UGL

JUNE 2024

MONTHLY CONSTRUCTION WATER QUALITY MONITORING REPORT

June 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.

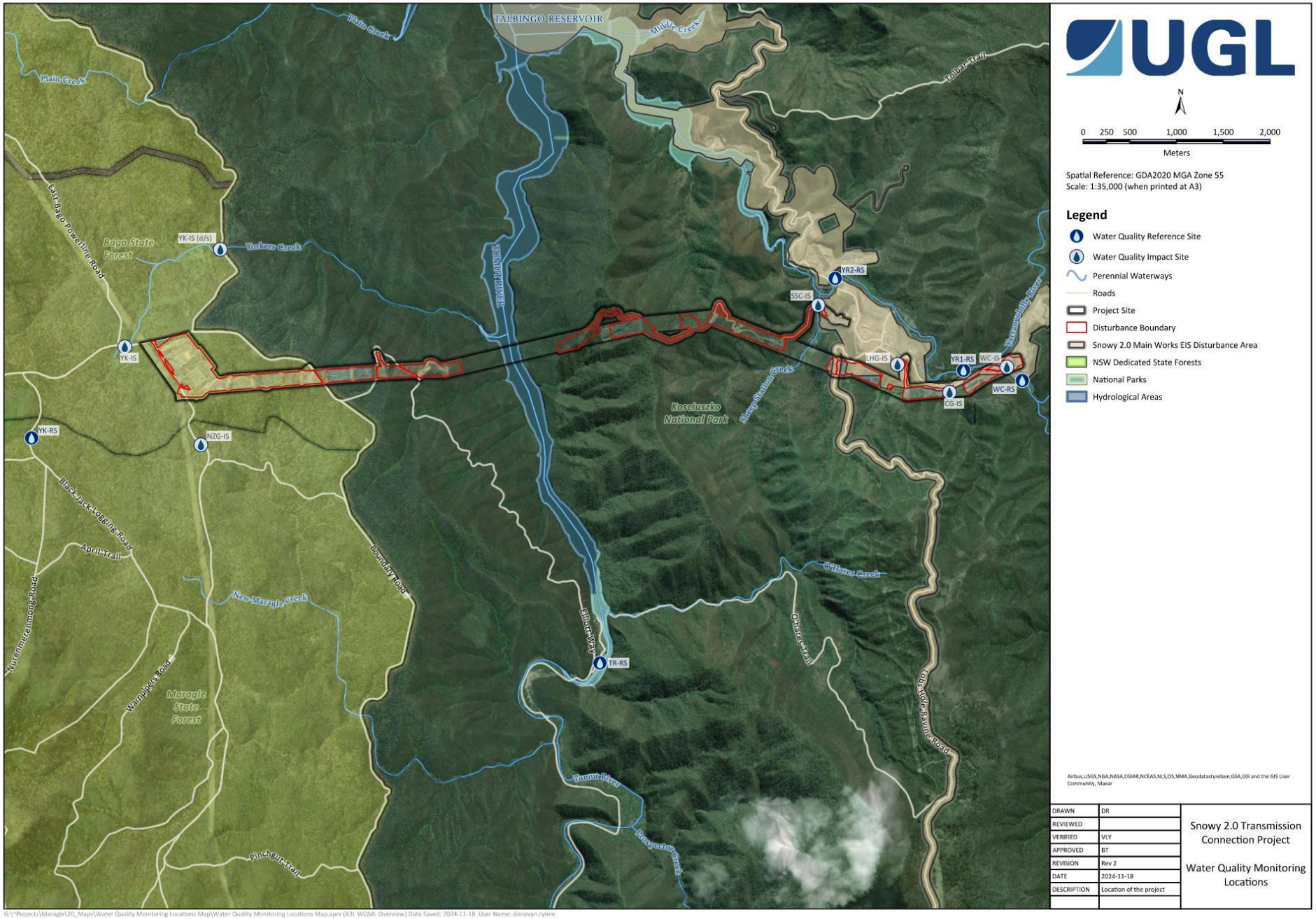

FIGURE 1 LOCALITY OF THE PROJECT AND SWQ MONITORING LOCATIONS

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

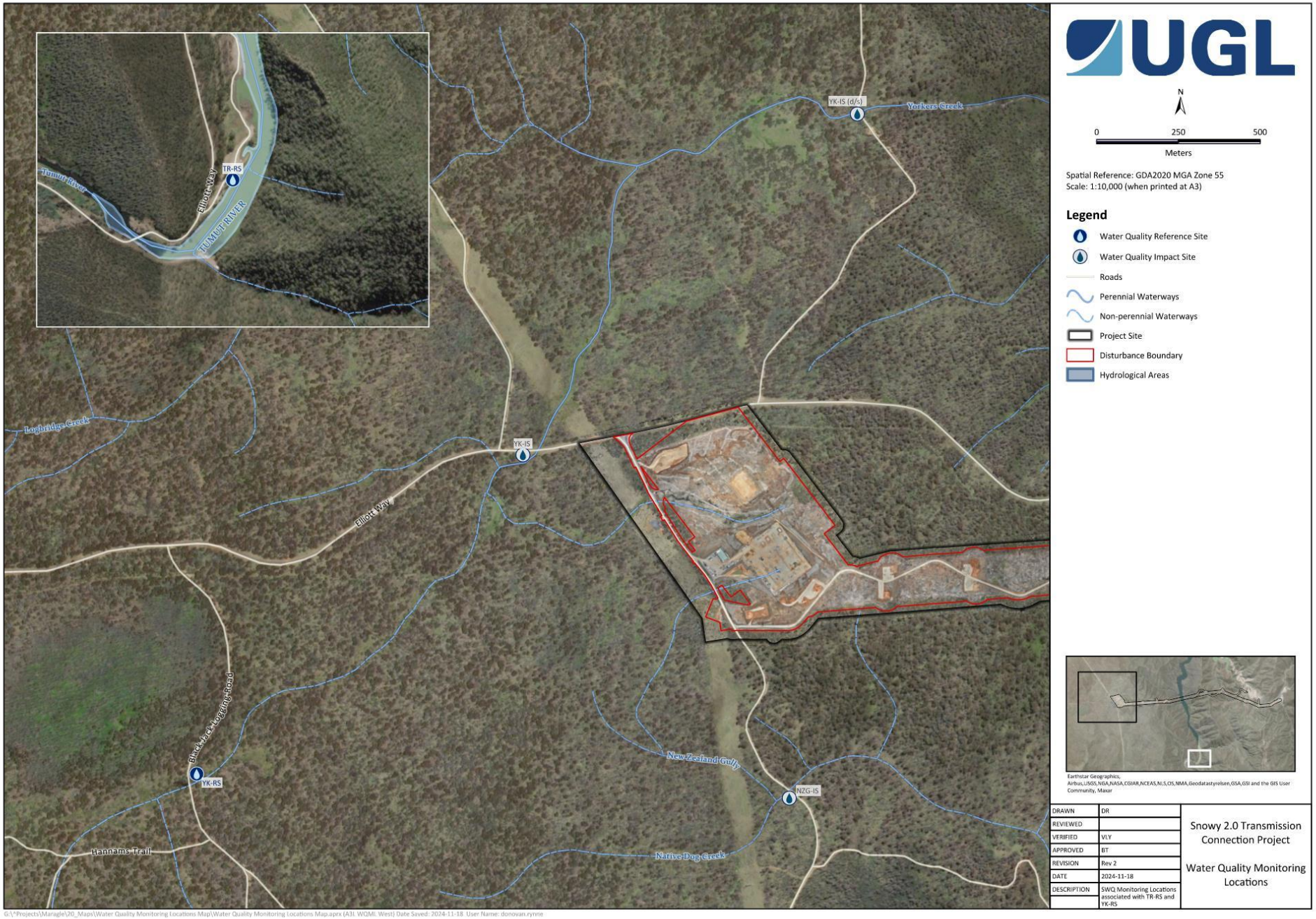

FIGURE 2 WATER QUALITY MONITORING LOCATIONS ASSOCIATED WITH REFERENCE SITE YR-RS AND TR-RS IN RELATION TO THE PROJECT

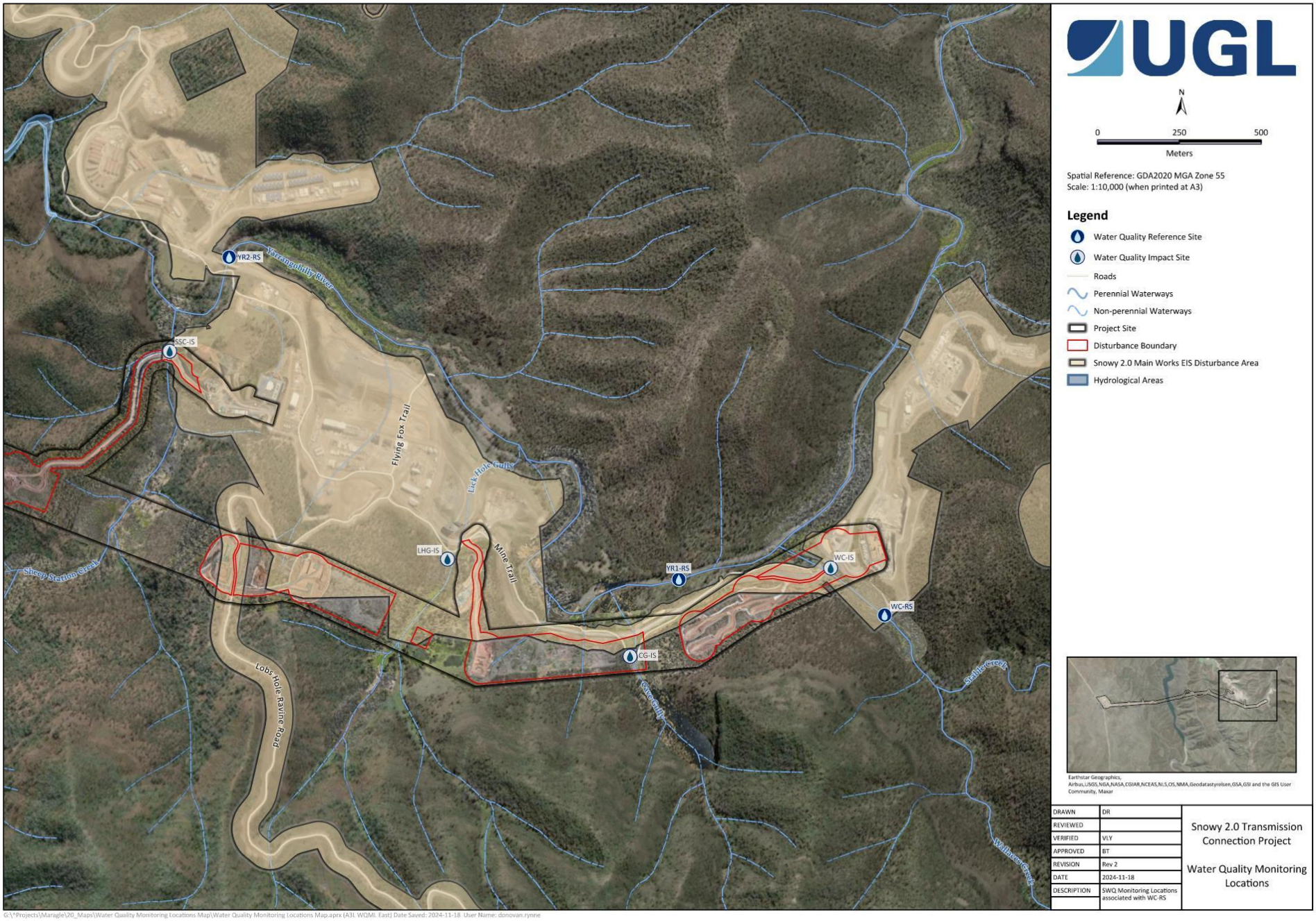

FIGURE 3 WATER QUALITY MONITORING LOCATIONS ASSOCIATED WITH REFERENCE SITE WC-RS IN RELATION TO THE PROJECT

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

** °C = 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. JUNE 2024 MONITORING

SW sampling was undertaken at 12 monitoring locations on 25 and 26 June 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)
- EC (µS/cm)
- 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	25.06.2024 and 26.06.2024	
Weather	Given the cold temperatures, frost was largely observed on flora and ground cover during sampling, with thin sheets of ice observed at some locations with small sections of non-flowing water of the waterbodies. Overcast conditions were also present.	
ID	**Observations**	**Photo**
WC-RS	• Clear shallow waters, relatively fast flowing • Vegetation along one bank • Debris/sticks along the other bank	

FIELD OBSERVATIONS

Date	25.06.2024 and 26.06.2024	
Weather	Given the cold temperatures, frost was largely observed on flora and ground cover during sampling, with thin sheets of ice observed at some locations with small sections of non-flowing water of the waterbodies. Overcast conditions were also present.	
ID	**Observations**	**Photo**
WC-IS	• Very clear, shallow waters, relatively fast flowing • Strong weed/vegetation growth on northern bank	
CG-IS	• Creek dry, no water present	
YR1-IS	• Clear shallow waters, fast flowing	

FIELD OBSERVATIONS

Date	25.06.2024 and 26.06.2024	
Weather	Given the cold temperatures, frost was largely observed on flora and ground cover during sampling, with thin sheets of ice observed at some locations with small sections of non-flowing water of the waterbodies. Overcast conditions were also present.	
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 volume of flow, minimal surface current/disturbance • Clear water • Thin vegetation scattered along either bank, however mostly rocks/ large pebbles	
SSC-IS	• Creek completely dry, no water present	

FIELD OBSERVATIONS

Date	25.06.2024 and 26.06.2024	
Weather	Given the cold temperatures, frost was largely observed on flora and ground cover during sampling, with thin sheets of ice observed at some locations with small sections of non-flowing water of the waterbodies. Overcast conditions were also present.	
ID	**Observations**	**Photo**
TR-RS	• Clear water, large volume with gradual flow • Light rain falling at the time of sampling	
YK-IS (D/S)	• Clear water and shallow depth, with some fine sediment settled on the base • Thick vegetation cover on either bank	
NZG-IS	• Thick vegetation cover on either bank • Clear water • Fine sediment visible on either bank and on the bottom of the gully • Hoof marks on bank several meters up from the sampling point	

FIELD OBSERVATIONS

Date	25.06.2024 and 26.06.2024	
Weather	Given the cold temperatures, frost was largely observed on flora and ground cover during sampling, with thin sheets of ice observed at some locations with small sections of non-flowing water of the waterbodies. Overcast conditions were also present.	
ID	**Observations**	**Photo**
YK-IS	• Fine sediment evident on banks and bottom of Creek • Sticks/debris along Creek • Low water levels, fine sediment moving with gradual flow of water • Slight milky brown colouration to water • Vegetation present along both banks	
YK-RS	• Minimal volume, sandy loam on base of Creek • Grasses/vegetation on either bank • Settled sediment at the bottom • Mud tracking from fauna on the banks	

5.2. Results

The data obtained during the construction SWQ monitoring program have been divided into the Yarrongabilly River, Talbingo Reservoir and Yorkers Creek catchments.

Yarrangobilly River catchment SWQ monitoring includes the reference site at Wallace Creek and impact sites in Yarrangobilly River, Wallace Creek, Cave Gully, Lick Hole Gully and Sheep Station Creek. Yorkers Creek catchment SWQ monitoring includes the reference site in Yorkers Creek and impact sites in Yorkers Creek and New Zealand Gully. Talbingo Reservoir reference site is situated in Talbingo Reservoir, upstream of monitoring sites within the Yarrangobilly River and Yorkers Creek Catchments. This site acts as an overall reference for the SWQ monitoring program.

The SWQ monitoring results for key physical and chemical parameters, including the site-specific trigger values, are presented in Section 5.2.1 and results for dissolved and total metals, including site-specific trigger values, are presented 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

Temperatures in June 2024 within the Yarrangobilly catchment recorded a marginal increase from the prior month to between 4.7 °C and 8.5 °C, refer to Figure 4. In the Talbingo Reservoir, temperatures decreased from 10.1 °C in May to 8.7 °C in June 2024, refer to Figure 5. Meanwhile, temperatures in the Yorkers Creek catchment remained relatively stable, ranging between 3.2 °C and 4.4 °C in June 2024, refer to Figure 6.

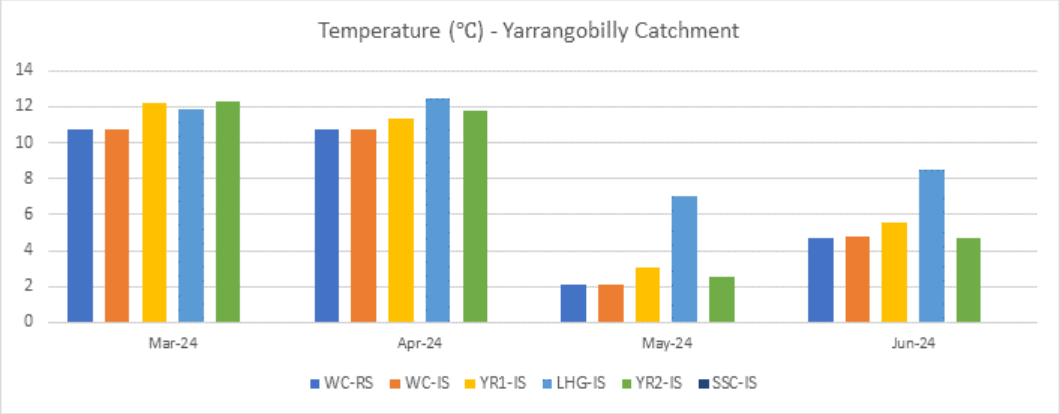

FIGURE 4 : TEMPERATURE FOR YARRANGOBILLY CATCHMENT

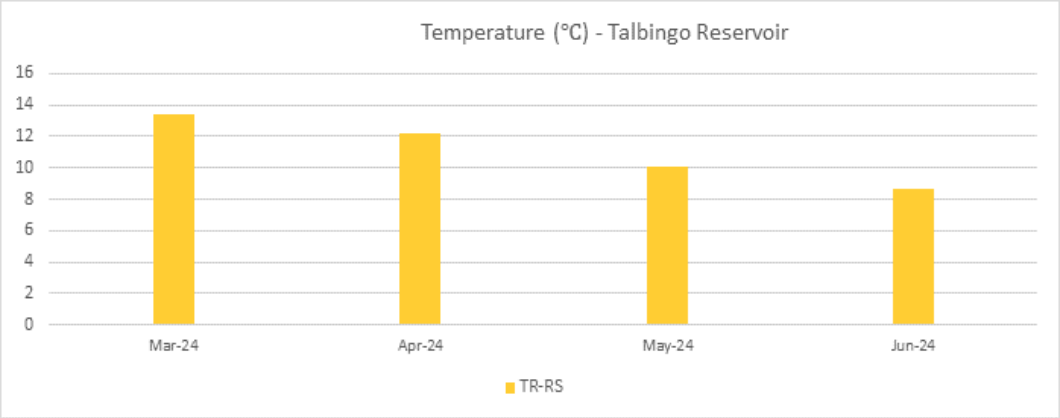

FIGURE 5: TEMPERATURE FOR TALBINGO RESERVOIR

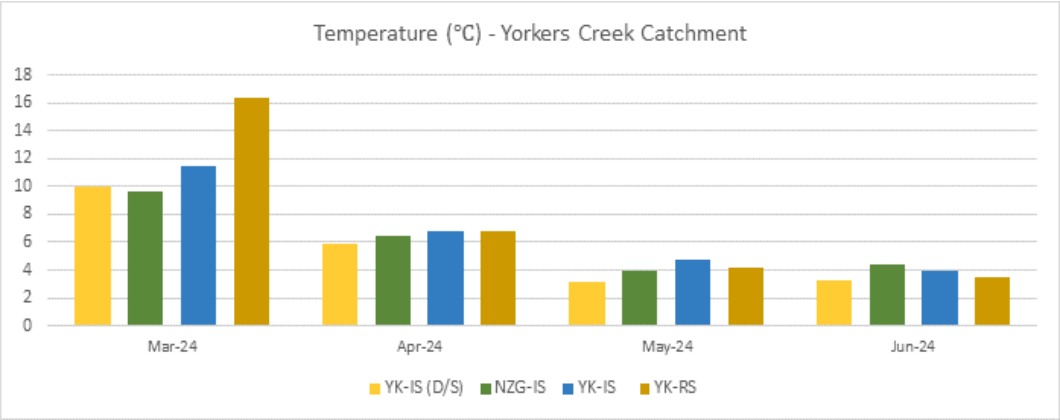

FIGURE 6: TEMPERATURE FOR YORKERS CREEK CATCHMENT

pH

In June 2024, all sites fell within the pH SSGV range (6.5 to 8.0), except for TR-RS (8.32) and NSG-IS (8.14), which slightly exceeded the guideline limits, refer Figure 7 to Figure 9.

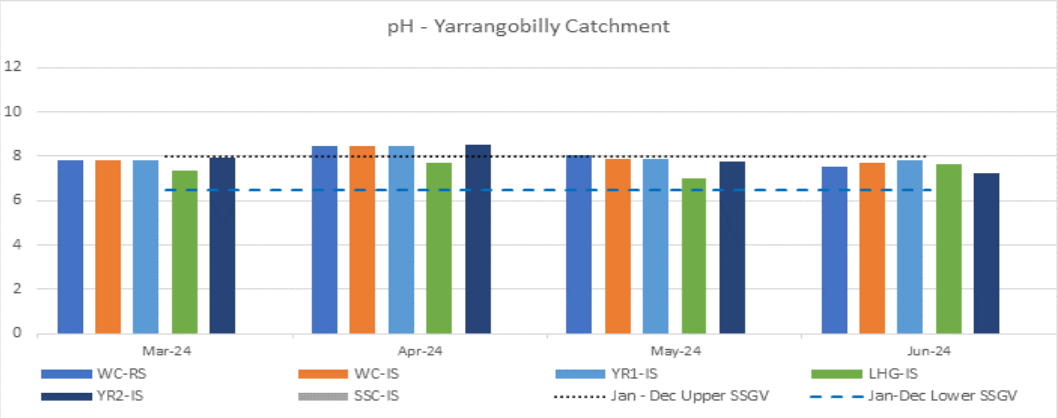

FIGURE 7: PH FOR YARRANGOBILLY CATCHMENT

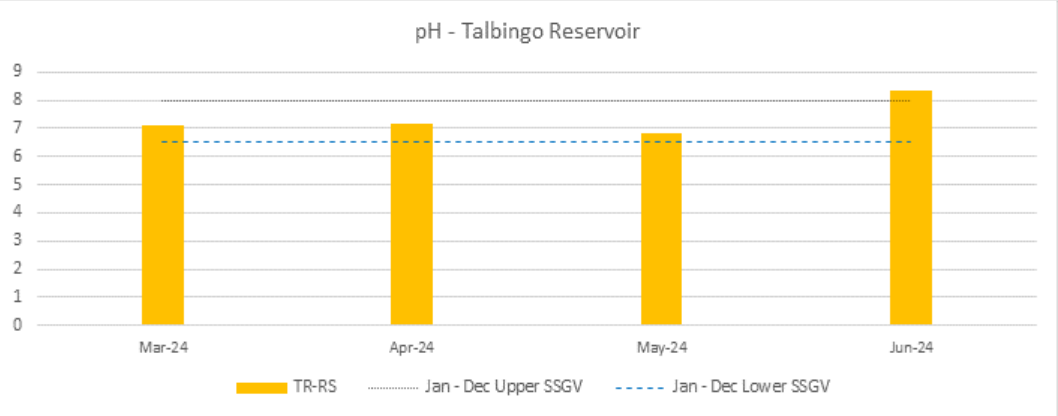

FIGURE 8: PH FOR TALBINGO RESERVOIR

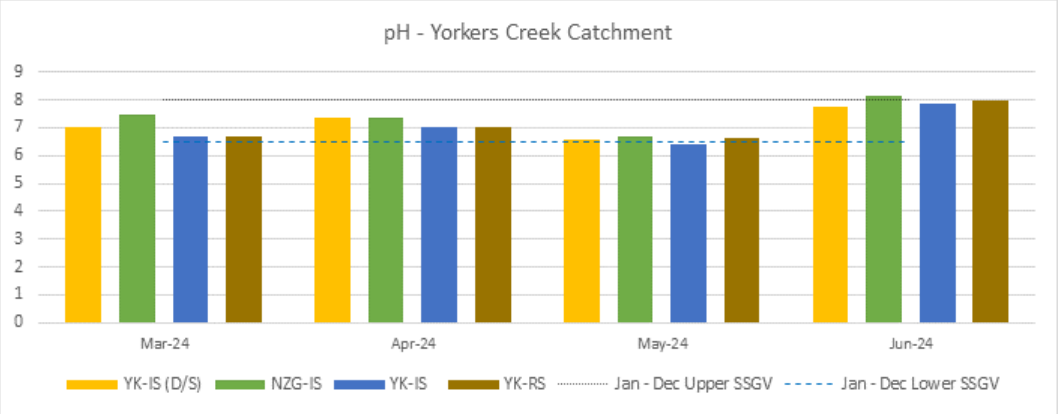

FIGURE 9: PH FOR YORKERS CREEK CATCHMENT

Dissolved Oxygen

DO (%) results in the Yarrangobilly catchment were within the SSGV range (90% to 110%), except for LHG-IS, which increased from May levels to 70.4%, refer Figure 10. In the Talbingo Reservoir, results remained consistent with May, recording 91.6%, which falls within the SSGV, refer Figure 11. All DO% results for the Yorkers Creek Catchment were below the SSGV (refer to Figure 12), aligning with baseline monitoring for this period in 2023.

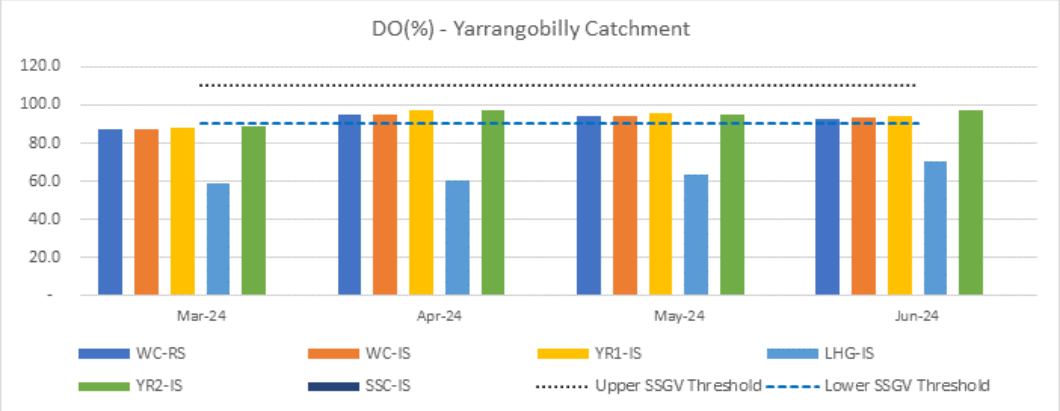

FIGURE 10: DO FOR YARRANGOBILLY CATCHMENT

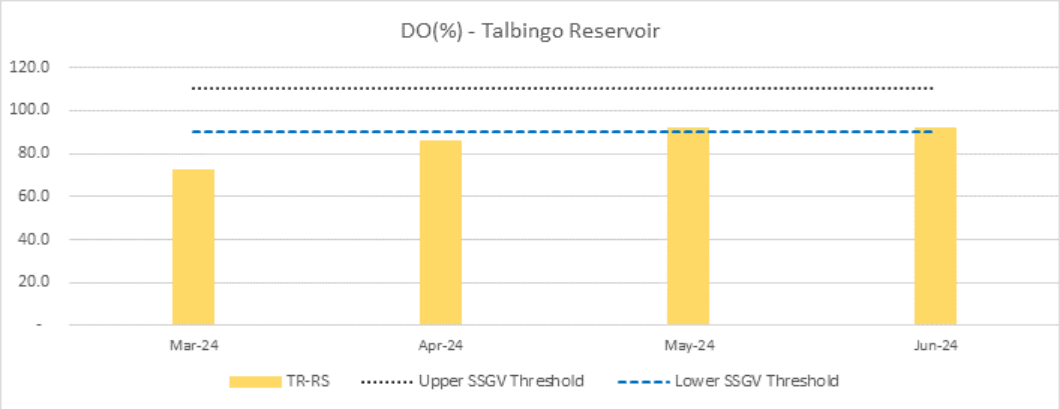

FIGURE 11: DO FOR TALBINGO RESERVOIR

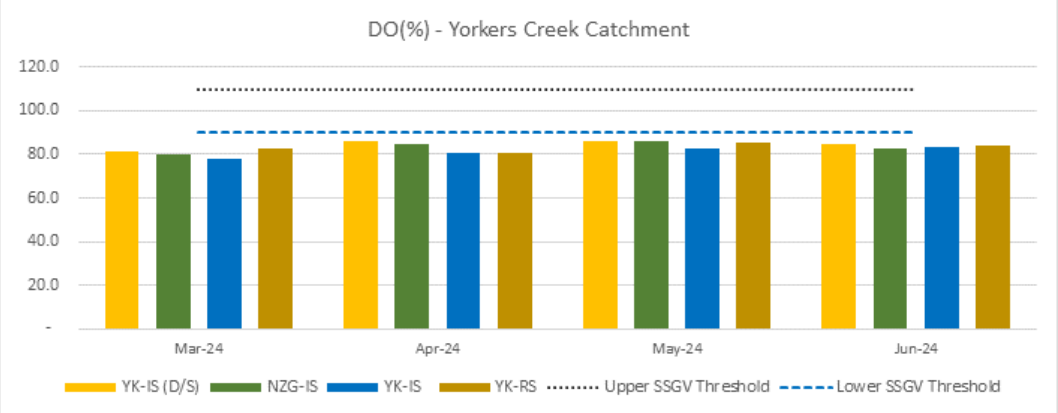

FIGURE 12: DO FOR YORKERS CREEK CATCHMENT

Specific Conductance

SPC (µS/cm) results for the Yarrangobilly catchment indicate that all sites exceeded the June to November SSGV (88 µS/cm), with the reference site (WC-RS) recording a value of 126.8 µS/cm. LHG-IS recorded a significantly higher value of 616 µS/cm (refer to Figure 13), consistent with baseline data for this location. In contrast, Talbingo Reservoir recorded a much lower value of 26.4 µS/cm, remaining within the June–November SSGV (38.7 µS/cm), refer Figure 14. Specific conductance in the Yorkers Creek catchment consistently exceeded the June–November SSGV (27.9 µS/cm), with the reference site (YK-RS) recording 30.1 µS/cm in June 2024. Results for this catchment are consistent with previous months, refer to Figure 15.

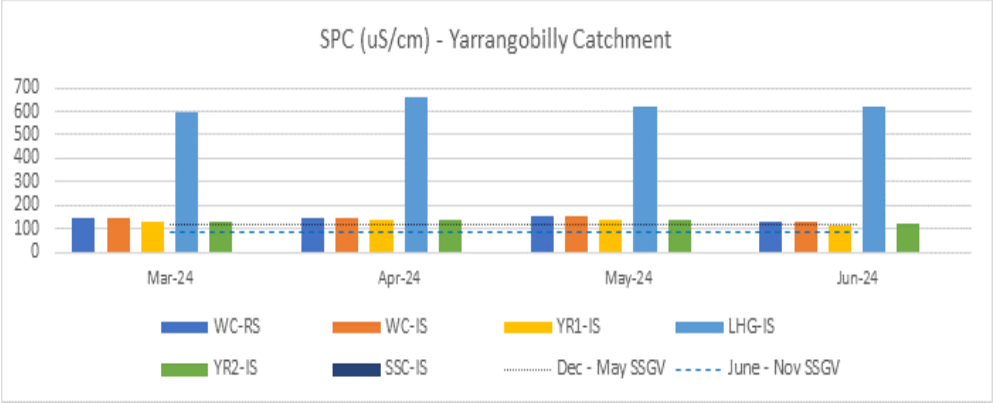

FIGURE 13: SPC FOR YARRANGOBILLY CATCHMENT

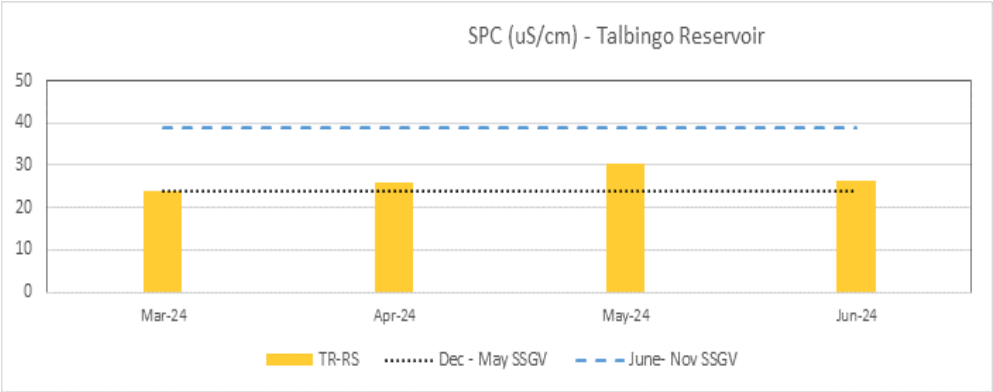

FIGURE 14: SPC FOR TALBINGO RESERVOIR

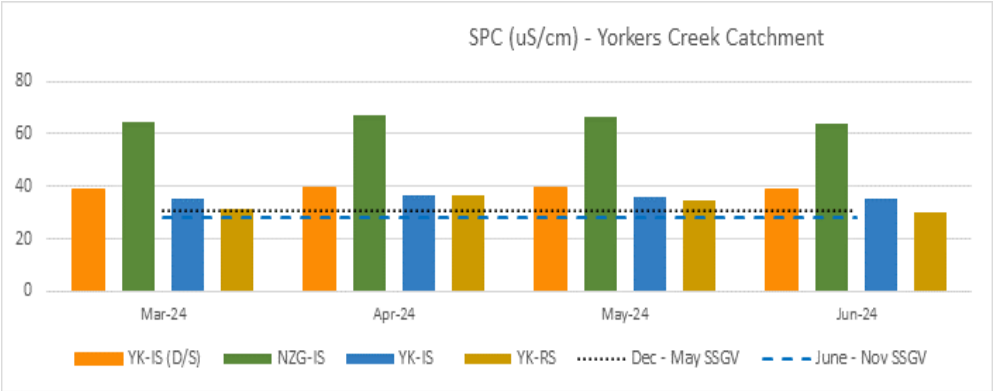

FIGURE 15: SPC FOR YORKERS CREEK CATCHMENT

Turbidity

Turbidity (NTU) levels in the Yarrangobilly Catchment were within the June to November SSGV (5.12), except for LHG-IS, which recorded 10.05 NTU in June. While above the SSGV, this represents a significant reduction compared to May levels, refer Figure 16. Turbidity in the Talbingo Reservoir remained below the LOR in June, refer Figure 17. In the Yorkers Creek catchment, turbidity was within the June to November SSGV (7.87) at YK-IS (D/S) and NZG-IS but exceeded the SSGV at the reference site (YK-RS: 26.48) and impact site (YK-IS), refer Figure 18.

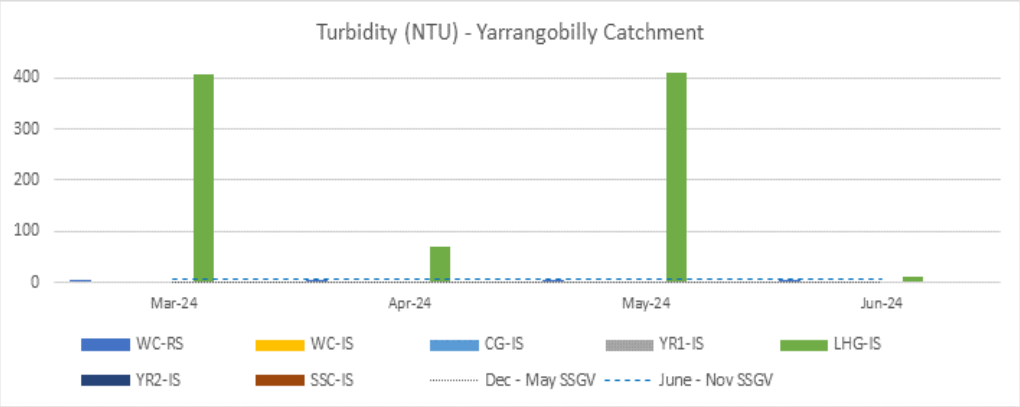

FIGURE 16: TURBIDITY FOR YARRANGOBILLY CATCHMENT

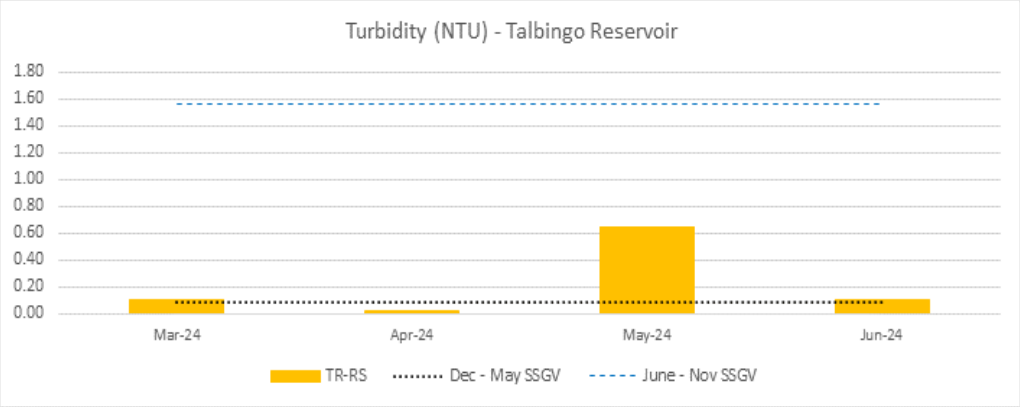

FIGURE 17: TURBIDITY FOR TALBINGO RESERVOIR

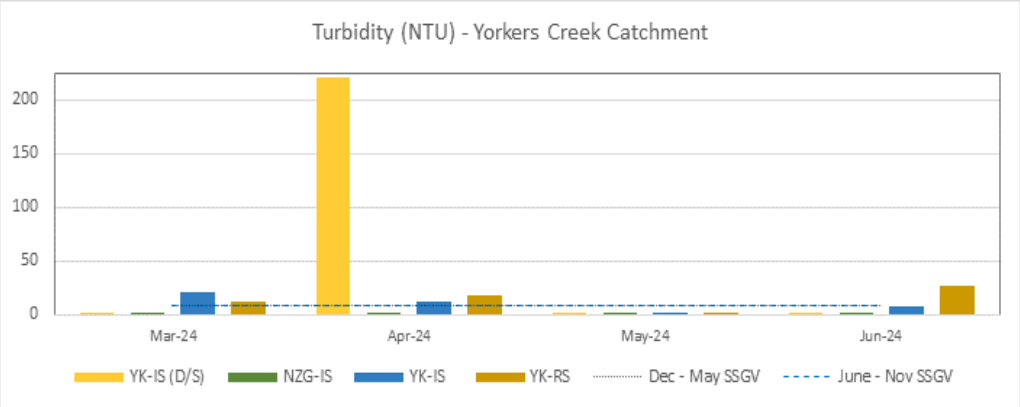

FIGURE 18: TURBIDITY FOR YORKERS CREEK CATCHMENT

Total Suspended Solids

TSS (mg/L) in the Yarrangobilly catchment exceeded the June to November SSGV (1.0 mg/L) at the reference site WC-RS (2.0 mg/L) and the impact site LHG-IS (17 mg/L). While TSS at LHG-IS was moderately higher than May levels, it showed a significant reduction compared to April. All other sites in the Yarrangobilly catchment recorded values below the LOR, refer Figure 19. In Talbingo Reservoir, TSS exceeded the June to November SSGV (0.2 mg/L), recording 2.0 mg/L, which was lower than May results, refer to Figure 20. In the Yorkers Creek catchment, all sites exceeded the June–November SSGV (0.2 mg/L), with NGZ-IS reporting the highest value of 20 mg/L, refer to Figure 21.

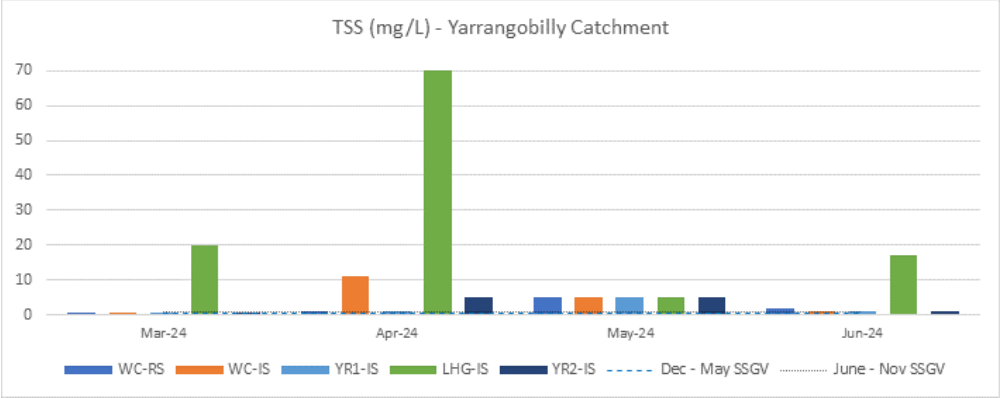

FIGURE 19: TSS FOR YARRANGOBILLY CATCHMENT

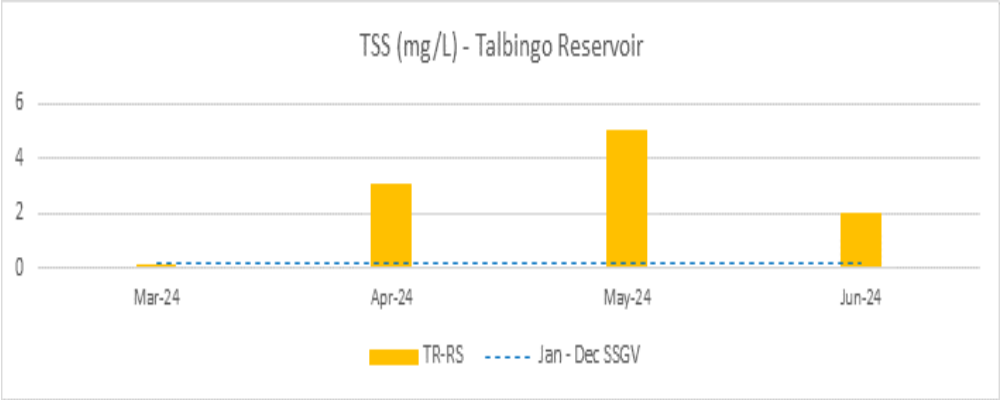

FIGURE 20: TSS FOR TALBINGO RESERVOIR

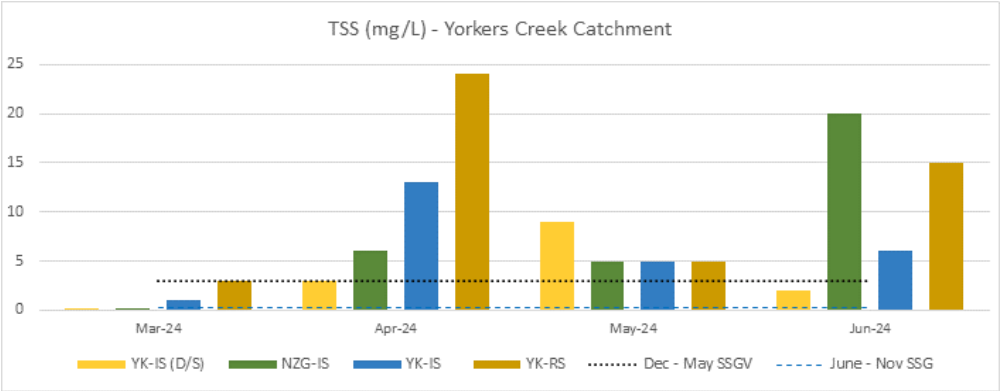

FIGURE 21: TSS FOR YORKERS CREEK CATCHMENT

Ammonia

Ammonia (mg/L) levels were below the LOR at all sites except LHG-IS (0.02 mg/L) and YK-RS (0.02 mg/L), which exceeded the June to November SSGV (0.013 mg/L). Refer to Figure 22 to Figure 24.

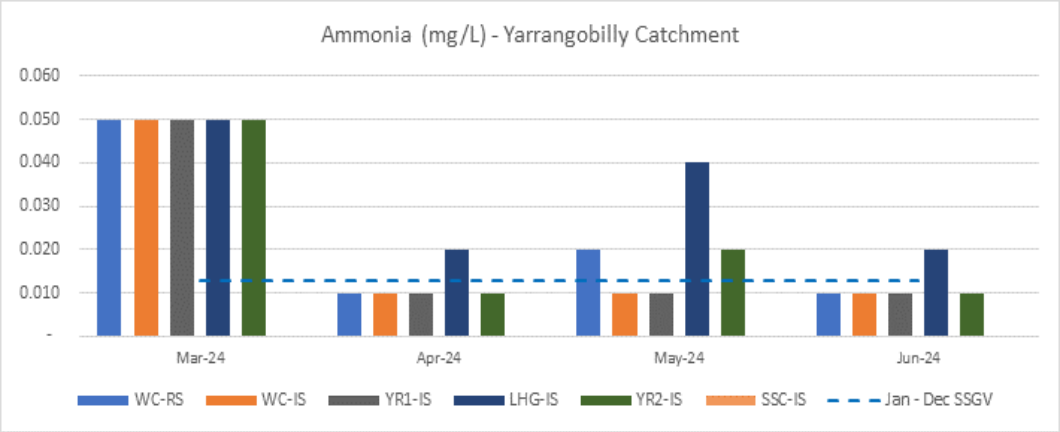

FIGURE 22: AMMONIA FOR YARRANGOBILLY CATCHMENT

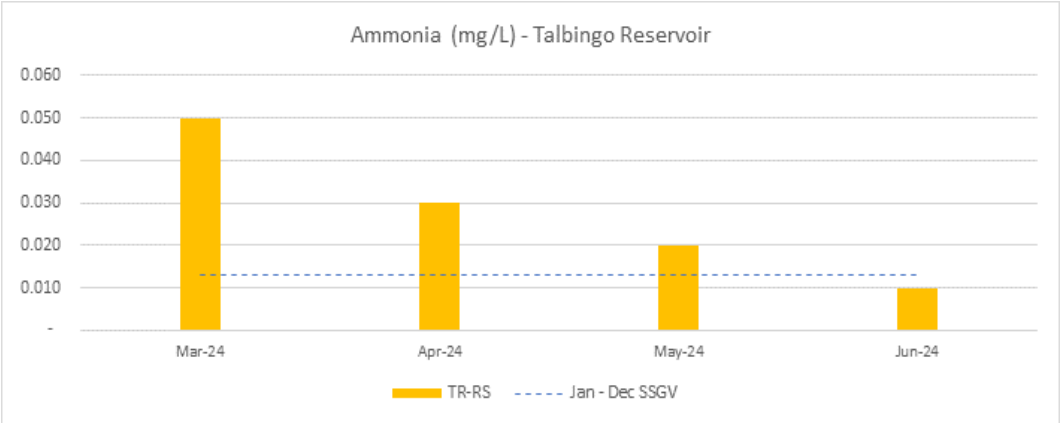

FIGURE 23: AMMONIA FOR TALBINGO RESERVOIR

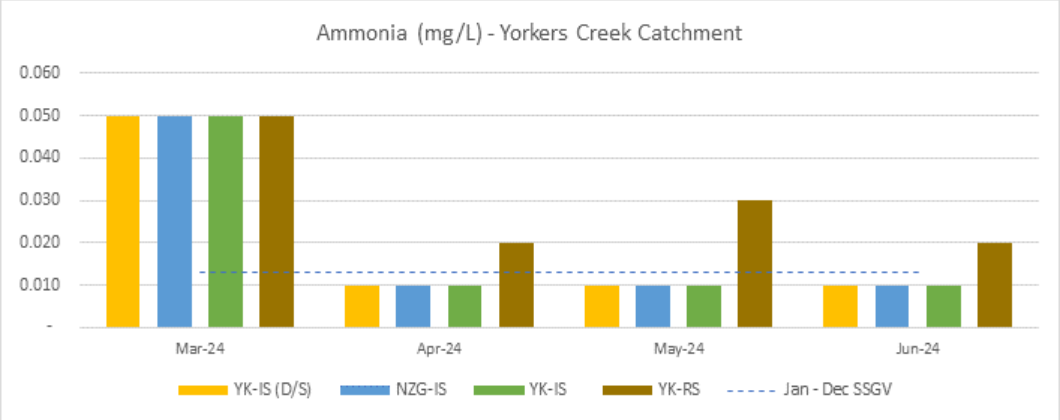

FIGURE 24: AMMONIA FOR YORKERS CREEK CATCHMENT

Nitrogen Oxides

Nitrogen Oxides (mg/L) values exceeded the June to November SSGV (0.015 mg/L) at all reference sites, with Talbingo Reservoir recording a significantly elevated value of 1.92 mg/L. Impact sites WC-IS (0.02 mg/L), LHG-IS (0.02 mg/L), and YK-IS (0.06 mg/L) were slightly above the SSGV, while all other impact sites remained below the LOR. Refer to Figure 25 to Figure 27.

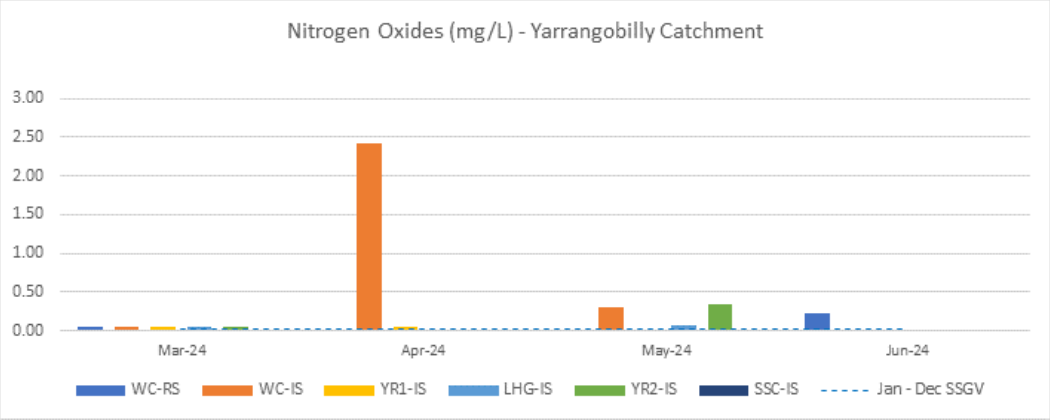

FIGURE 25: NITROGEN OXIDES FOR YARRANGOBILLY CATCHMENT

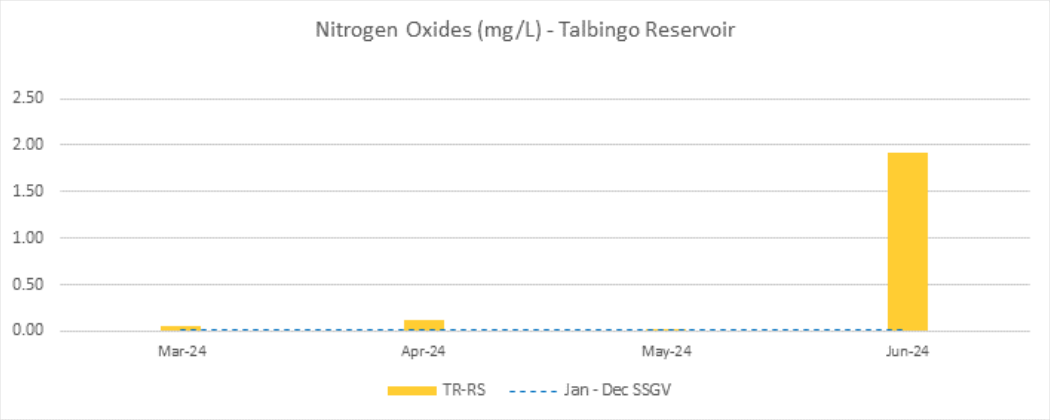

FIGURE 26: NITROGEN OXIDES FOR TALBINGO RESERVOIR

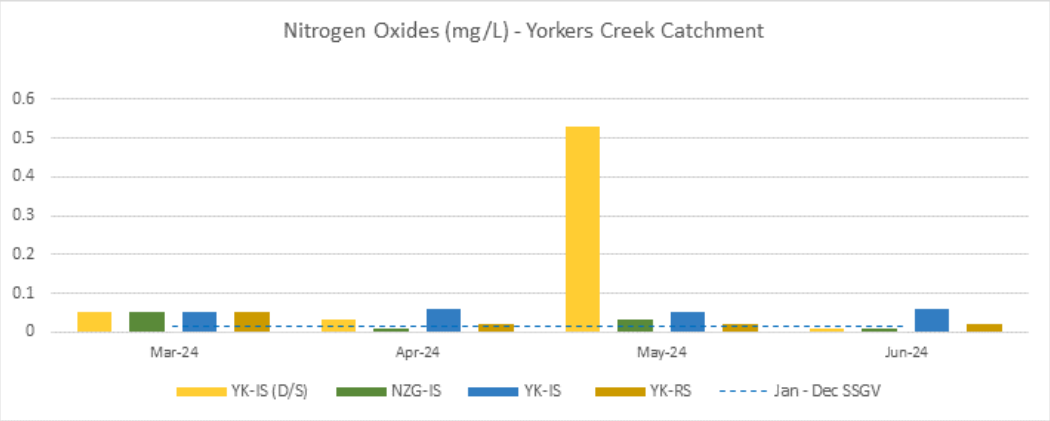

FIGURE 27: NITROGEN OXIDES FOR YORKERS CREEK CATCHMENT

Total Kjeldahl Nitrogen

In the Yarrangobilly catchment, TKN (mg/L) levels were either below the LOR or below the June to November SSGV (0.2 mg/L) at all sites, refer Figure 28. In the Talbingo Reservoir (TR-RS) and Yorkers Creek reference site (YK-RS), levels exceeded the June–November SSGV, while all impact sites remained within the SSGV, refer to Figure 29 and Figure 30.

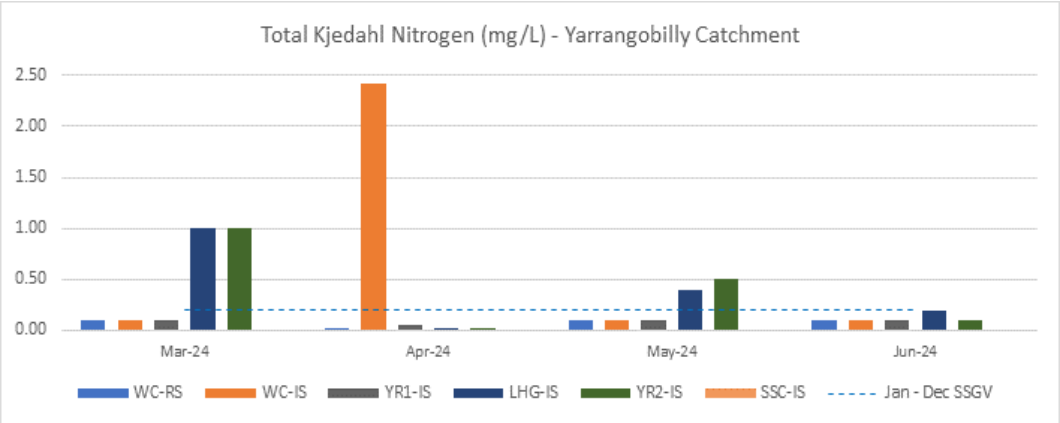

FIGURE 28: TOTAL KJELDAHL NITROGEN FOR YARRANGOBILLY CATCHMENT

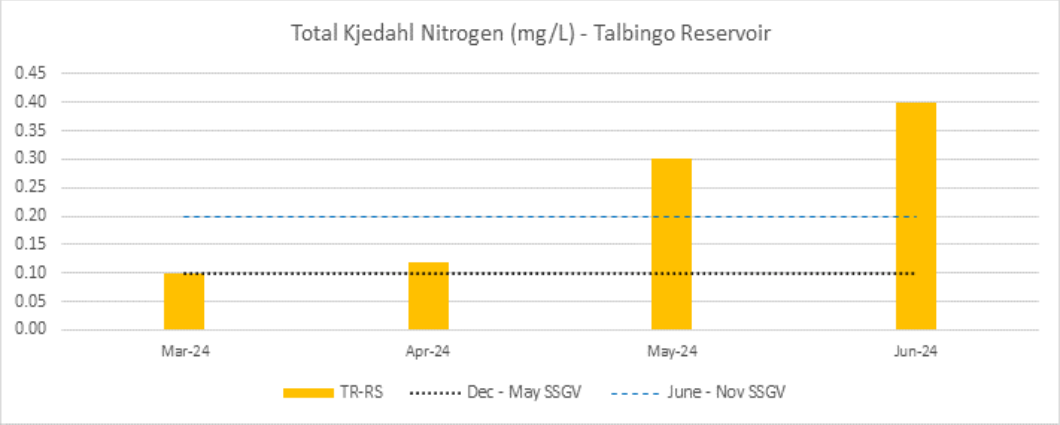

FIGURE 29: TOTAL KJEHAHL NITROGEN FOR TALBINGO RESERVOIR

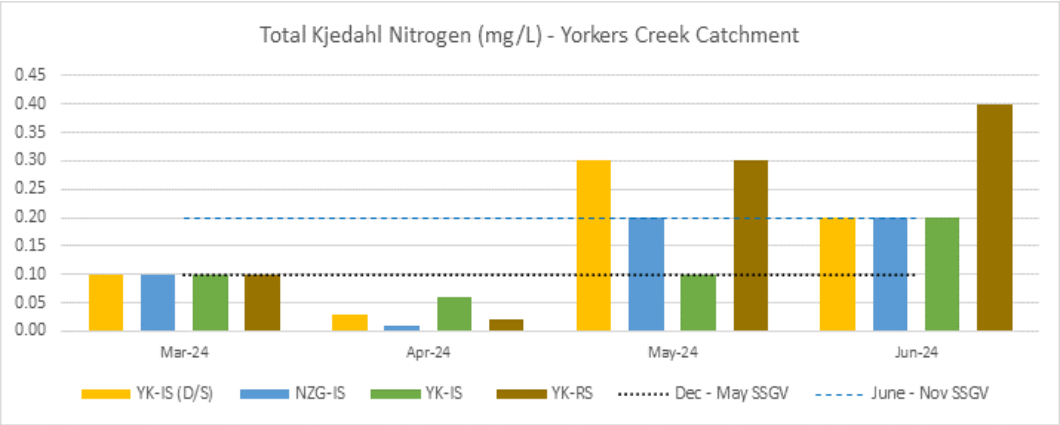

FIGURE 30: TOTAL KJELDAHL NITROGEN FOR YORKERS CREEK CATCHMENT

Reactive Phosphorus

Reactive Phosphorus (mg/L) was below the LOR at all sites except WC-IS (0.04 mg/L), YR1-IS (0.03 mg/L), and YK-RS (0.03 mg/L), which exceeded the June–November SSGV (0.015 mg/L). Refer to Figure 31 to Figure 33.

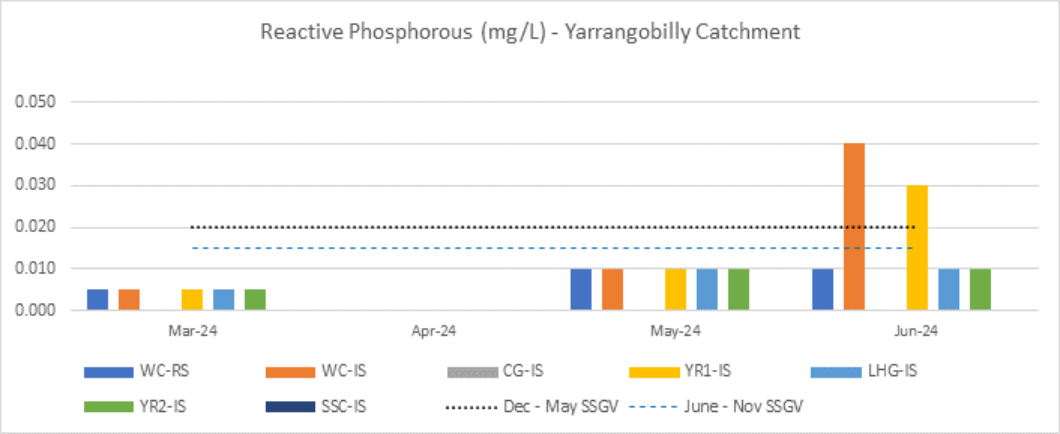

FIGURE 31 REACTIVE PHOSPHOROUS FOR YARRANGOBILLY CATCHMENT

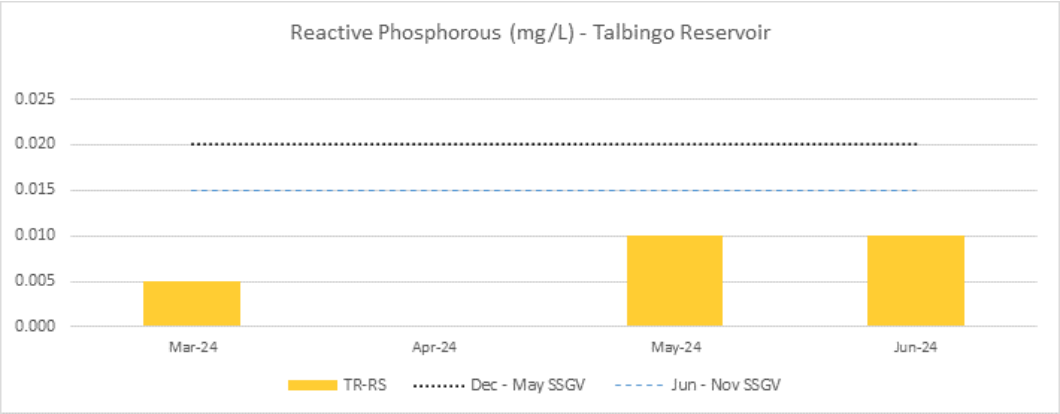

FIGURE 32 REACTIVE PHOSPHOROUS FOR TALBINGO RESERVOIR

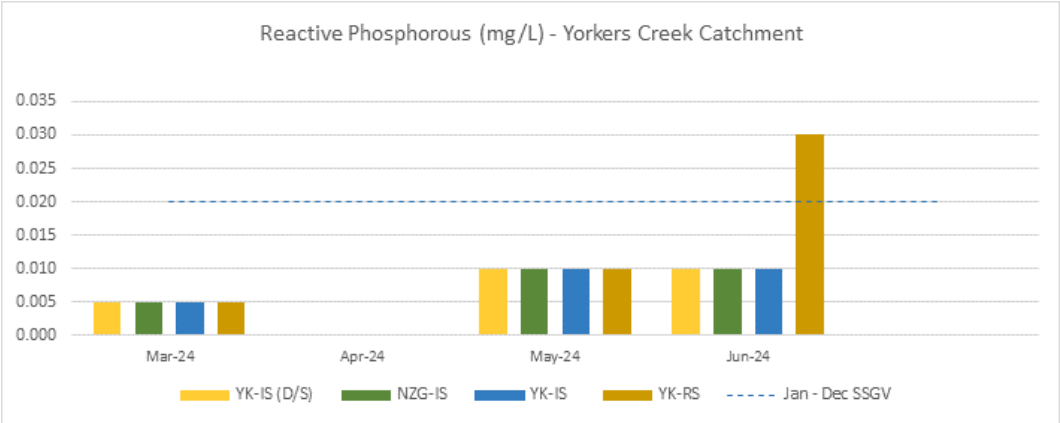

FIGURE 33 REACTIVE PHOSPHOROUS FOR YORKERS CREEK CATCHMENT

Total Hardness

$CaCO_3$ (mg/L) exceeded the June to November SSGV at both reference and impact sites in the Yarrangobilly catchment (SSGV: 30 mg/L) and Yorkers Creek catchment (SSGV: 7 mg/L). LHG-IS recorded a notably high value of 313 mg/L, consistent with previous months. In contrast, Talbingo Reservoir remained below the June to November SSGV (8.0 mg/L), recording 5 mg/L, which aligns with prior observations. Refer to Figure 34 to Figure 36.

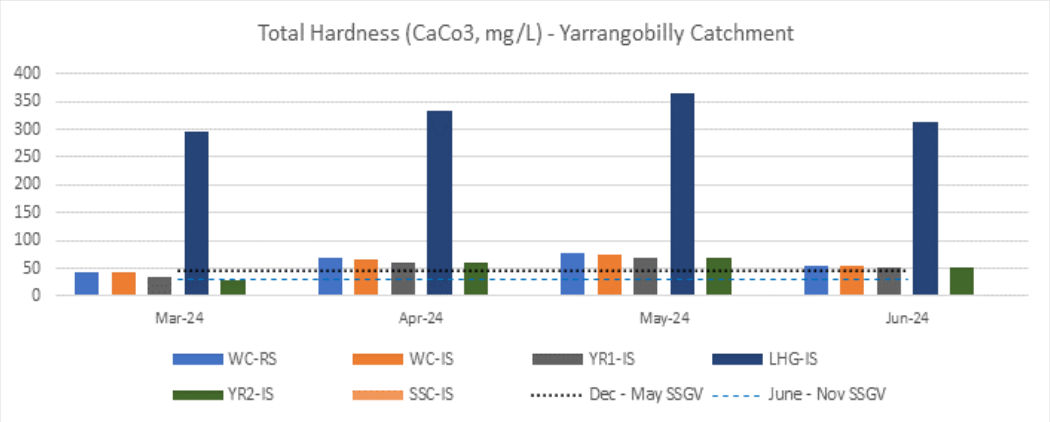

FIGURE 34: TOTAL HARDNESS FOR YARRANGOBILLY CATCHMENT

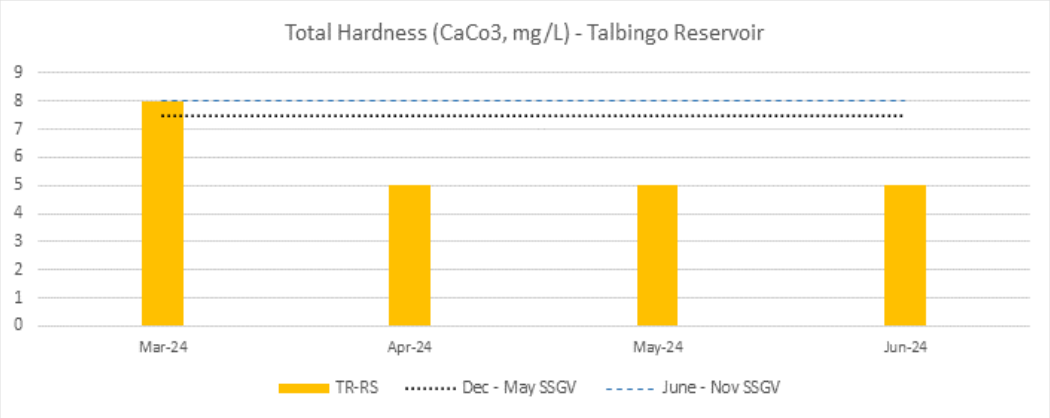

FIGURE 35: TOTAL HARDNESS FOR TALBINGO RESERVOIR

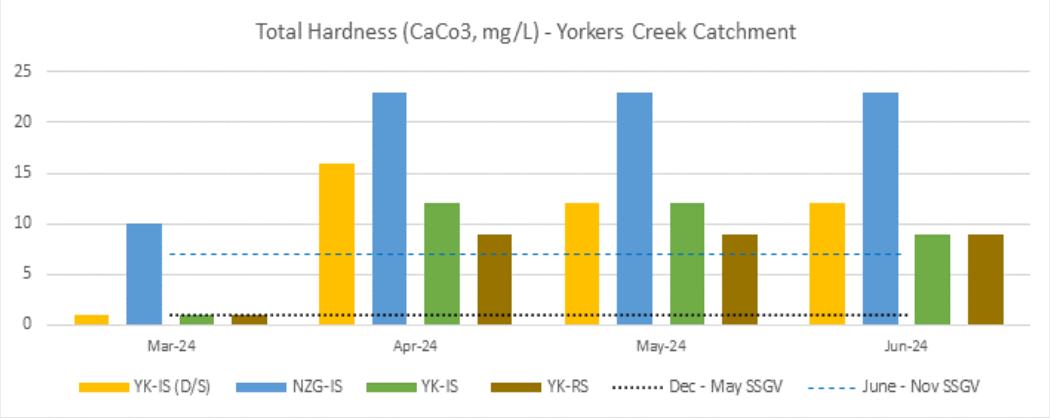

FIGURE 36: TOTAL HARDNESS FOR YORKERS CREEK CATCHMENT

Total Nitrogen

TN (mg/L) values were below the LOR or the June–November SSGV (0.2 mg/L) at all sites in the Yarrangobilly and Yorkers Creek catchments, except for reference site YK-RS (0.4 mg/L) and impact site YK-IS (0.3 mg/L), which were slightly above the SSGV. In contrast, Talbingo Reservoir recorded a significantly higher value of 2.3 mg/L. Refer to Figure 37 to Figure 39.

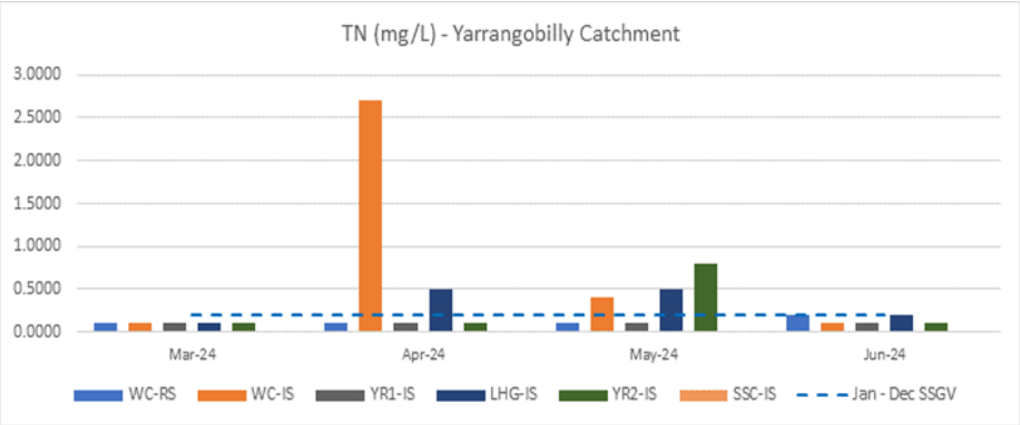

FIGURE 37: TOTAL NITROGEN FOR YARRANGOBILLY CATCHMENT

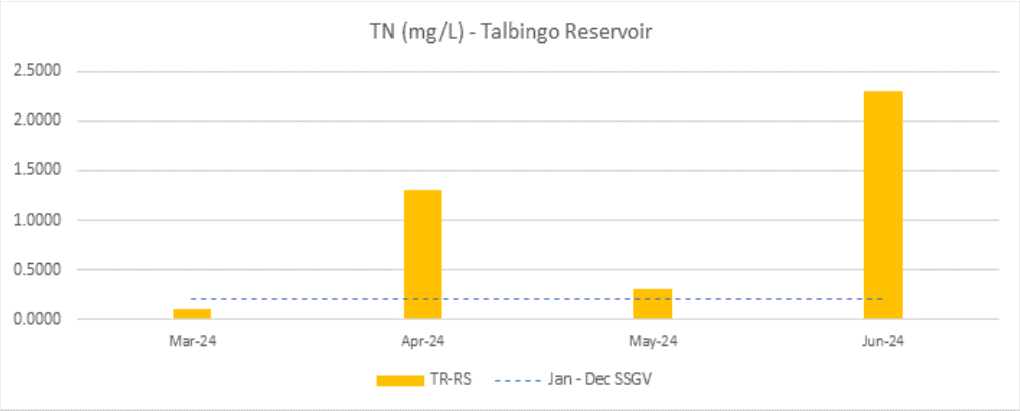

FIGURE 38: TOTAL NITROGEN FOR TALBINGO RESERVOIR

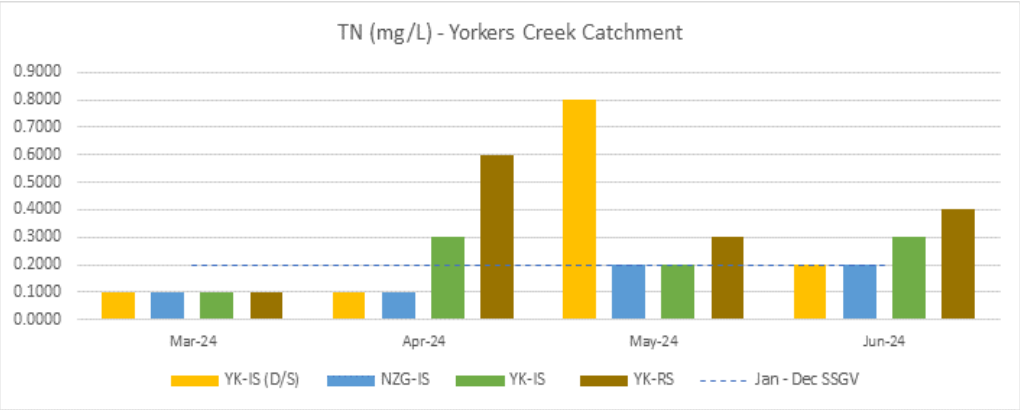

FIGURE 39: TOTAL NITROGEN FOR YORKERS CREEK CATCHMENT

Total Phosphorous

TP (mg/L) values were either below the LOR or the June to November SSGV (0.02 mg/L) at all sites, except for LHG-IS, YK-RS, and YK-IS (D/S), which each recorded 0.04 mg/L, as well as YK-IS (0.3 mg/L) and NZG-IS (0.07 mg/L). These exceedances were slightly above the SSGV and consistent with May results. Refer to Figure 40 to Figure 42.

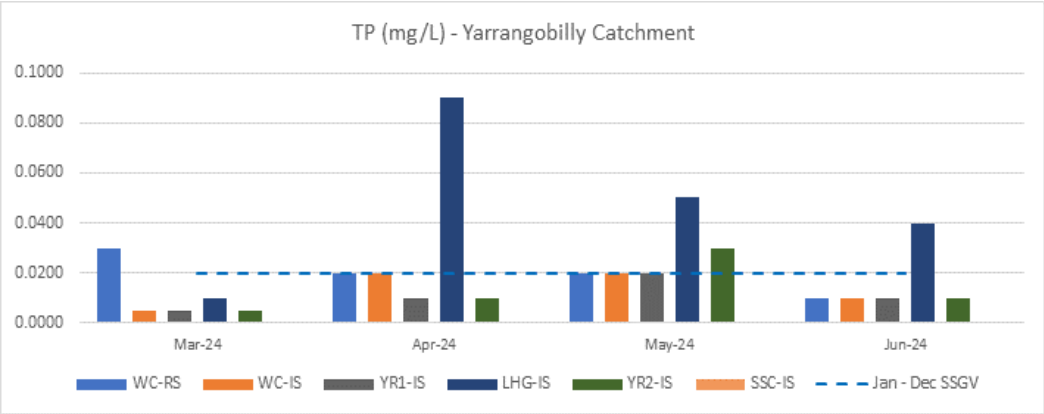

FIGURE 40: TOTAL PHOSPHOROUS FOR YARRANGOBILLY CATCHMENT

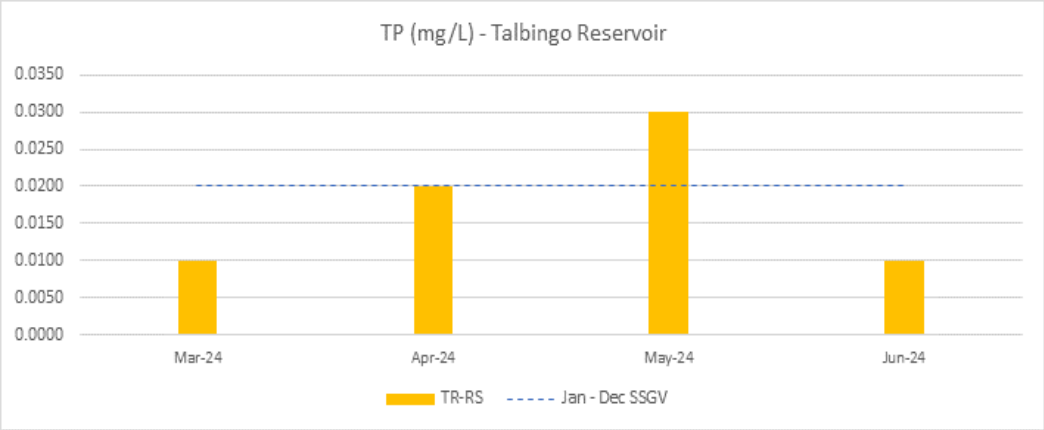

FIGURE 41: TOTAL PHOSPHOROUS FOR TALBINGO RESERVOIR

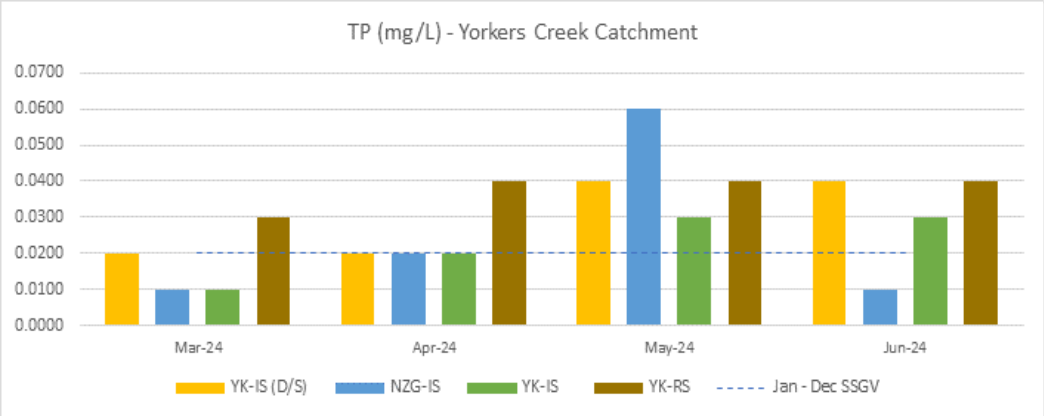

FIGURE 42: TOTAL PHOSPHOROUS FOR YORKERS CREEK CATCHMENT

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	YR1-IS	0.14	0.03	Fe (mg/L) levels were above the SSGV at YR1-IS and significantly exceeded the SSGV at LHG-IS. However, Fe values at LHG-IS showed a reduction from April (0.71 mg/L). All other sites across the catchments were either below the LOR or within the respective SSGV.
	LHG-IS	0.48		
Mn	WC-RS	0.005	0.002	The June to November SSGV for Mn (mg/L) was exceeded at all reference sites and several impact sites. Notably, most sites with exceedances in June recorded lower values compared to May, except for TR-RS, which showed a slight increase.
	WC-IS	0.004		
	YR1-IS	0.003		
	LHG-IS	0.158		
	YR2-IS	0.003		
	TR-RS	0.010		
	YK-RS	0.021	0.003	
	YK-IS (D/S)	0.009		
	NZG-IS	0.005		
	YK-IS	0.010		

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	YR1-IS	0.03	0.027	Al (mg/L) levels exceeded the DGV at YR1-IS and LHG-IS in the Yarrangobilly catchment. Similarly, the reference sites in Talbingo Reservoir (TR-RS) and Yorkers Creek (YC-RS), along with all impact sites in the Yorkers Creek Catchment, also recorded exceedances.
	LHG-IS	0.38		
	TR-RS	0.03		
	YC-RS	0.23		
	YK-IS (D/S)	0.48		
	NZG-IS	0.12		
	YC-IS	0.32		
As	LH-G	0.002	0.008	The DGV for As (mg/L) was exceeded at LHG-IS. All other sites were below the LOR.
Fe	LHG-IS	1.54	0.3	In the Yarrangobilly Catchment, all sites recorded Fe (mg/L) levels below the DGV or LOR, except for LHG-IS, which significantly exceeded the DGV. In the Yorkers Creek Catchment, all sites recorded Fe levels above the DGV.
	YK-RS	0.50		
	YK-IS (D/S)	0.66		
	NZG-IS	0.67		
	YK-IS	0.42		

5.3. Discussion

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

- Construction activities on the transmission line were paused in June due to the winter shutdown. Maintenance on erosion and sediment controls were undertaken on an as needed basis.
- 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.
- Lick Hole Gully (LHG-IS) within the Yarrangobilly catchment was observed as being shallow with high silt deposition and low flow at the time of sampling. LGH-IS consistently recorded higher values across multiple parameters.
- Many of the results are recorded as below (<) the LOR.

- The SSGV/DGV for a number of parameters is below (<) than the LOR from the laboratory.
- June exhibited slightly increasing temperatures in Yarrangobilly, steady levels in Yorkers Creek, and further cooling in Talbingo Reservoir.
- In May, LHG-IS in Yarrangobilly recorded low DO% (63.3%), while June showed a slight improvement to 70.4%.
- Yorkers Creek consistently recorded DO levels below the SSGV, as per previous months.
- Specific conductance levels remained high at LHG-IS (618 µS/cm), as per previous months.
- TSS values increased in June compared to May, with higher levels observed at LHG-IS (17 mg/L) and NGZ-IS (20 mg/L) compared to 9 mg/L at YK-IS (D/S) in May.
- TN increased significantly in June at Talbingo Reservoir (2.3 mg/L) compared to May, while phosphorus exceedances remained similar across months.
- Fe levels remained elevated at LHG-IS, but Mn levels showed improvement in June compared to May.

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.

In June 2024, temperatures in the Yarrangobilly catchment slightly increased compared to May, ranging from 4.7 °C to 8.5 °C, while temperatures in Talbingo Reservoir decreased to 8.7 °C. Temperatures in the Yorkers Creek catchment remained stable, ranging from 3.2 °C to 4.4 °C. pH values at most sites fell within the SSGV range (6.5–8.0), except TR-RS and NSG-IS, which slightly exceeded the guideline.

DO (%) levels were mostly within the SSGV (90–110%) across the Yarrangobilly catchment, except for LHG-IS, which recorded 70.4%. Talbingo Reservoir maintained SSGV compliance, while Yorkers Creek sites were consistently below the SSGV, reflecting baseline trends.

SPC exceeded SSGVs at all sites in Yarrangobilly, with LHG-IS recording 616 µS/cm, while Talbingo Reservoir remained compliant at 26.4 µS/cm. Yorkers Creek also exceeded SSGVs, with YK-RS reaching 30.1 µS/cm, consistent with previous months.

Turbidity levels were generally within SSGVs, except for elevated values at LHG-IS in Yarrangobilly and YK-RS in Yorkers Creek. TSS levels exceeded SSGVs in Yarrangobilly and Yorkers Creek catchments, with notable values at LHG-IS (17 mg/L) and NGZ-IS (20 mg/L). Talbingo Reservoir recorded lower TSS levels (2.0 mg/L) compared to May.

Ammonia exceeded SSGVs at LHG-IS and YK-RS, while nitrogen oxides were above SSGVs at reference sites and marginally higher at specific impact sites.

Reactive phosphorus levels exceeded SSGVs at WC-IS, YR1-IS, and YK-RS, while total hardness exceeded SSGVs across most sites, with LHG-IS notably high at 313 mg/L. Talbingo Reservoir maintained levels below the SSGV.

TN exceeded SSGVs at YK-RS and YK-IS in Yorkers Creek and was significantly higher in Talbingo Reservoir (2.3 mg/L). Total phosphorus levels exceeded SSGVs at several sites, with consistent trends compared to May.

Dissolved metals such as Fe and Mn exceeded SSGVs at several sites, though Mn levels showed improvement compared to May. For total metals, Al exceeded DGVs at multiple sites, and Fe levels were significantly elevated at LHG-IS and all sites in the Yorkers Creek catchment.

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Appendix A: Field Sheet (UGL, 2024a)

Water Quality Monitoring Field Data Sheet

UGL

ate: 25th & 26th June **Sample Run:** 4C **Sampling Purpose:** Monthly Water 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
YR2-IS	East	10:00	4.7		97.1	118.6	7.24	0.00			Minimal surface flow
[illegible]-RS	East	10:20	4.7		92.9	126.8	7.51	0.56			Wet rocks indicating recent rainfall
[illegible]-IS	East	10:40	4.8		93.3	126.7	7.72	0.35			Very clear, clearer than previous minutes
YR1-IS	East	11:20	5.6		94.3	112.4	7.8	1.94			
LHG-IS	East	12:00	8.5		70.4	616	7.65	10.05			High silt deposition
SSC-IS	East	12:30									DRY
CG-IS	East	13:00									DRY
TR-RS	Reservoir	15:00	8.7		91.6	26.4	8.32	0.10			Very light rain
YK-RS	West	0700	3.5		84.2	30.1	7.99	26.48			Settled sediment, mud tracking from fauna on banks
YK-IS	West	0730	3.9		83.1	35.1	7.88	7.99			
YK-D(d/s)	West	0800	3.2		84.6	38.9	7.76	2.46			
NZG-IS	West	0830	4.4		82.7	64.1	8.14	0.89			Solid flow, fauna tracks on 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	: **ES2421627**	Page	: 1 of 11
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: CAMILLE PALMER	Contact	: Customer Services ES
Address	: Cnr Hill Rd & Pondage Link Rd HOMEBUSH BAY 2127	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 3200-0645	Date Samples Received	: 02-Jul-2024 08:00
Order number	: -	Date Analysis Commenced	: 02-Jul-2024
C-O-C number	: 69296	Issue Date	: 10-Jul-2024 16:01
Sampler	: CAMILLE PALMER		
Site	: Snowy 2.0 Connection WQM June 2024		
Quote number	: ES24UGLLIM0001_V3		
No. of samples received	: 13		
No. of samples analysed	: 13		

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
Wisam Marassa	Inorganics Coordinator	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.
- 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: SURFACE WATER (Matrix: WATER)			Sample ID	NZG_IS	WC-RS	WC-IS	YR1-IS	LHG-IS
			Sampling date / time	25-Jun-2024 13:16	25-Jun-2024 13:56	25-Jun-2024 14:14	25-Jun-2024 15:11	25-Jun-2024 15:36
Compound	CAS Number	LOR	Unit	ES2421627-001	ES2421627-002	ES2421627-003	ES2421627-004	ES2421627-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.94	7.24	6.78	7.22	7.98
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	118	126	126	113	610
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	76	81	81	68	339
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	1	mg/L	<1	2	<1	<1	17
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.9	1.1	1.1	0.7	18.8
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	51	53	53	51	313
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	<0.01	<0.01	0.02	<0.01
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	<0.005
Manganese	7439-96-5	0.001	mg/L	0.003	0.005	0.004	0.003	0.158
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.14	0.48
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	<0.01	<0.01	0.03	0.38
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	NZG_IS	WC-RS	WC-IS	YR1-IS	LHG-IS
			Sampling date / time	25-Jun-2024 13:16	25-Jun-2024 13:56	25-Jun-2024 14:14	25-Jun-2024 15:11	25-Jun-2024 15:36
Compound	CAS Number	LOR	Unit	ES2421627-001	ES2421627-002	ES2421627-003	ES2421627-004	ES2421627-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued								
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	<0.005
Manganese	7439-96-5	0.001	mg/L	**0.002**	**0.007**	**0.005**	<0.001	**0.282**
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	**1.54**
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	0.002	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.01**	**0.01**	<0.01	<0.01	**0.02**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.23**	**0.02**	<0.01	**0.02**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.23**	**0.02**	<0.01	**0.02**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	**0.1**	**0.1**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	**0.2**	**0.1**	**0.1**	**0.2**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	**0.01**	<0.01	**0.04**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	NZG_IS	WC-RS	WC-IS	YR1-IS	LHG-IS
			Sampling date / time	25-Jun-2024 13:16	25-Jun-2024 13:56	25-Jun-2024 14:14	25-Jun-2024 15:11	25-Jun-2024 15:36
Compound	CAS Number	LOR	Unit	ES2421627-001	ES2421627-002	ES2421627-003	ES2421627-004	ES2421627-005
				Result	Result	Result	Result	Result
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	**0.04**	**0.03**	<0.01
EP025: Oxygen - Dissolved (DO)								
Dissolved Oxygen	----	0.1	mg/L	**10.9**	**10.4**	**10.6**	**10.3**	**9.7**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	TR-RS Light rain during sampling	YK-RS_Replicate1	YK-RS_Replicate 2	YK-IS	YK-IS(d/s)
			Sampling date / time	26-Jun-2024 09:04	26-Jun-2024 09:57	26-Jun-2024 10:05	26-Jun-2024 10:24	26-Jun-2024 10:49
Compound	CAS Number	LOR	Unit	ES2421627-006	ES2421627-007	ES2421627-008	ES2421627-009	ES2421627-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.90	7.50	7.09	6.99	6.97
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	27	34	33	35	39
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	17	21	18	19	25
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	1	mg/L	2	15	12	6	2
EA045: Turbidity								
Turbidity	----	0.1	NTU	1.1	13.7	12.8	9.4	4.8
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	5	9	9	9	12
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.09	0.11	0.08	0.06
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	<0.005
Manganese	7439-96-5	0.001	mg/L	0.010	0.021	0.021	0.010	0.009
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	0.18	0.19	0.15	0.10
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.03	0.23	0.15	0.32	0.48
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	TR-RS Light rain during sampling	YK-RS_Replicate1	YK-RS_Replicate 2	YK-IS	YK-IS(d/s)
			Sampling date / time	26-Jun-2024 09:04	26-Jun-2024 09:57	26-Jun-2024 10:05	26-Jun-2024 10:24	26-Jun-2024 10:49
Compound	CAS Number	LOR	Unit	ES2421627-006	ES2421627-007	ES2421627-008	ES2421627-009	ES2421627-010
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS - Continued								
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	<0.005
Manganese	7439-96-5	0.001	mg/L	**0.056**	**0.032**	**0.026**	**0.014**	**0.027**
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	**0.07**	**0.50**	**0.39**	**0.42**	**0.66**
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	0.002	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.01**	**0.02**	**0.02**	**0.01**	<0.01
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**1.92**	**0.02**	**0.02**	**0.06**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**1.92**	**0.02**	**0.02**	**0.06**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.4**	**0.4**	**0.3**	**0.2**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**2.3**	**0.4**	**0.3**	**0.3**	**0.2**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	TR-RS Light rain during sampling	YK-RS_Replicate1	YK-RS_Replicate 2	YK-IS	YK-IS(d/s)
			Sampling date / time	26-Jun-2024 09:04	26-Jun-2024 09:57	26-Jun-2024 10:05	26-Jun-2024 10:24	26-Jun-2024 10:49
Compound	CAS Number	LOR	Unit	ES2421627-006	ES2421627-007	ES2421627-008	ES2421627-009	ES2421627-010
				Result	Result	Result	Result	Result
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	**0.04**	**0.04**	**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**	**0.03**	**0.02**	**0.01**	**0.01**
EP025: Oxygen - Dissolved (DO)								
Dissolved Oxygen	----	0.1	mg/L	**10.4**	**10.7**	**10.7**	**10.6**	**10.7**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	NZG-IS	Spring	Blank	----	----
			Sampling date / time	26-Jun-2024 15:31	26-Jun-2024 15:52	27-Jun-2024 15:58	----	----
Compound	CAS Number	LOR	Unit	ES2421627-011	ES2421627-012	ES2421627-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.01**	**7.20**	**7.24**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**64**	**84**	<1	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**38**	**46**	<10	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	1	mg/L	**20**	<1	<1	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**8.3**	**1.9**	<0.1	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**23**	**25**	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	<0.01	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.002**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L	**0.005**	**0.017**	<0.001	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Iron	7439-89-6	0.05	mg/L	**0.07**	<0.05	<0.05	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.12**	**0.02**	<0.01	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	NZG-IS	Spring	Blank	----	----
			Sampling date / time	26-Jun-2024 15:31	26-Jun-2024 15:52	27-Jun-2024 15:58	----	----
Compound	CAS Number	LOR	Unit	ES2421627-011	ES2421627-012	ES2421627-013	--------	--------
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS - Continued								
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.002**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L	**0.037**	**0.018**	<0.001	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Iron	7439-89-6	0.05	mg/L	**0.67**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<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	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	0.002	mg/L	<0.002	<0.002	<0.002	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	**0.02**	<0.01	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	**0.03**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.03**	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	<0.1	<0.1	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.2**	<0.1	<0.1	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.07**	**0.03**	<0.01	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	NZG-IS	Spring	Blank	----	----
			Sampling date / time	26-Jun-2024 15:31	26-Jun-2024 15:52	27-Jun-2024 15:58	----	----
Compound	CAS Number	LOR	Unit	ES2421627-011	ES2421627-012	ES2421627-013	--------	--------
				Result	Result	Result	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**0.02**	<0.01	**----**	**----**
EP025: Oxygen - Dissolved (DO)								
Dissolved Oxygen	----	0.1	mg/L	**10.3**	**10.7**	**10.3**	**----**	**----**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2421627**	Page	: 1 of 14
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: CAMILLE PALMER	Telephone	: +61-2-8784 8555
Project	: 3200-0645	Date Samples Received	: 02-Jul-2024
Site	: Snowy 2.0 Connection WQM June 2024	Issue Date	: 10-Jul-2024
Sampler	: CAMILLE PALMER	No. of samples received	: 13
Order number	: -	No. of samples analysed	: 13

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.**
- **NO Matrix Spike outliers occur.**
- **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 : 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
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	05-Jul-2024	25-Jun-2024	**10**
Clear Plastic Bottle - Natural TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	----	----	----	05-Jul-2024	26-Jun-2024	**9**
Clear Plastic Bottle - Natural Blank	----	----	----	05-Jul-2024	27-Jun-2024	**8**
EA045: Turbidity						
Clear Plastic Bottle - Natural NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	02-Jul-2024	27-Jun-2024	**5**
Clear Plastic Bottle - Natural TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	----	----	----	02-Jul-2024	28-Jun-2024	**4**
Clear Plastic Bottle - Natural Blank	----	----	----	02-Jul-2024	29-Jun-2024	**3**
EK026SF: Total CN by Segmented Flow Analyser						
Black Opaque Plastic Bottle - NaOH NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	10-Jul-2024	09-Jul-2024	**1**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	04-Jul-2024	27-Jun-2024	**7**
Clear Plastic Bottle - Natural TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	----	----	----	04-Jul-2024	28-Jun-2024	**6**

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
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural Blank	----	----	----	04-Jul-2024	29-Jun-2024	**5**
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	05-Jul-2024	27-Jun-2024	**8**
Clear Plastic Bottle - Natural NZG-IS	----	----	----	04-Jul-2024	28-Jun-2024	**6**
Clear Plastic Bottle - Natural TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), Spring	----	----	----	05-Jul-2024	28-Jun-2024	**7**
Clear Plastic Bottle - Natural Blank	----	----	----	04-Jul-2024	29-Jun-2024	**5**
EP025: Oxygen - Dissolved (DO)						
Clear Plastic Bottle - Natural NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	----	----	----	02-Jul-2024	25-Jun-2024	**7**
Clear Plastic Bottle - Natural TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	----	----	----	02-Jul-2024	26-Jun-2024	**6**
Clear Plastic Bottle - Natural Blank	----	----	----	02-Jul-2024	27-Jun-2024	**5**

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

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**05-Jul-2024**	25-Jun-2024	×
Clear Plastic Bottle - Natural (EA005-P) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**05-Jul-2024**	26-Jun-2024	×
Clear Plastic Bottle - Natural (EA005-P) Blank	**27-Jun-2024**	**----**	----	----	**05-Jul-2024**	27-Jun-2024	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**05-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Natural (EA010-P) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**05-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Natural (EA010-P) Blank	**27-Jun-2024**	**----**	----	----	**05-Jul-2024**	25-Jul-2024	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**02-Jul-2024**	02-Jul-2024	✓
Clear Plastic Bottle - Natural (EA015H) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**02-Jul-2024**	03-Jul-2024	✓
Clear Plastic Bottle - Natural (EA015H) Blank	**27-Jun-2024**	**----**	----	----	**02-Jul-2024**	04-Jul-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
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**02-Jul-2024**	02-Jul-2024	✓
Clear Plastic Bottle - Natural (EA025) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**02-Jul-2024**	03-Jul-2024	✓
Clear Plastic Bottle - Natural (EA025) Blank	**27-Jun-2024**	**----**	----	----	**02-Jul-2024**	04-Jul-2024	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**02-Jul-2024**	27-Jun-2024	×
Clear Plastic Bottle - Natural (EA045) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**02-Jul-2024**	28-Jun-2024	×
Clear Plastic Bottle - Natural (EA045) Blank	**27-Jun-2024**	**----**	----	----	**02-Jul-2024**	29-Jun-2024	×
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**05-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**05-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) Blank	**27-Jun-2024**	**----**	----	----	**05-Jul-2024**	25-Jul-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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**05-Jul-2024**	22-Dec-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**05-Jul-2024**	23-Dec-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) Blank	**27-Jun-2024**	**----**	----	----	**05-Jul-2024**	24-Dec-2024	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**05-Jul-2024**	22-Dec-2024	✓	**05-Jul-2024**	22-Dec-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**05-Jul-2024**	23-Dec-2024	✓	**05-Jul-2024**	23-Dec-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T) Blank	**27-Jun-2024**	**05-Jul-2024**	24-Dec-2024	✓	**05-Jul-2024**	24-Dec-2024	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**08-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**08-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) Blank	**27-Jun-2024**	**----**	----	----	**08-Jul-2024**	25-Jul-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
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	----	----	----	**08-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	----	----	----	**08-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) Blank	**27-Jun-2024**	----	----	----	**08-Jul-2024**	25-Jul-2024	✓
EK026SF: Total CN by Segmented Flow Analyser							
Black Opaque Plastic Bottle - NaOH (EK026SF) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	----	----	----	**10-Jul-2024**	09-Jul-2024	✗
Black Opaque Plastic Bottle - NaOH (EK026SF) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	----	----	----	**10-Jul-2024**	10-Jul-2024	✓
Black Opaque Plastic Bottle - NaOH (EK026SF) Blank	**27-Jun-2024**	----	----	----	**10-Jul-2024**	11-Jul-2024	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	----	----	----	**06-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	----	----	----	**06-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) Blank	**27-Jun-2024**	----	----	----	**06-Jul-2024**	25-Jul-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
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**04-Jul-2024**	27-Jun-2024	×
Clear Plastic Bottle - Natural (EK057G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**04-Jul-2024**	28-Jun-2024	×
Clear Plastic Bottle - Natural (EK057G) Blank	**27-Jun-2024**	**----**	----	----	**04-Jul-2024**	29-Jun-2024	×
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	----	**06-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	----	**06-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) Blank	**27-Jun-2024**	**----**	----	----	**06-Jul-2024**	25-Jul-2024	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**06-Jul-2024**	23-Jul-2024	✓	**06-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**06-Jul-2024**	24-Jul-2024	✓	**06-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) Blank	**27-Jun-2024**	**06-Jul-2024**	25-Jul-2024	✓	**06-Jul-2024**	25-Jul-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
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**06-Jul-2024**	23-Jul-2024	✓	**06-Jul-2024**	23-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**06-Jul-2024**	24-Jul-2024	✓	**06-Jul-2024**	24-Jul-2024	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) Blank	**27-Jun-2024**	**06-Jul-2024**	25-Jul-2024	✓	**06-Jul-2024**	25-Jul-2024	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	**----**	**05-Jul-2024**	27-Jun-2024	×
Clear Plastic Bottle - Natural (EK071G) NZG-IS	**26-Jun-2024**	**----**	----	**----**	**04-Jul-2024**	28-Jun-2024	×
Clear Plastic Bottle - Natural (EK071G) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), Spring	**26-Jun-2024**	**----**	----	**----**	**05-Jul-2024**	28-Jun-2024	×
Clear Plastic Bottle - Natural (EK071G) Blank	**27-Jun-2024**	**----**	----	**----**	**04-Jul-2024**	29-Jun-2024	×
EP025: Oxygen - Dissolved (DO)							
Clear Plastic Bottle - Natural (EP025) NZG_IS, WC-RS, WC-IS, YR1-IS, LHG-IS	**25-Jun-2024**	**----**	----	**----**	**02-Jul-2024**	25-Jun-2024	×
Clear Plastic Bottle - Natural (EP025) TR-RS - Light rain during sampling, YK-RS_Replicate1, YK-RS_Replicate 2, YK-IS, YK-IS(d/s), NZG-IS, Spring	**26-Jun-2024**	**----**	----	**----**	**02-Jul-2024**	26-Jun-2024	×
Clear Plastic Bottle - Natural (EP025) Blank	**27-Jun-2024**	**----**	----	**----**	**02-Jul-2024**	27-Jun-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
Conductivity by Auto Titrator	EA010-P	4	31	12.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	30	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	15.38	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	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-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
Turbidity	EA045	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
Conductivity by Auto Titrator	EA010-P	3	31	9.68	8.33	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	3	13	23.08	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	13	23.08	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	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-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

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 Control Samples (LCS) - Continued							
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	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
Conductivity by Auto Titrator	EA010-P	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	13	**7.69**	**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	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-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
Turbidity	EA045	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	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	40	**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	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	**5.00**	**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
pH by Auto Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by Auto Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
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	EA025	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)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. 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 Metals by ICP-MS - Suite B	EG020B-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 B	EG020B-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.

Analytical Methods	Method	Matrix	Method Descriptions
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).
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 as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. 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)
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)

Analytical Methods	Method	Matrix	Method Descriptions
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)
Oxygen - Dissolved	EP025	WATER	In house: Referenced to APHA 4500-O G. Dissolved Oxygen Probe. 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	: **ES2421627**	Page	: 1 of 11
Client	: **UGL LIMITED**	Laboratory	: Environmental Division Sydney
Contact	: CAMILLE PALMER	Contact	: Customer Services ES
Address	: Cnr Hill Rd & Pondage Link Rd HOMEBUSH BAY 2127	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 3200-0645	Date Samples Received	: 02-Jul-2024
Order number	: -	Date Analysis Commenced	: 02-Jul-2024
C-O-C number	: 69296	Issue Date	: 10-Jul-2024
Sampler	: CAMILLE PALMER		
Site	: Snowy 2.0 Connection WQM June 2024		
Quote number	: ES24UGLLIM0001_V3		
No. of samples received	: 13		
No. of samples analysed	: 13		

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
Wisam Marassa	Inorganics Coordinator	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
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

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 (%)
EA005P: pH by PC Titrator (QC Lot: 5906311)									
ES2421495-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.05	6.33	4.5	0% - 20%
ES2421627-007	YK-RS_Replicate1	EA005-P: pH Value	----	0.01	pH Unit	7.50	7.25	3.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 5906308)									
ES2421627-013	Blank	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.0	No Limit
ES2421495-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	173	173	0.0	0% - 20%
ES2421627-007	YK-RS_Replicate1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	34	34	0.0	0% - 20%
EN2406279-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	119	117	1.1	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 5896773)									
ES2421627-011	NZG-IS	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38	40	7.0	No Limit
ES2421627-001	NZG_IS	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	76	80	4.8	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5896774)									
ES2421627-011	NZG-IS	EA025: Suspended Solids (SS)	----	1	mg/L	20	19	8.4	0% - 20%
ES2421627-001	NZG_IS	EA025: Suspended Solids (SS)	----	1	mg/L	<1	<1	0.0	No Limit
EA045: Turbidity (QC Lot: 5896674)									
ES2421597-001	Anonymous	EA045: Turbidity	----	0.1	NTU	13.6	13.6	0.0	0% - 20%
ES2421627-009	YK-IS	EA045: Turbidity	----	0.1	NTU	9.4	9.1	3.1	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5903499)									
ES2421496-003	Anonymous	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

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: 5903499) - continued									
ES2421496-003	Anonymous	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: Manganese	7439-96-5	0.001	mg/L	0.014	0.013	0.0	0% - 50%
		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	0.285	0.296	3.6	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	0.17	18.2	No Limit
ES2421496-011	Anonymous	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: Manganese	7439-96-5	0.001	mg/L	0.005	0.007	23.6	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	0.120	0.129	7.5	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5903500)									
ES2421496-003	Anonymous	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2421496-011	Anonymous	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5903503)									
ES2421627-012	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
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.017	0.018	0.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 5903504)									
ES2421627-012	Spring	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 5903955)									
EN2406011-001	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

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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 5903955) - continued									
EN2406011-001	Anonymous	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: Manganese	7439-96-5	0.001	mg/L	0.430	0.422	1.9	0% - 20%
		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
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.03	0.04	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.40	0.39	0.0	No Limit
EN2406225-002	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	0.001	0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.023	0.023	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.034	0.033	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	2.12	2.09	1.3	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.37	1.36	1.2	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 5903957)									
ES2421627-004	YR1-IS	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EN2406225-002	Anonymous	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 5903959)									
ES2421627-013	Blank	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: Manganese	7439-96-5	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
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2421627-004	YR1-IS	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: Manganese	7439-96-5	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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 5903959) - continued									
ES2421627-004	YR1-IS	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
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5903502)									
ES2421496-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2421496-010	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 5903506)									
ES2421627-013	Blank	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2422022-001	Anonymous	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: 5901699)									
ES2421627-001	NZG_IS	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2421627-011	NZG-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: 5910151)									
EN2406091-005	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
EB2422097-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004 (0.400) *	mg/L	<0.400	<0.400	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 5910152)									
ES2421794-003	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004 (2.00)*	mg/L	96.5	100	3.9	0% - 20%
ES2421682-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004 (4.00)*	mg/L	131	142	7.9	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 5907345)									
ES2421499-010	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.01	0.0	No Limit
ES2421627-009	YK-IS	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 5900293)									
ES2421627-001	NZG_IS	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2421627-010	YK-IS(d/s)	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5907344)									
ES2421499-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2421627-009	YK-IS	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.06	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5907339)									
ES2421627-001	NZG_IS	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0	No Limit
ES2421627-011	NZG-IS	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5907340)									
ES2421627-001	NZG_IS	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2421627-011	NZG-IS	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.07	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5900292)									

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 (%)*
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 5900292) - continued									
ES2421627-001	NZG_IS	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2421627-010	YK-IS(d/s)	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
EA005P: pH by PC Titrator (QCLot: 5906311)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.8	101
				----	7 pH Unit	99.8	99.2	101
EA010P: Conductivity by PC Titrator (QCLot: 5906308)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	104	89.9	110
				<1	2100 µS/cm	105	90.2	111
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 5896773)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	93.7	87.0	109
				<10	293 mg/L	114	75.2	126
				<10	2410 mg/L	93.7	83.0	124
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5896774)								
EA025: Suspended Solids (SS)	----	1	mg/L	<1	150 mg/L	101	83.0	129
				<1	1000 mg/L	94.0	81.0	111
				<1	928 mg/L	95.2	83.0	118
EA045: Turbidity (QCLot: 5896674)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	97.5	91.0	105
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903499)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.3	80.0	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.2	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.1	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.1	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.9	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.7	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.0	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.8	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.1	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903500)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	74.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903503)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.6	80.0	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.5	85.0	114

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
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903503) - continued								
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.9	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.3	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.1	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.0	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.4	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903504)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	72.4	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 5903955)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.1	82.0	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.8	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.8	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.1	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.3	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.8	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.3	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.5	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.0	85.0	117
EG020T: Total Metals by ICP-MS (QCLot: 5903957)								
EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	81.8	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 5903959)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.5	82.0	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.6	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.5	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.6	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	88.5	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.1	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	87.5	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	87.7	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.7	85.0	117

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
EG035F: Dissolved Mercury by FIMS (QCLot: 5903502)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.6	83.0	105
EG035F: Dissolved Mercury by FIMS (QCLot: 5903506)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.2	83.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5901699)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.0	77.0	111
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5910151)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	124	73.0	133
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5910152)								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	114	73.0	133
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5907345)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	102	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5900293)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.4	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5907344)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.1	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5907339)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	104	69.0	123
				<0.1	1 mg/L	99.3	70.0	123
				<0.1	5 mg/L	119	70.0	123
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5907340)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	102	71.3	126
				<0.01	0.442 mg/L	98.0	71.3	126
				<0.01	1 mg/L	120	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5900292)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	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: 5903499)							
ES2421496-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	98.6	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903499) - continued							
ES2421496-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.25 mg/L	98.0	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.6	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	95.0	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.8	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	93.0	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	116	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 5903503)							
ES2421627-011	NZG-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	98.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	100	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	96.9	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	96.5	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	99.1	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.6	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	98.3	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 5903955)							
EN2405924-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.9	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	96.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	108	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	99.5	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	108	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	106	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	92.8	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.7	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 5903959)							
ES2421627-010	YK-IS(d/s)	EG020A-T: Arsenic	7440-38-2	1 mg/L	116	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	115	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	128	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	119	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	126	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	129	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	110	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	116	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5903502)							
ES2421496-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	92.0	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 5903506)							
ES2421627-010	YK-IS(d/s)	EG035F: Mercury	7439-97-6	0.01 mg/L	87.0	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
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5901699)							
ES2421627-001	NZG_IS	EG035T: Mercury	7439-97-6	0.01 mg/L	88.2	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5910151)							
EB2422097-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.2 mg/L	105	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 5910152)							
ES2421682-001	Anonymous	EK026SF: Total Cyanide	57-12-5	400 mg/L	108	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 5907345)							
ES2421499-010	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	79.2	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 5900293)							
ES2421627-001	NZG_IS	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	116	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5907344)							
ES2421499-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5907339)							
ES2421627-002	WC-RS	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	82.9	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5907340)							
ES2421627-002	WC-RS	EK067G: Total Phosphorus as P	----	2 mg/L	75.4	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 5900292)							
ES2421627-001	NZG_IS	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	110	70.0	130

CHAIN OF CUSTODY

ALS COC#: **69296** ALS Laboratory: ES Sydney Environmental

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 2/7/24	DATE TIME:	DATE TIME:

CLIENT: UGLLIM - UGL LIMITED

PROJECT: 3200-0645

SITE: Snowy 2.0 Connection WQM June 2024

ORDER NO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Camille Palmer CONTACT PH: 0438 177 874 SAMPLER MOBILE: 0438 177 874

PRIMARY SAMPLER: Camille Palmer QUOTE NO: ES24UGLLIM0001 / ES2024UGLLIM0001

EMAIL REPORTS TO: camille.palmer@ugllimited.com, alozie.agomoh@ugllimited.com, lachlan.whiteford@ugllimited.com, lauren.logue@ugllimited.com, vivian.leeyu@ugllimited.com, brendan.toohey@ugllimited.com

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SAMPLE DETAILS / **ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Monthly Testing WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	NZG_IS		25/06/2024 01:16 PM	WATER	ALS: 6 Non ALS: 0	No	X		
002	WC-RS		25/06/2024 01:56 PM	WATER	ALS: 6 Non ALS: 0	No	X		
003	WC-IS		25/06/2024 02:14 PM	WATER	ALS: 6 Non ALS: 0	No	X		
004	YR1-IS		25/06/2024 03:11 PM	WATER	ALS: 6 Non ALS: 0	No	X		
005	LHG-IS		25/06/2024 03:36 PM	WATER	ALS: 6 Non ALS: 0	No	X		
006	TR-RS	Light rain during sampling	26/06/2024 09:04 AM	WATER	ALS: 6 Non ALS: 0	No	X		Light rain during sampling
007	YK-RS_Replicate1		26/06/2024 09:57 AM	WATER	ALS: 6 Non ALS: 0	No	X		

Environmental Division Sydney
Work Order Reference
ES2421627

Telephone : + 61-2-8784 8555

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CHAIN OF CUSTODY

ALS COC#: 69296 ALS Laboratory: ES Sydney Environmental

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 2/7/24	DATE TIME:	DATE TIME:

CLIENT: UGLLIM - UGL LIMITED

PROJECT: 3200-0645

SITE: Snowy 2.0 Connection WQM June 2024

ORDER NO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

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PRIMARY SAMPLER: Camille Palmer QUOTE NO: ES24UGLLIM0001 / ES2024UGLLIM0001

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SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Monthly Testing WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
008	YK-RS_Replicate 2		26/06/2024 10:05 AM	WATER	ALS: 6 Non ALS: 0	No	X		
009	YK-IS		26/06/2024 10:24 AM	WATER	ALS: 6 Non ALS: 0	No	X		
010	YK-IS(d/s)		26/06/2024 10:49 AM	WATER	ALS: 6 Non ALS: 0	No	X		
011	NZG-IS		26/06/2024 03:31 PM	WATER	ALS: 6 Non ALS: 0	No	X		
012	Spring		26/06/2024 03:52 PM	WATER	ALS: 6 Non ALS: 0	No	X		
013	Blank		27/06/2024 03:58 PM	WATER	ALS: 6 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: **69296** *ALS Laboratory:* ES Sydney Environmental

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 2/7/24	DATE TIME:	DATE TIME:

CLIENT: UGLLIM - UGL LIMITED

PROJECT: 3200-0645

SITE: Snowy 2.0 Connection WQM June 2024

ORDER NO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Camille Palmer CONTACT PH: 0438 177 874 SAMPLER MOBILE: 0438 177 874

PRIMARY SAMPLER: Camille Palmer QUOTE NO: ES24UGLLIM0001 / ES2024UGLLIM0001

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EMAIL INVOICES TO: brendan.toohey@ugllimited.com, camille.palmer@ugllimited.com, alozie.agomoh@ugllimited.com

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	NZG_IS	Clear Plastic Bottle - Natural	250 mL	00070623007561	Green	No	
001	NZG_IS	Clear Plastic Bottle - Natural	500 mL	00070623151278	Green	No	
001	NZG_IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083085	Red	No	
001	NZG_IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083118	Red	No	
001	NZG_IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002268	Blue	No	
001	NZG_IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031953	Purple	No	
002	WC-RS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822109056	Red	Yes	
002	WC-RS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822109074	Red	No	
002	WC-RS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002308	Blue	No	
002	WC-RS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00101123040906	Purple	No	
002	WC-RS	Clear Plastic Bottle - Natural	250 mL	00070623007490	Green	No	
002	WC-RS	Clear Plastic Bottle - Natural	500 mL	00070623194713	Green	No	
003	WC-IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083157	Red	Yes	
003	WC-IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083101	Red	No	
003	WC-IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031891	Purple	No	
003	WC-IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002270	Blue	No	
003	WC-IS	Clear Plastic Bottle - Natural	250 mL	00070623007598	Green	No	
003	WC-IS	Clear Plastic Bottle - Natural	500 mL	00070623151275	Green	No	
004	YR1-IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822109049	Red	Yes	
004	YR1-IS	Clear Plastic Bottle - Natural	500 mL	00070623194735	Green	No	
004	YR1-IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002269	Blue	No	
004	YR1-IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083106	Red	No	
004	YR1-IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031795	Purple	No	
004	YR1-IS	Clear Plastic Bottle - Natural	250 mL	00070623007493	Green	No	
005	LHG-IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822109048	Red	Yes	
005	LHG-IS	Clear Plastic Bottle - Natural	500 mL	00070623194741	Green	No	

CHAIN OF CUSTODY

ALS COC#: **69296** *ALS Laboratory:* ES Sydney Environmental

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 2/7/24 8a	DATE TIME:	DATE TIME:

CLIENT: UGLLIM - UGL LIMITED

PROJECT: 3200-0645

SITE: Snowy 2.0 Connection WQM June 2024

ORDER NO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Camille Palmer CONTACT PH: 0438 177 874 SAMPLER MOBILE: 0438 177 874

PRIMARY SAMPLER: Camille Palmer QUOTE NO: ES24UGLLIM0001 / ES2024UGLLIM0001

EMAIL REPORTS TO: camille.palmer@ugllimited.com, alozie.agomoh@ugllimited.com, lachlan.whiteford@ugllimited.com, lauren.logue@ugllimited.com, vivian.leeyu@ugllimited.com, brendan.toohey@ugllimited.com

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005	LHG-IS	Clear Plastic Bottle - Natural	250 mL	00070623007553	Green	No	
005	LHG-IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822109050	Red	No	
005	LHG-IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002329	Blue	No	
005	LHG-IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031543	Purple	No	
006	TR-RS	Clear Plastic Bottle - Natural	500 mL	00070623151269	Green	No	
006	TR-RS	Clear Plastic Bottle - Natural	250 mL	00070623007471	Green	No	
006	TR-RS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083159	Red	No	
006	TR-RS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723032060	Purple	No	
006	TR-RS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002282	Blue	No	
006	TR-RS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083131	Red	Yes	
007	YK-RS_Replicate1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083074	Red	Yes	
007	YK-RS_Replicate1	Clear Plastic Bottle - Natural	500 mL	00070623151246	Green	No	
007	YK-RS_Replicate1	Clear Plastic Bottle - Natural	250 mL	00070623007459	Green	No	
007	YK-RS_Replicate1	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031875	Purple	No	
007	YK-RS_Replicate1	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002279	Blue	No	
007	YK-RS_Replicate1	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083108	Red	No	
008	YK-RS_Replicate 2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083127	Red	Yes	
008	YK-RS_Replicate 2	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083120	Red	No	
008	YK-RS_Replicate 2	Clear Plastic Bottle - Natural	500 mL	00070623151264	Green	No	
008	YK-RS_Replicate 2	Clear Plastic Bottle - Natural	250 mL	00070623007499	Green	No	
008	YK-RS_Replicate 2	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723032115	Purple	No	
008	YK-RS_Replicate 2	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002280	Blue	No	
009	YK-IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083145	Red	No	
009	YK-IS	Clear Plastic Bottle - Natural	250 mL	00070623007481	Green	No	
009	YK-IS	Clear Plastic Bottle - Natural	500 mL	00070623151234	Green	No	
009	YK-IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031912	Purple	No	
009	YK-IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002271	Blue	No	

CHAIN OF CUSTODY

ALS COC#: **69296** *ALS Laboratory:* ES Sydney Environmental

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 2/7/24 8:30am	DATE TIME:	DATE TIME:

CLIENT: UGLLIM - UGL LIMITED

PROJECT: 3200-0645

SITE: Snowy 2.0 Connection WQM June 2024

ORDER NO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

PROJECT MANAGER: Camille Palmer CONTACT PH: 0438 177 874 SAMPLER MOBILE: 0438 177 874

PRIMARY SAMPLER: Camille Palmer QUOTE NO: ES24UGLLIM0001 / ES2024UGLLIM0001

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EMAIL INVOICES TO: brendan.toohey@ugllimited.com, camille.palmer@ugllimited.com, alozie.agomoh@ugllimited.com

009	YK-IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822109035	Red	Yes	
010	YK-IS(d/s)	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822109047	Red	Yes	
010	YK-IS(d/s)	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083075	Red	No	
010	YK-IS(d/s)	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002311	Blue	No	
010	YK-IS(d/s)	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031691	Purple	No	
010	YK-IS(d/s)	Clear Plastic Bottle - Natural	250 mL	00070623007552	Green	No	
010	YK-IS(d/s)	Clear Plastic Bottle - Natural	500 mL	00070623194711	Green	No	
011	NZG-IS	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083100	Red	Yes	
011	NZG-IS	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083136	Red	No	
011	NZG-IS	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002341	Blue	No	
011	NZG-IS	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031672	Purple	No	
011	NZG-IS	Clear Plastic Bottle - Natural	250 mL	00070623007500	Green	No	
011	NZG-IS	Clear Plastic Bottle - Natural	500 mL	00070623151229	Green	No	
012	Spring	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083128	Red	Yes	
012	Spring	Clear Plastic Bottle - Natural	500 mL	00070623151277	Green	No	
012	Spring	Clear Plastic Bottle - Natural	250 mL	00070623007491	Green	No	
012	Spring	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083094	Red	No	
012	Spring	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002283	Blue	No	
012	Spring	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031646	Purple	No	
013	Blank	Clear Plastic Bottle - Natural	500 mL	00070623151272	Green	No	
013	Blank	Clear Plastic Bottle - Natural	250 mL	00070623007514	Green	No	
013	Blank	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00120822083109	Red	No	
013	Blank	Black Opaque Plastic Bottle - NaOH	60 mL	00021222002345	Blue	No	
013	Blank	Clear Plastic Bottle - Sulfuric Acid	60 mL	00100723031709	Purple	No	
013	Blank	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120822083129	Red	Yes	

Total Bottle Count: ALS: 78, Non ALS: 0

Appendix C: June 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)
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
Limit of Reporting (LOR)				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
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
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
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
	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
	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
	Jun-24	No	4.7	92.9	-	126.8	-	7.51	-	0.56	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
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
	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
	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
	Jun-24	No	4.8	93.3	-	126.7	-	7.72	-	0.35	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
CG-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-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
	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
	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
	Jun-24	No	5.6	94.3	-	112.4	-	7.8	-	1.94	0.02	0.001	0.0001	0.001	0.001	0.002	0.14	0.001
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
	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
	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
	Jun-24	No	8.5	70.4	-	616	-	7.65	-	10.05	0.01	0.001	0.0001	0.001	0.001	0.002	0.48	0.001
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
	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
	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
	Jun-24	No	4.7	97.1	-	118.6	-	7.24	-	0	0.02	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
SSC-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Parameter		Dissolved Mn (mg/L)	Dissolved Hg (mg/L)	Dissolved Ni (mg/L)	TN (mg/L)	TP (mg/L)	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)		1.2	0.00006	0.008	0.25	0.02	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	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	0.010	0.010	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.		0.002	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.020	47	0.2	52	0.2												
June - Nov SSGV		0.002	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.015	30	0.2	39	1												
WC-RS	Mar-24	0.003	0.00002	0.001	0.1	0.03	0.00001	0.001	0.050	0.05	0.005	42	0.1	70	0.1												
	Apr-24	0.007	0.0001	0.001	0.1	0.02	0.001	0.005	0.010	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	0.009	0.0001	0.001	0.1	0.02	0.001	0.005	0.020	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
	Jun-24	0.005	0.0001	0.001	0.2	0.01	0.001	0.005	0.010	0.23	0.01	53	0.1	81	2	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	0.003	0.00002	0.0005	0.1	0.005	0.00001	0.001	0.050	0.05	0.005	42	0.1	88	0.1												
	Apr-24	0.006	0.0001	0.001	2.7	0.02	0.001	0.005	0.010	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	0.007	0.0001	0.001	0.4	0.02	0.001	0.005	0.010	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
	Jun-24	0.004	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	0.02	0.04	53	0.1	81	1	0.01	0.001	0.0001	0.001	0.001	0.001	0.005	0.001	0.001	0.005	0.05	0.0001
CG-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YR1-IS	Mar-24	0.002	0.000015	0.001	0.1	0.005	0.00001	0.001	0.050	0.05	0.005	34	0.1	66	0.1												
	Apr-24	0.002	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	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	0.002	0.0001	0.001	0.1	0.02	0.001	0.005	0.010	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
	Jun-24	0.003	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	0.01	0.03	51	0.1	68	1	0.03	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.05	0.0001
	Jul-24	0.002	0.0001	0.001	0.2	0.02	0.001	0.005	0.010	0.01	0.01	19	0.2	48	7	0.17	0.001	0.0001	0.001	0.001	0.001	0.009	0.001	0.001	0.005	0.15	0.0001
LHG-IS	Mar-24	0.040	0.000015	0.003	0.1	0.01	0.00001	0.006	0.050	0.05	0.005	297	1	330	20												
	Apr-24	0.184	0.0001	0.001	0.5	0.09	0.001	0.005	0.020	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	0.184	0.0001	0.001	0.5	0.05	0.001	0.005	0.040	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
	Jun-24	0.158	0.0001	0.001	0.2	0.04	0.001	0.005	0.020	0.02	0.01	313	0.2	339	17	0.38	0.002	0.0001	0.001	0.001	0.001	0.282	0.001	0.001	0.005	1.54	0.0001
YR2-IS	Mar-24	0.001	0.000015	0.001	0.1	0.005	0.00001	0.001	0.050	0.05	0.005	27	1	58	0.1												
	Apr-24	0.003	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	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	0.004	0.0001	0.001	0.8	0.03	0.001	0.007	0.020	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
	Jun-24	0.003	0.0001	0.001	0.1	0.01	0.001	0.005	0.010	0.01	0.01	51	0.1	76	1	0.03	0.001	0.0001	0.001	0.001	0.001	0.002	0.001	0.001	0.005	0.05	0.0001
SSC-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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)
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
LOR				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
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
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
TR-RS	Mar-24	No	13.4	72.5	7.57	24	18.7	7.1	55	*0.10*	0.015	*0.00015*	*0.00001*	*0.000005*	*0.0001*	*0.001*	*0.05*	0.005
	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*
	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*
	Jun-24	No	8.7	91.6	-	26.4	-	8.32	-	*0.10*	*0.01*	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	*0.05*	*0.001*
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
LOR				-	-	-	-	-	-	0.1	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001
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
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
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
	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*
	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*
	Jun-24	No	3.5	84.2	-	30.1	-	7.99	-	26.48	0.09	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.18	*0.001*
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*
	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*
	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*
	Jun-24	No	3.2	84.6	-	38.9	-	7.76	-	2.46	0.06	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.1	*0.001*
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*
	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*
	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*
	Jun-24	No	4.4	82.7	-	64.1	-	8.14	-	0.89	0.04	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.07	*0.001*
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*
	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*
	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*
	Jun-24	No	3.9	83.1	-	35.1	-	7.88	-	7.99	0.08	*0.001*	*0.0001*	*0.001*	*0.001*	*0.002*	0.15	*0.001*

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

Parameter		Dissolved Mn (mg/L)	Dissolved Hg (mg/L)	Dissolved Ni (mg/L)	TN (mg/L)	TP (mg/L)	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)
TALBINGO RESERVOIR																											
DGV		1.2	0.00006	0.008	0.25	0.02	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	0.0001	0.001	0.1	0.01	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		0.003	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.02	7.5	0.1	12.5	0.2												
June - Nov SSGV		0.002	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.015	8	0.2	15	0.2												
TR-RS	Mar-24	0.005	0.000015	0.0005	0.1	0.01	0.00001	0.001	0.050	0.05	0.005	8	0.1	44	0.1												
	Apr-24	0.026	0.0001	0.001	1.3	0.02	0.001	0.066	0.030	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	0.002	0.0001	0.001	0.3	0.03	0.001	0.023	0.020	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
	Jun-24	0.010	0.0001	0.001	2.3	0.01	0.001	0.005	0.010	1.92	0.01	5	0.4	17	2	0.03	0.001	0.0001	0.001	0.001	0.001	0.056	0.001	0.001	0.005	0.07	0.0001
YORKERS CREEK CATCHMENT																											
DGV		1.2	0.00006	0.008	0.25	0.02	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	0.0001	0.001	0.1	0.01	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		0.005	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.02	1	0.1	30	3												
June - Nov SSGV		0.003	0.00003	0.001	0.2	0.02	0.00002	0.002	0.013	0.015	0.02	7	0.2	10	0.2												
YK-RS	Mar-24	0.013	0.000015	0.0005	0.1	0.03	0.00001	0.003	0.050	0.05	0.005	1	0.1	30	3												
	Apr-24	0.014	0.0001	0.001	0.6	0.04	0.001	0.013	0.020	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	0.026	0.0001	0.001	0.3	0.04	0.001	0.005	0.030	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
	Jun-24	0.021	0.0001	0.001	0.4	0.04	0.001	0.005	0.020	0.02	0.03	9	0.4	21	15	0.23	0.001	0.0001	0.001	0.001	0.001	0.032	0.001	0.001	0.005	0.50	0.0001
YK-IS (D/S)	Mar-24	0.006	0.000015	0.0005	0.1	0.02	0.00001	0.002	0.050	0.05	0.005	1	0.1	15	0.1												
	Apr-24	0.014	0.0001	0.001	0.1	0.02	0.001	0.005	0.010	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	0.021	0.0001	0.001	0.8	0.04	0.001	0.005	0.010	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
	Jun-24	0.009	0.0001	0.001	0.2	0.04	0.001	0.005	0.010	0.01	0.01	12	0.2	25	2	0.48	0.001	0.0001	0.001	0.001	0.001	0.027	0.001	0.001	0.005	0.66	0.0001
NZG-IS	Mar-24	0.004	0.000015	0.0005	0.1	0.01	0.00001	0.002	0.050	0.05	0.005	10	0.1	22	0.1												
	Apr-24	0.006	0.0001	0.001	0.1	0.02	0.001	0.005	0.010	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	0.007	0.0001	0.001	0.2	0.06	0.001	0.007	0.010	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
	Jun-24	0.005	0.0001	0.001	0.2	0.01	0.001	0.005	0.010	0.01	0.01	23	0.2	38	20	0.12	0.001	0.0001	0.001	0.001	0.001	0.037	0.001	0.001	0.005	0.67	0.0001
YK-IS	Mar-24	0.018	0.000015	0.0005	0.1	0.01	0.00001	0.004	0.050	0.05	0.005	1	0.1	21	1												
	Apr-24	0.016	0.0001	0.001	0.3	0.02	0.001	0.005	0.010	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	0.015	0.0001	0.001	0.2	0.03	0.001	0.005	0.010	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
	Jun-24	0.010	0.0001	0.001	0.3	0.03	0.001	0.005	0.010	0.06	0.01	9	0.2	19	6	0.32	0.001	0.0001	0.001	0.001	0.001	0.014	0.001	0.001	0.005	0.42	0.0001
	Jul-24	0.008	0.0001	0.001	0.3	0.07	0.001	0.009	0.010	0.01	0.01	9	0.3	52	7	0.8	0.001	0.0001	0.001	0.001	0.001	0.015	0.001	0.001	0.005	0.62	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
Tel: +61 8 9328 2900
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www.ecoenvironmental.com.au

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