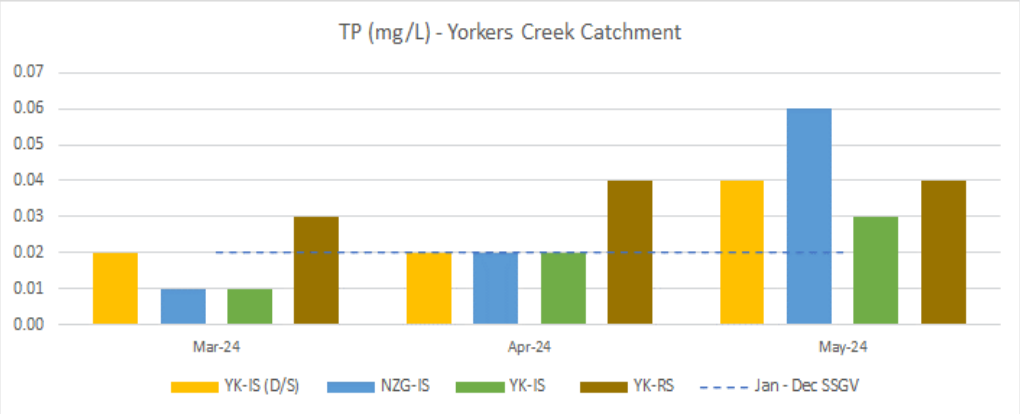


FIGURE 39: TOTAL PHOSPHOROUS FOR YORKERS CREEK CATCHMENT

5.2.2. Dissolved Metals

Dissolved metals exceeding the SSGV are listed in Table 4.

Table 4: Results for Dissolved Metals

DISSOLVED METALS RESULTS				
Analyte	**Site**	**Result (mg/L)**	**SGV (mg/L)**	**Comment**
Fe	LHG-IS	0.71	0.03	Fe (mg/L) exceeded the SSGV at LHG-IS, with results in May 2024 were higher than those recorded in April 2024 (0.34 mg/L). All other sites across the catchments were either below the LOR or their respective SSGV.
Mn	WC-RS	0.009	0.002	The reference sites in both the Yarrangobilly and Yorkers Creek catchments, along with several impact sites, exceeded the SSGV for Mn (mg/L).
	WC-IS	0.007		
	LHG-IS	0.184		
	YR2-IS	0.004		
	YK-RS	0.026	0.005	
	YK-IS (D/S)	0.021		
	NZG-IS	0.007		
	YK-IS	0.015		
Zn	YR2-IS	0.007	0.005	Zn (mg/L) was slightly above the SSGV at YR2-IS and NZG-IS, and moderately above the reference site at Talbingo Reservoir. All other sites were either below the LOR or the SSGV.
	TR-RS	0.023		
	NZG-IS	0.007		

5.2.3. Total Metals

Total metals exceeding the DGV are listed in Table 5.

Table 5: Results for Total Metals

TOTAL METALS RESULTS				
Analyte	**Site**	**Result (mg/L)**	**SGV (mg/L)**	**Comment**
Al	LHG-IS	0.07	0.027	Al (mg/L) exceeded the DGV at the reference sites of Talbingo Reservoir (TR-RS) and Yorkers Creek (YC-RS), with several impact sites also recording values above the DGV.
	TR-RS	0.03		
	YC-RS	0.10		
	YK-IS (D/S)	0.12		
	NZG-IS	0.06		
	YC-IS	0.04		
Zn	YR2-IS	0.007	0.0024	The DGV for Zn (mg/L) was exceeded at the Talbingo Reservoir (TR-RS) reference site, as well as at the impact site YR2-IS.
	TR-RS	0.012		
Fe	LHG-IS	1.09	0.3	All sites were below the DGV or the LOR for Fe (mg/L), except for LHG-IS, which was significantly above the DGV, YK-IS (D/S), which was moderately above the DGV, and YK-RS and NZG-IS, which were both slightly above the DGV.
	YK-RS	0.34		
	YK-IS (D/S)	0.61		
	NZG-IS	0.35		
Cr	YK-IS (D/S)	0.003	0.00001	Cr (mg/L) at YK-IS (D/S) was notably above the DGV.

5.3. Discussion

Below is a summary of key observations and discussion points from the May monitoring results:

- Transmission line clearing and bulk earthworks activities were ongoing within the Yarrangobilly and Yorkers Creek catchment areas.
- Site being prepared (disturbed surfaces sealed and ESC measures put in place) for winter shutdown.
- Impact sites within the Yarrangobilly catchment are influenced by other activities associated with the Snowy 2.0 project.
- Cave Gully (CG-IS) and Sheep Station Creek (SSC-IS) impact sites within the Yarrangobilly catchment were both dry at the time of sampling.
- Fine sediment was observed on the banks and on the bottom of the waterway at all sites within the Yorkers Creek catchment.
- Horse hoof marks were evident on the bed and banks of the sampling site at New Zealand Gully (NZG-IS) within the Yorkers Creek Catchment
- Many of the results are recorded as below (<) the LOR.
- The SSGV/DGV for a number of parameters is lower than the LOR from the laboratory.

- Reference and impact site comparisons show exceedances in multiple parameters, including nitrogen, phosphorus, turbidity, and ammonia.
- Lick Hole Gully (LHG-IS) within the Yarrangobilly catchment was observed as being shallow with high silt deposition and no visible flow at the time of sampling. LGH-IS consistently recorded higher values across multiple parameters.

6. CONCLUSION

The results from the construction SWQ monitoring program were reported for three key catchments: Yarrangobilly River, Talbingo Reservoir, and Yorkers Creek. Each catchment had a reference site, with impact sites also monitored for comparison. Key parameters such as temperature, pH, DO, SPC, turbidity, TSS, ammonia, nitrogen oxides, TKN, $CaCO_3$, TN, TP and metals (both dissolved and total) were analysed.

Consistent trends were observed in water temperature, pH, and DO, reflecting seasonal changes in May 2024. Significant seasonal decreases in temperature were observed across all catchments, with ranges from 2.1 °C to 7.0 °C in Yarrangobilly, 10.1 °C in Talbingo Reservoir, and 3.1 °C to 4.7 °C in Yorkers Creek being recorded in May. pH levels generally decreased compared to April, with the Yarrangobilly reference site slightly exceeding the SSGV (8.05) and the Yorkers Creek site YK-IS recorded slightly below the SSGV at 6.43. DO (%) levels remained within SSGV ranges in Yarrangobilly, except for LHG-IS, which remained low at 63.3%. Talbingo Reservoir recorded an improvement to 91.5%, while Yorkers Creek sites consistently remained below SSGVs. SPC within Yarrangobilly and Yorkers Creek catchments consistently exceeded SSGVs, with Yarrangobilly's LHG-IS reaching a significantly high value of 618 µS/cm. Talbingo Reservoir recorded a much lower value of 30.2 µS/cm, aligning with SSGVs. Turbidity and TSS levels were observed in Yarrangobilly and Talbingo Reservoir, while Yorkers Creek remained within SSGVs. TSS exceeded SSGVs in all catchments, with notable values at 9 mg/L for YK-IS (D/S) in Yorkers Creek. TN and TP frequently exceeded SSGVs across all catchments. The most notable TN exceedance was 0.8 mg/L at YK-IS (D/S), and TP ranged from 0.03–0.06 mg/L in Yorkers Creek. Exceedances were noted for dissolved metals such as Mn and Zn, particularly at YR2-IS and NZG-IS. Total metals, including Al and Fe, also exceeded DGVs, with LHG-IS recording significantly elevated Fe levels of 1.09 mg/L.

REFERENCES

ALS. (2024a). ES2417957. *Certificate of Analysis*. NSW, Australia: ALS Limited.

ALS. (2024b). ES2417957. *QA/QC Compliance Assessment to assist with Quality Review*. NSW, Australia: ALS Limited.

ALS. (2024c). ES2417957. *Quality Control Report*. NSW, Australia: ALS Limited.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. ACT, Australia: Australian and New Zealand Governments and Australian state and territory governments.

DTN. (2024, May). *Cabramurra Weather*. Retrieved from Weatherzone: https://www.weatherzone.com.au/nsw/snowy-mountains/cabramurra

Jacobs. (2020). *Environmental Impact Statement.* NSW: Transgrid.

NGH. (2022). *Pre-construction Water Quality Monitoring Program and Methodology.* NSW: NGH Pty Ltd.

NGH. (2024). *Baseline Water Quality Report.* NSW: NGH Pty Ltd.

UGL. (2024a). May 2024. *Water Quality Monitoring Field Data Sheet*. NSW, Australia: UGL Limited.

UGL. (2024b). ES2417957. *Chain of Custody*. NSW, Australia: UGL Limited.

Appendix A: Field Sheet (UGL, 2024a)

Water Quality Monitoring Field Data Sheet

UGL

Date: 28 & 29th May, 2024 **Sample Run:** 3C **Sampling Purpose:** Monthly surface monitoring **Samplers:** Lachlan Whiteford

Sample ID	Sample Location	Time	Temp (°C)	Water Pressure (mmHg)	Dissolved Oxygen (%)	Conductivity (SPC-µS/cm)	pH	Turbidity FNU	TSS (mg/L)	Water level	Description
WC-RS	East	1100	2.1		93.8	155.0	8.05	0.39			Lower depth, debris along banks
WC-IS	East	1120	2.1		94.1	159.9	7.96	6.3			Clear, low levels of water
YR1-IS	East	1155	3.1		95.6	138.8	7.91	0.92			Few white caps & bubbles
LHG-IS	East	1230	7.0		63.3	618	7.00	1003.7			
YR2-IS	East	1300	2.5		94.7	142.1	7.77	0.343			Very clear, lower levels than usual. Exposed rocks
TR-RS	Reservoir	1600	10.1		91.5	30.2	6.8	0.65			Small bits of dirt & rock suspended on surface
SSC-IS	East	1380									DRY
CG-IS	East	1345									DRY
YK-IS(d/s)	West	0700	3.1		85.9	39.6	6.59	2.57			
N26IS	West	0730	3.9		85.8	66.6	6.68	1.61			
YK-IS	West	0800	4.7		82.7	35.8	6.43	6.09			Quite muddy, silt sediment in water. Sticks & debris
YK-RS	West	0830	4.2		85.1	34.7	6.62	9.34			Debris in & around banks

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Appendix B: COA (ALS, 2024a), QA/QC Assessment (ALS, 2024b), QCR (ALS, 2024c) and COC (UGL, 2024b)

CERTIFICATE OF ANALYSIS

Work Order	: **ES2417957**	Page	: 1 of 8
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: MR TIM McCARTHY	Contact	: Customer Services ES
Address	: Level 4, 40 Miller Street North Sydney 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 9219 5303	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 31-May-2024 11:15
Order number	: ----	Date Analysis Commenced	: 31-May-2024
C-O-C number	: ----	Issue Date	: 07-Jun-2024 18:38
Sampler	: ----		
Site	: Maragle/Lobs Hole		
Quote number	: EN/333		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sample 5 ID on the COC is YR2-RS, received as YR2-IS , please confirm which is correct ID.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	WC-RS	WC-IS	YR1-RS	LHG-IS	YR2-IS YR2-RS
			Sampling date / time	29-May-2024 09:11	29-May-2024 08:56	29-May-2024 09:36	29-May-2024 10:10	29-May-2024 08:31
Compound	CAS Number	LOR	Unit	ES2417957-001	ES2417957-002	ES2417957-003	ES2417957-004	ES2417957-005
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**102**	**106**	**95**	**402**	**98**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**77**	**75**	**68**	**365**	**68**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	**0.007**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	**0.001**	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	**0.007**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	<0.004	<0.004	**0.024**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WC-RS	WC-IS	YR1-RS	LHG-IS	YR2-IS YR2-RS
				Sampling date / time	29-May-2024 09:11	29-May-2024 08:56	29-May-2024 09:36	29-May-2024 10:10	29-May-2024 08:31
Compound	CAS Number	LOR	Unit		ES2417957-001	ES2417957-002	ES2417957-003	ES2417957-004	ES2417957-005
					Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	<0.01	<0.01	**0.04**	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**0.31**	<0.01	**0.06**	**0.34**
EK060G:Organic Nitrogen as N (TKN-NH3) By Discrete Analyser									
Organic Nitrogen as N	----	0.1	mg/L		<0.1	**0.1**	**0.1**	**0.4**	**0.5**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	**0.1**	**0.1**	**0.4**	**0.5**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	**0.4**	**0.1**	**0.5**	**0.8**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.02**	**0.02**	**0.05**	**0.03**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	TR-RS	YK-IS (D/S)	NZG-IS	YK-IS	YK-RS
				Sampling date / time	28-May-2024 16:23	28-May-2024 14:45	28-May-2024 14:07	28-May-2024 15:03	28-May-2024 15:23
Compound	CAS Number	LOR	Unit		ES2417957-006	ES2417957-007	ES2417957-008	ES2417957-009	ES2417957-010
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**35**	**39**	**60**	**48**	**37**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	**9**	<5	<5	<5
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		**5**	**12**	**23**	**12**	**9**
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.023**	<0.005	**0.007**	<0.005	<0.005
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.003**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.012**	<0.005	<0.005	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		<0.004	<0.004	<0.004	<0.004	<0.004

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	TR-RS	YK-IS (D/S)	NZG-IS	YK-IS	YK-RS
				Sampling date / time	28-May-2024 16:23	28-May-2024 14:45	28-May-2024 14:07	28-May-2024 15:03	28-May-2024 15:23
Compound	CAS Number	LOR	Unit		ES2417957-006	ES2417957-007	ES2417957-008	ES2417957-009	ES2417957-010
					Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.02**	<0.01	<0.01	<0.01	**0.03**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.03**	**0.53**	**0.03**	**0.05**	**0.02**
EK060G:Organic Nitrogen as N (TKN-NH3) By Discrete Analyser									
Organic Nitrogen as N	----	0.1	mg/L		**0.3**	**0.3**	**0.2**	**0.1**	**0.3**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**0.3**	**0.2**	**0.1**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	**0.8**	**0.2**	**0.2**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.04**	**0.06**	**0.03**	**0.04**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QAQC	SPRING	----	----	----
				Sampling date / time	29-May-2024 10:10	28-May-2024 13:56	----	----	----
Compound	CAS Number	LOR	Unit		ES2417957-011	ES2417957-012	--------	--------	--------
					Result	Result	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	**207**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	**78**	----	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		----	**27**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.001**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.001**	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.006**	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.003**	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.005**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	**0.003**	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.006**	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide	57-12-5	0.004	mg/L		----	<0.004	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QAQC	SPRING	----	----	----
				Sampling date / time	29-May-2024 10:10	28-May-2024 13:56	----	----	----
Compound	CAS Number	LOR	Unit		ES2417957-011	ES2417957-012	--------	--------	--------
					Result	Result	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	**0.03**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	**0.17**	----	----	----
EK060G:Organic Nitrogen as N (TKN-NH3) By Discrete Analyser									
Organic Nitrogen as N	----	0.1	mg/L		----	<0.1	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	**0.1**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	**0.3**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	**0.18**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	**0.01**	----	----	----

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2417957**	Page	: 1 of 9
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: MR TIM McCARTHY	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 31-May-2024
Site	: Maragle/Lobs Hole	Issue Date	: 07-Jun-2024
Sampler	: ----	No. of samples received	: 12
Order number	: ----	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES2417956--001	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	ES2417956--001	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
TR-RS,	YK-IS (D/S),	----	----	----	31-May-2024	30-May-2024	**1**
NZG-IS,	YK-IS,						
YK-RS,	SPRING						

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
TR-RS,	YK-IS (D/S),	**28-May-2024**	**----**	----	**----**	**04-Jun-2024**	04-Jun-2024	✓
NZG-IS,	YK-IS,							
YK-RS,	SPRING							
Clear Plastic Bottle - Natural (EA015H)								
WC-RS,	WC-IS,	**29-May-2024**	**----**	----	**----**	**04-Jun-2024**	05-Jun-2024	✓
YR1-RS,	LHG-IS,							
YR2-IS - YR2-RS								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**04-Jun-2024**	04-Jun-2024	✓
Clear Plastic Bottle - Natural (EA025H)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**04-Jun-2024**	05-Jun-2024	✓
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**05-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**05-Jun-2024**	26-Jun-2024	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**05-Jun-2024**	24-Nov-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS, QAQC	**29-May-2024**	**----**	----	----	**05-Jun-2024**	25-Nov-2024	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**05-Jun-2024**	24-Nov-2024	✓	**05-Jun-2024**	24-Nov-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS, QAQC	**29-May-2024**	**05-Jun-2024**	25-Nov-2024	✓	**05-Jun-2024**	25-Nov-2024	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**07-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS, QAQC	**29-May-2024**	**----**	----	----	**07-Jun-2024**	26-Jun-2024	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**07-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS, QAQC	**29-May-2024**	**----**	----	----	**07-Jun-2024**	26-Jun-2024	✓
EK026SF: Total CN by Segmented Flow Analyser							
Black Opaque Plastic Bottle - NaOH - Pb Acetate (EK026SF)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**06-Jun-2024**	11-Jun-2024	✓
Black Opaque Plastic Bottle - NaOH - Pb Acetate (EK026SF)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**06-Jun-2024**	12-Jun-2024	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**06-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**06-Jun-2024**	26-Jun-2024	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**06-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**06-Jun-2024**	26-Jun-2024	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**05-Jun-2024**	25-Jun-2024	✓	**05-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**05-Jun-2024**	26-Jun-2024	✓	**05-Jun-2024**	26-Jun-2024	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**05-Jun-2024**	25-Jun-2024	✓	**05-Jun-2024**	25-Jun-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**05-Jun-2024**	26-Jun-2024	✓	**05-Jun-2024**	26-Jun-2024	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TR-RS, YK-IS (D/S), NZG-IS, YK-IS, YK-RS, SPRING	**28-May-2024**	**----**	----	----	**31-May-2024**	30-May-2024	×
Clear Plastic Bottle - Natural (EK071G) WC-RS, WC-IS, YR1-RS, LHG-IS, YR2-IS - YR2-RS	**29-May-2024**	**----**	----	----	**31-May-2024**	31-May-2024	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	39	**12.82**	**12.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	5	39	**12.82**	**12.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Total Cyanide by Segmented Flow Analyser	EK026SF	WATER	In house: Referenced to APHA 4500-CN C&O / ASTM D7511 / ISO 14403. Sodium hydroxide preserved samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Organic Nitrogen as N (TKN - NH3) (discrete analyser)	EK060G	WATER	In house: Referenced to APHA 4500-Norg/4500-NH3. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

QUALITY CONTROL REPORT

Work Order	: **ES2417957**	Page	: 1 of 7
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: MR TIM McCARTHY	Contact	: Customer Services ES
Address	: Level 4, 40 Miller Street North Sydney 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 9219 5303	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 31-May-2024
Order number	: ----	Date Analysis Commenced	: 31-May-2024
C-O-C number	: ----	Issue Date	: 07-Jun-2024
Sampler	: ----		
Site	: Maragle/Lobs Hole		
Quote number	: EN/333		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 5835626)									
ES2417667-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3750	3780	0.8	0% - 20%
ES2417901-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	47	50	5.7	No Limit
ES2417957-010	YK-RS	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37	56	39.8	No Limit
EW2402527-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	44	43	0.0	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5835627)									
ES2417667-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2417901-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2417957-010	YK-RS	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EW2402527-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5836759)									
ES2417957-001	WC-RS	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
ES2417957-012	SPRING	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5836759) - continued									
ES2417957-012	SPRING	EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 5837973)									
ES2417934-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.025	0.026	0.0	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.072	0.071	1.6	0% - 50%
WN2406710-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5836758)									
ES2417957-002	WC-IS	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2417957-010	YK-RS	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 5837944)									
ES2417725-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	0.0	No Limit
ES2417957-004	LHG-IS	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 5839001)									
ES2417957-001	WC-RS	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
ES2418056-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5837826)									
ES2417957-001	WC-RS	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.0	No Limit
ES2417957-010	YK-RS	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.02	38.7	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5837825)									
ES2417957-001	WC-RS	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.0	No Limit
ES2417957-010	YK-RS	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5837821)									
ES2417929-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
ES2417957-009	YK-IS	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5837822)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5837822) - continued									
ES2417954-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.76	0.75	1.6	0% - 20%
ES2417957-009	YK-IS	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5829709)									
ES2417957-007	YK-IS (D/S)	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2417839-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 5835626)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	87.5	87.0	109
				<10	293 mg/L	106	75.2	126
				<10	2410 mg/L	97.2	83.0	124
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5835627)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	96.3	83.0	129
				<5	1000 mg/L	93.4	82.0	110
				<5	928 mg/L	94.9	83.0	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 5836759)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	105	81.0	117
EG020T: Total Metals by ICP-MS (QCLot: 5837973)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.0	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.0	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.5	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.6	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.8	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.5	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.7	79.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 5836758)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.7	83.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5837944)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.9	77.0	111
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5839001)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	107	73.0	133
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5837826)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5837826) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	104	90.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5837825)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	108	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5837821)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.9	69.0	123
				<0.1	1 mg/L	102	70.0	123
				<0.1	5 mg/L	95.7	70.0	123
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5837822)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	97.0	71.3	126
				<0.01	0.442 mg/L	97.4	71.3	126
				<0.01	1 mg/L	102	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5829709)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	100	85.0	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5836759)							
ES2417957-004	LHG-IS	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	98.2	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	93.9	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	95.4	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	92.5	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	95.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	97.0	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 5837973)							
ES2417934-003	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	86.9	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	94.0	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	72.1	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	77.0	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	89.0	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	89.5	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	87.8	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG035F: Dissolved Mercury by FIMS (QCLot: 5836758)							
ES2417957-003	YR1-RS	EG035F: Mercury	7439-97-6	0.01 mg/L	91.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5837944)							
ES2417725-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	81.8	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5839001)							
ES2418056-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.2 mg/L	98.5	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5837826)							
ES2417957-001	WC-RS	EK055G: Ammonia as N	7664-41-7	0.5 mg/L	107	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5837825)							
ES2417957-001	WC-RS	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5837821)							
ES2417956-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5837822)							
ES2417956-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5829709)							
ES2417839-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	99.8	70.0	130

CHAIN OF CUSTODY

Mandatory Fields

Page ___of___

CLIENT CODE:	UFLLIM	*PROJECT MANAGER:	Tim McCarthy	SAMPLER:	Lachlan Whiteford
*CLIENT:	UGL Limited	*PM. MOBILE:	0455 087 248	SAMPLER MOBILE:	0475 369 909
OFFICE: (Invoiced Office)		ALS QUOTE # (Client PL if blank)		PURCHASE ORDER NO.:	0475 369 909
PROJECT NO./PROJECT:				SITE:	Maragle/Lobs Hole
*INVOICE TO: (client default if nil)				☐ CC Invoice to PM	

CoC #: (if applicable)

BIOSECURITY

Country of Origin:

*EMAIL REPORTS TO: (default to PM if blank): brendan.toohey@ugllimited.com; camille.palmer@ugllimited.com; lauren.logue@ugllimited.com; alozie.agomoh@ugllimited.com; vivian.leeyu@ugllimited.com,lachlan.whiteford@ugllimited.com

*** STORAGE REQUIREMENTS**
Please check box. →
Standard Storage time from receipt of samples:
Waters - 3 weeks
Solids - 2 months

- ☒ Standard Storage
- ☐ Extended Storage

Specify Disposal Date:

Note: Extended storage incurs a fee and requires a signed agreement.

*** TURNAROUND**
Please check box. →
(Not all tests can be expedited, contact Client Services for more information)

- ☒ 5+ days (no surcharge)
- ☐ 3 day (+15%)
- ☐ 2 day (+30%)
- ☐ 1 day (+50%)

***ANALYSIS REQUIRED**
(NB. ALS Quote No. and/or Analysis Suite Codes must be listed to attract suite/quoted price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
Mark an X in the boxes below analysis to indicate the parameter listed above to be tested on that sample.

Environmental Division Sydney
Work Order Reference
ES2417957

Telephone : - 61-2-8784 8555

Comments: Apologies for not sending with the samples, and not labelling properly due to unforseen circumstances. Each zip lock bag has all the samples for that location. None of them are mixed. There will be one bottle in each which has the location - this will be the same for the other 5 bottles in the zip lock

ALS Use Only Lab ID	Sample ID	Depth (cm)	Date/Time	No. Bottles	MATRIX: Soil/Solid(S) Water(W) Sediments (SD), Dust (D), Product (P), Biota (B), Biosolid (BS)	Total Nitrogen	Total Phosphorus	Totaol Suspended Solids	Total Metals	Dissolved metals	Total Hardness	Ammonia	Reactive Phosphotus	Total Kjeldahl Nitrogen	Nitrogen Oxides	Cyanide	Total dissolved solids	Lab QC (additional bottles req.) Dup	Lab QC (additional bottles req.) MS	Additional Information (Comment on hazards - e.g., asbestos, known high contamination)
	1 WC-RS	17	29/05/2024 9:11	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	HT
	2 WC-IS	27	29/05/2024 8:56	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	3 YR1-RS	23	29/05/2024 9:36	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	4 LHG-IS	17	29/05/2024 10:10	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	5 YR2-RS YR2 IS	22	29/05/2024 8:31	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	6 TR-RS	38	28/05/2024 16:23	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	7 YK-IS(d/s)	14	28/05/2024 14:45	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	8 NZG-IS	32	28/05/2024 14:07	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	9 YK-IS	21	28/05/2024 15:03	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	10 YK-RS	29	28/05/2024 15:23	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	
	11 QAQC		29/05/2024 10:10	2	W					X	X							☒	☐	
	12 Spring		28/05/2024 13:56	6	W	X	X	X	X	X	X	X	X	X	X	X	X	☐	☐	

Receipt Detail (Lab Use ONLY)

Chilling Method: Ice: (Frozen) / Melted — Ice Bricks: Frozen / Thawed — None

Sample Temp at Receipt: °C °C °C

Security Seal Intact (circle): Yes / No / NA(None)

Carrier Details: ☐ Courier/Post ☐ Client

Con Note #

Packaging: (Circle) (Hard Esky) Foam Esky Box/Bag/Other

Count # 2 # #

Relinquished by:		Signature:	Lachlan Whiteford	Date/ Time:	31/05/2024 10:30	Received by:	Signature 31/5/24
Relinquished by:		Signature:		Date/ Time:		Received by:	Signature 11:15

Date/ Time:

Date/ Time:

Appendix C: May 2024 SWQ Monitoring Results

Parameter		Sheen/ oil/ grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidity (NTU)	Dissolved Al (mg/L)	Dissolved As (mg/L)	Dissolved Cd (mg/L)	Dissolved Cr (mg/L)	Dissolved Cu (mg/L)	Cyanide (mg/L)	Dissolved Fe (mg/L)	Dissolved Pb (mg/L)	Dissolved Mn (mg/L)	Dissolved Hg (mg/L)	Dissolved Ni (mg/L)	TN (mg/L)	TP (mg/L)
YARRANGOBILLY CATCHMENT																							
Default Guideline Value (DGV)		No	-	90-110	-	30-350	30-350	6.5-8	-	2-25	0.027	0.0008	0.0006	0.00001	0.001	0.004	0.3	0.001	1.2	0.00006	0.008	0.25	0.02
Limit of Reporting (LOR)				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.1	0.01
Dec - May Site Specific Guideline Value (SSGV)				90-110	9.08	115	93.2	6.5-8	79.1	0.37	0.03	0.0003	0.00002	0.00001	0.0002	0.002	0.03	0.001	0.002	0.00003	0.001	0.2	0.02
June - Nov SSGV				90-110	10.28	88	60.85	6.5-8	98.4	5.12	0.04	0.0003	0.00002	0.00001	0.0002	0.002	0.02	0.001	0.002	0.00003	0.001	0.2	0.02
WC-RS	Mar-24	No	10.7	87.5	9.72	143.6	104.3	7.8	25.9	*0.1*	0.02	*0.00015*	*0.00001*	*0.00001*	0.002	*0.001*	*0.03*	0.002	0.003	*0.00002*	*0.001*	*0.1*	0.03
	Apr-24	No	10.7	94.8	-	145.6	-	8.44	-	1.05	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.002	0.11	*0.001*	0.007	*0.0001*	*0.001*	*0.1*	0.02
	May-24	No	2.1	93.8	-	155	-	8.05	-	0.39	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	*0.05*	*0.001*	0.009	*0.0001*	*0.001*	*0.1*	0.02
WC-IS	Mar-24	No	10.7	87.1	9.68	145.9	105.9	7.83	41.9	*0.1*	0.03	*0.00015*	*0.00001*	*0.00001*	0.002	*0.001*	*0.03*	0.002	0.003	*0.00002*	*0.0005*	*0.1*	*0.005*
	Apr-24	No	10.7	95.0	-	145.2	-	8.45	-	0.9	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.002	0.07	*0.001*	0.006	*0.0001*	*0.001*	2.7	0.02
	May-24	No	2.1	94.1	-	154.9	-	7.86	-	0.3	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	*0.05*	*0.001*	0.007	*0.0001*	*0.001*	0.4	0.02
CG-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YR1-IS	Mar-24	No	12.2	88.2	9.47	129.4	97.7	7.81	53.8	*0.1*	0.05	*0.00015*	*0.00001*	*0.000005*	0.002	*0.001*	*0.03*	*0.0005*	0.002	*0.000015*	*0.001*	*0.1*	*0.005*
	Apr-24	No	11.3	97.4	-	136.1	-	8.49	-	1.23	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	*0.05*	*0.001*	0.002	*0.0001*	*0.001*	*0.1*	*0.01*
	May-24	No	3.1	95.6	-	138.8	-	7.91	-	0.42	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	*0.05*	*0.001*	0.002	*0.0001*	*0.001*	*0.1*	0.02
LHG-IS	Mar-24	Yes	11.9	59.2	6.38	596	447.2	7.35	-17.2	408.5	0.2	*0.00015*	*0.00001*	*0.001*	0.003	*0.001*	0.18	0.005	0.04	*0.000015*	0.003	*0.1*	*0.01*
	Apr-24	No	12.5	60.1	-	658	-	7.69	-	69.72	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.34	*0.001*	0.184	*0.0001*	*0.001*	0.5	0.09
	May-24	No	7	63.3	-	618	-	7	-	1003.7	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	0.71	*0.001*	0.184	*0.0001*	*0.001*	0.5	0.05
YR2-IS	Mar-24	No	12.3	88.5	9.47	130.8	99.1	7.93	43.2	*0.1*	0.03	*0.00015*	*0.00001*	*0.000005*	*0.001*	*0.001*	*0.02*	0.005	*0.001*	*0.000015*	*0.001*	*0.1*	*0.005*
	Apr-24	No	11.8	97.1	-	139.7	-	8.52	-	1.16	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	*0.05*	*0.001*	0.003	*0.0001*	*0.001*	*0.1*	*0.01*
	May-24	No	2.5	94.7	-	142.1	-	7.77	-	0.343	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.024	*0.05*	*0.001*	0.004	*0.0001*	*0.001*	0.8	0.03
SSC-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TALBINGO RESERVOIR																							
DGV		No	-	90-110	-	30-350	30-350	6.5-8	-	2-25	0.027	0.0008	0.0006	0.00001	0.001	0.004	0.3	0.001	1.2	0.00006	0.008	0.25	0.02
LOR				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.1	0.01
Dec - May SSGV				90-100	8.79	24.0	20.3	6.5-8	91.2	0.09	0.03	0.003	0.00002	0.00001	0.0002	0.002	0.04	0.001	0.003	0.00003	0.001	0.2	0.02
June - Nov SSGV				90-100	11.53	38.7	26.2	6.5-8	95.4	1.56	0.015	0.0003	0.00002	0.00001	0.0002	0.002	0.02	0.001	0.002	0.00003	0.001	0.2	0.02
TR-RS	Mar-24	No	13.4	72.5	7.57	24	18.7	7.1	55	*0.1*	0.015	*0.00015*	*0.00001*	*0.000005*	*0.0001*	*0.001*	*0.05*	0.005	0.005	*0.000015*	*0.0005*	*0.1*	*0.01*
	Apr-24	No	12.2	85.9	-	25.9	-	7.17	-	*0.02*	*0.01*	*0.001*	*0.0001*	*0.001*	0.005	*0.002*	*0.05*	*0.001*	0.026	*0.0001*	*0.001*	1.3	0.02
	May-24	No	10.1	91.5	-	30.2	-	6.8	-	0.65	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	*0.05*	*0.001*	0.002	*0.0001*	*0.001*	0.3	0.03
YORKERS CREEK CATCHMENT																							
DGV		No	-	90-110	-	30-350	30-350	6.5-8	-	2-25	0.027	0.0008	0.0006	0.00001	0.001	0.004	0.3	0.001	1.2	0.00006	0.008	0.25	0.02
LOR				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.1	0.01
Dec - May SSGV				90-110	8.35	31	24	6.5-8	94.6	9	0.36	0.003	0.00002	0.00001	0.002	0.002	0.41	0.001	0.005	0.00003	0.001	0.2	0.02
June - Nov SSGV				90-110	10.2	27.9	20.5	6.5-8	106.1	7.87	0.32	0.0003	0.00002	0.00001	0.0002	0.002	0.23	0.001	0.003	0.00003	0.001	0.2	0.02
YK-RS	Mar-24	Yes	16.3	82.5	8.09	31.5	26.2	6.69	64.5	12.24	0.6	*0.00015*	*0.00001*	*0.000005*	*0.001*	*0.001*	0.66	0.002	0.013	*0.000015*	*0.0005*	*0.1*	0.03
	Apr-24	No	6.8	80.7	-	36.5	-	7.04	-	17.27	0.10		*0.0001*	*0.001*	*0.001*	*0.002*	0.12	*0.001*	0.014	*0.0001*	*0.001*	0.6	0.04
	May-24	No	4.2	85.1	-	34.7	-	6.62	-	0.3	0.10	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	0.17	*0.001*	0.026	*0.0001*	*0.001*	0.3	0.04
YK-IS (D/S)	Mar-24	No	10	81.6	9.21	39.1	27.9	7.02	63.2	*0.1*	*0.0065*	*0.00015*	*0.00001*	*0.000005*	*0.0001*	*0.001*	0.26	*0.0005*	0.006	*0.000015*	*0.0005*	*0.1*	0.02
	Apr-24	No	5.9	86.0	-	39.4	-	7.33	-	221.78	0.05	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.11	*0.001*	0.014	*0.0001*	*0.001*	*0.1*	0.02
	May-24	No	3.1	85.9	-	39.6	-	6.59	-	0.8	0.09	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	0.15	*0.001*	0.021	*0.0001*	*0.001*	0.8	0.04
NZG-IS	Mar-24	No	9.6	80.2	9.13	64.2	45.3	7.45	31.1	*0.1*	0.14	*0.00015*	*0.00001*	*0.000005*	*0.0001*	*0.001*	0.18	*0.0005*	0.004	*0.000015*	*0.0005*	*0.1*	*0.01*
	Apr-24	No	6.4	84.9	-	67.1	-	7.38	-	0.96	0.03		*0.0001*	*0.001*	*0.001*	*0.002*	0.08	*0.001*	0.006	*0.0001*	*0.001*	*0.1*	0.02
	May-24	No	3.9	85.8	-	66.6	-	6.68	-	0.2	0.04	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	0.07	*0.001*	0.007	*0.0001*	*0.001*	0.2	0.06
YK-IS	Mar-24	No	11.4	78.0	8.53	35	25.9	6.7	41.1	21.44	0.45	*0.00015*	*0.00001*	*0.000005*	*0.001*	*0.001*	0.4	*0.0005*	0.018	*0.000015*	*0.0005*	*0.1*	*0.01*
	Apr-24	No	6.8	80.7	-	36.5	-	7.04	-	12.37	0.09	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.15	*0.001*	0.016	*0.0001*	*0.001*	0.3	0.02
	May-24	No	4.7	82.7	-	35.8	-	6.43	-	0.2	0.06	*0.001*	*0.0001*	*0.001*	*0.001*	0.004	0.1	*0.001*	0.015	*0.0001*	*0.001*	0.2	0.03

	Reference Site exceeds SSGV
	Impact Site Result exceeds SSGV or DGV
italics	Result exceeds the Limit of Reporting

Parameter		Dissolved Ag (mg/L)	Dissolved Zn (mg/L)	Ammonia (mg/L)	Nitrogen Oxides (mg/L)	Reactive Phosphorous (mg/L)	Total Hardness (mg/L) (CaCO3)	Total Kjedahl Nitrogen (mg/L) (TKN)	TDS (mg/L)	TSS (mg/L)	Total Al (mg/L)	Total As (mg/L)	Total Cd (mg/L)	Total Cr (mg/L)	Total Cu (mg/L)	Total Pb (mg/L)	Total Mn (mg/L)	Total Ni (mg/L)	Total Ag (mg/L)	Total Zn (mg/L)	Total Fe (mg/L)	Total Hg (mg/L)
YARRANGOBILLY CATCHMENT																						
Default Guideline Value (DGV)		0.00002	0.0024	0.013	0.015	0.015	-	-	-	0.2	0.027	0.0008	0.0006	0.00001	0.001	0.001	1.2	0.008	0.00002	0.0024	0.3	0.00006
Limit of Reporting (LOR)		0.001	0.005	0.01	0.010	0.01	1	0.1	10	1	0.01	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.05	0.0001
Dec - May Site Specific Guideline V		0.00002	0.002	0.013	0.015	0.02	47	0.2	52	0.2												
June - Nov SSGV		0.00002	0.002	0.013	0.015	0.015	30	0.2	39	1												
WC-RS	Mar-24	*0.00001*	*0.001*	0.05	0.05	*0.005*	42	*0.1*	70	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	*0.01*	-	70	*0.01*	-	*1*	0.02	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.01	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
	May-24	*0.001*	*0.005*	0.02	*0.01*	*0.01*	77	*0.1*	102	5	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.007	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
WC-IS	Mar-24	*0.00001*	*0.001*	0.05	0.05	*0.005*	42	*0.1*	88	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	2.42	-	67	2.42	-	11	0.15	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.022	0.004	*0.001*	*0.005*	0.22	*0.0001*
	May-24	*0.001*	*0.005*	*0.01*	0.31	*0.01*	75	*0.1*	106	5	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.006	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
CG-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YR1-IS	Mar-24	*0.00001*	*0.001*	0.05	0.05	*0.005*	34	*0.1*	66	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	0.05	-	61	*0.05*	-	*1*	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.002	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
	May-24	*0.001*	*0.005*	*0.01*	0.01	*0.01*	68	*0.1*	95	5	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
LHG-IS	Mar-24	*0.00001*	0.006	0.05	0.05	*0.005*	297	1	330	20												
	Apr-24	*0.001*	*0.005*	0.02	0.02	-	332	*0.02*	-	70	0.25	0.003	*0.0001*	*0.001*	0.002	*0.001*	0.51	0.006	*0.001*	0.009	2.22	*0.0001*
	May-24	*0.001*	*0.005*	0.04	0.06	*0.01*	365	0.4	402	5	0.07	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.177	*0.001*	*0.001*	*0.005*	1.09	*0.0001*
YR2-IS	Mar-24	*0.00001*	*0.001*	0.05	0.05	*0.005*	27	1	58	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	*0.01*	-	61	*0.01*	-	5	0.02	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.004	*0.001*	*0.001*	*0.005*	*0.05*	*0.0001*
	May-24	*0.001*	0.007	0.02	0.34	*0.01*	68	0.5	98	5	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.002	*0.001*	*0.001*	0.007	*0.05*	*0.0001*
SSC-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TALBINGO RESERVOIR																						
DGV		0.00002	0.0024	0.013	0.015	0.015	-	-	-	0.2	0.027	0.0008	0.0006	0.00001	0.001	0.001	1.2	0.008	0.00002	0.0024	0.3	0.00006
LOR		0.001	0.005	0.01	0.010	0.01	1	0.1	10	1	0.01	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.05	0.0001
Dec - May SSGV		0.00002	0.002	0.013	0.015	0.02	7.5	0.1	12.5	0.2												
June - Nov SSGV		0.00002	0.002	0.013	0.015	0.015	8	0.2	15	0.2												
TR-RS	Mar-24	*0.00001*	*0.001*	0.05	0.05	*0.005*	8	*0.1*	44	*0.1*												
	Apr-24	*0.001*	0.066	0.03	0.12	-	5	0.12	-	3	0.02	*0.001*	*0.0001*	*0.001*	0.006	*0.001*	0.039	0.002	*0.001*	0.067	0.07	*0.0001*
	May-24	*0.001*	0.023	0.02	0.03	*0.01*	5	0.3	35	5	0.03	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.033	*0.001*	*0.001*	0.012	0.06	*0.0001*
YORKERS CREEK CATCHMENT																						
DGV		0.00002	0.0024	0.013	0.015	0.015	-	-	-	0.2	0.027	0.0008	0.0006	0.00001	0.001	0.001	1.2	0.008	0.00002	0.0024	0.3	0.00006
LOR		0.001	0.005	0.010	0.010	0.01	1	0.1	10	1	0.01	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.05	0.0001
Dec - May SSGV		0.00002	0.002	0.013	0.015	0.02	1	0.1	30	3												
June - Nov SSGV		0.00002	0.002	0.013	0.015	0.02	7	0.2	10	0.2												
YK-RS	Mar-24	*0.00001*	*0.003*	0.05	0.05	*0.005*	*1*	*0.1*	30	3												
	Apr-24	*0.001*	0.013	0.02	0.02	-	9	*0.02*	-	24	0.15	*0.001*	*0.0001*	*0.001*	0.007	*0.001*	0.021	0.006	*0.001*	0.016	0.46	*0.0001*
	May-24	*0.001*	*0.005*	0.03	0.02	*0.01*	9	0.3	37	5	0.10	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.027	*0.001*	*0.001*	*0.005*	0.34	*0.0001*
YK-IS (D/S)	Mar-24	*0.00001*	*0.002*	0.05	0.05	*0.005*	*1*	*0.1*	15	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	0.03	-	16	*0.03*	-	3	0.1	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.016	0.003	*0.001*	0.006	0.26	*0.0001*
	May-24	*0.001*	*0.005*	*0.01*	0.53	*0.01*	12	0.3	39	9	0.12	*0.001*	*0.0001*	0.003	*0.001*	*0.001*	0.035	0.002	*0.001*	*0.005*	0.61	*0.0001*
NZG-IS	Mar-24	*0.00001*	*0.002*	0.05	0.05	*0.005*	10	*0.1*	22	*0.1*												
	Apr-24	*0.001*	*0.005*	*0.01*	*0.01*	-	23	*0.01*	-	6	0.04	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.012	*0.001*	*0.001*	*0.005*	0.24	*0.0001*
	May-24	*0.001*	0.007	*0.01*	0.03	*0.01*	23	0.2	60	5	0.06	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.021	*0.001*	*0.001*	*0.005*	0.35	*0.0001*
YK-IS	Mar-24	*0.00001*	*0.004*	0.05	0.05	*0.005*	*1*	*0.1*	21	*1*												
	Apr-24	*0.001*	*0.005*	*0.01*	0.06	-	12	*0.06*	-	13	0.15	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.024	*0.001*	*0.001*	*0.005*	0.52	*0.0001*
	May-24	*0.001*	*0.005*	*0.01*	0.05	*0.01*	12	*0.1*	48	5	0.04	*0.001*	*0.0001*	*0.001*	*0.001*	*0.001*	0.014	*0.001*	*0.001*	*0.005*	0.16	*0.0001*

	Reference Site exceeds SSGV
	Impact Site Result exceeds SSGV or DGV
italics	Result exceeds the Limit of Reporting

Appendix D: Calibration Certificate

Head Office Perth
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CALIBRATION CERTIFICATE - WATER

Invoice No: 13203

Equipment Received:

Handheld S/N 23H104391

Cable S/N: 23L10231

Included Items:

SENSOR CALIBRATION DETAILS

	Pre Calibration	Post Calibration	Accuracy	Pass	Fail
pH		4	+/- 0.2 %	✔	
pH		7	+/- 0.2%	✔	
ORP		230.0 @ 24.8 C	+/- 30 ORPmV	✔	
Conductivity		12.90 Ms/cm	+/- 0.5 %	✔	
DO		100% 758mmHg	+/- 0.2%	✔	
Turbidity		0 NTU	+/- 5 NTU	✔	
Turbidity		124 NTU	+/- 20 NTU	✔	
			+/-		
			+/-		
			+/-		
			+/-		

Findings/ Recommendations /Comments:

1/ New Equipment

2/

3/

4/

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

Regards,

Nicolas Galarce

Equipment Specialist
ECO Environmental Holdings

28-Nov-2023