



AUGUST 2024

# MONTHLY CONSTRUCTION WATER QUALITY MONITORING REPORT

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

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## APPENDICES

APPENDIX A: FIELD SHEET (UGL, 2024A)

APPENDIX B: COA (ALS, 2024A), QA/QC ASSESSMENT (ALS, 2024B) AND QCR (ALS, 2024C)

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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 <sub>3</sub>	Total Hardness
Cd	Cadmium
COA	'Certificate of Analysis' (ALS, 2024a)
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
NSW	New South Wales

## ABBREVIATIONS

Acronym	Full Form
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.

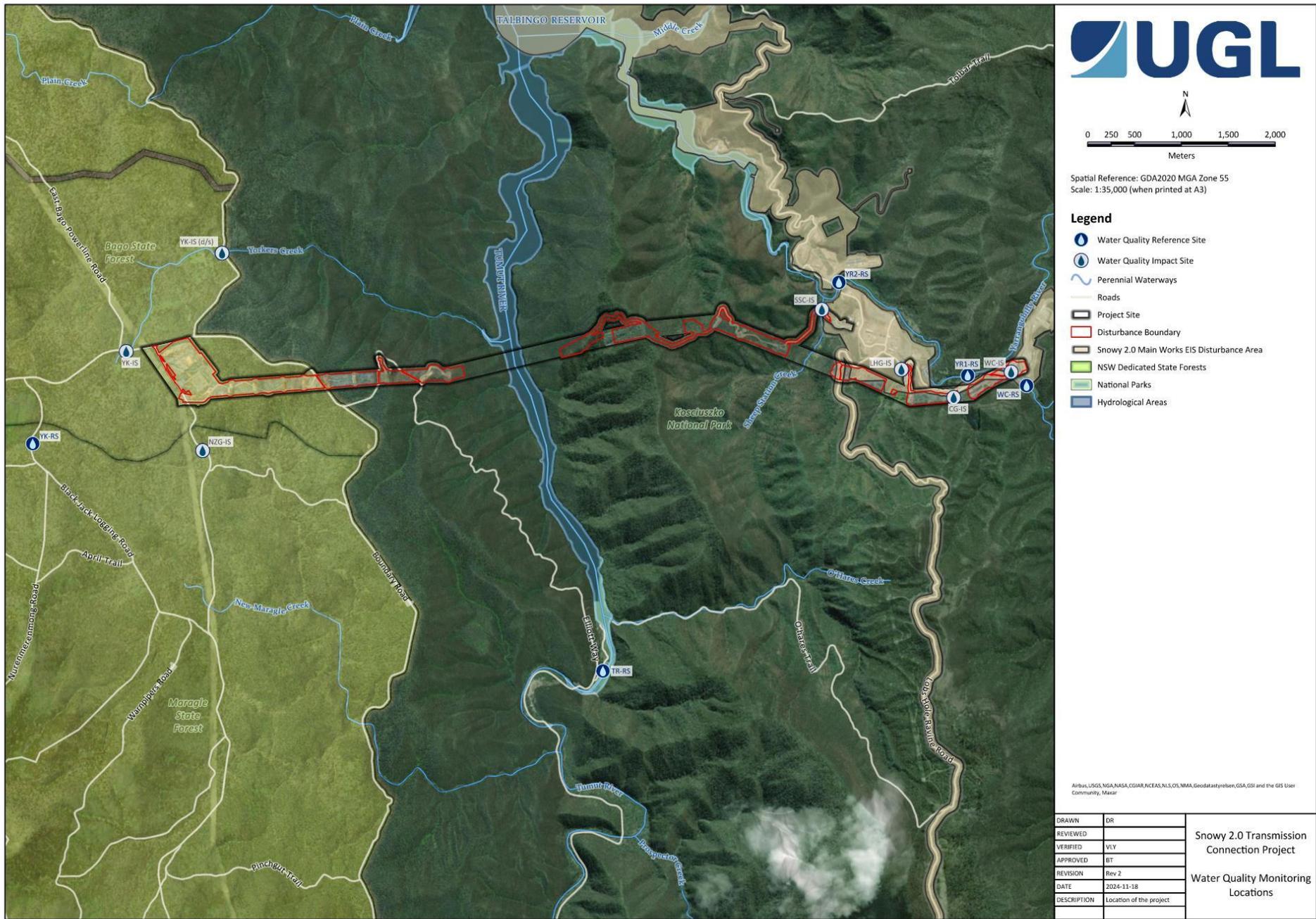


FIGURE 1 LOCALITY OF THE PROJECT AND SWQ MONITORING LOCATIONS

### 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

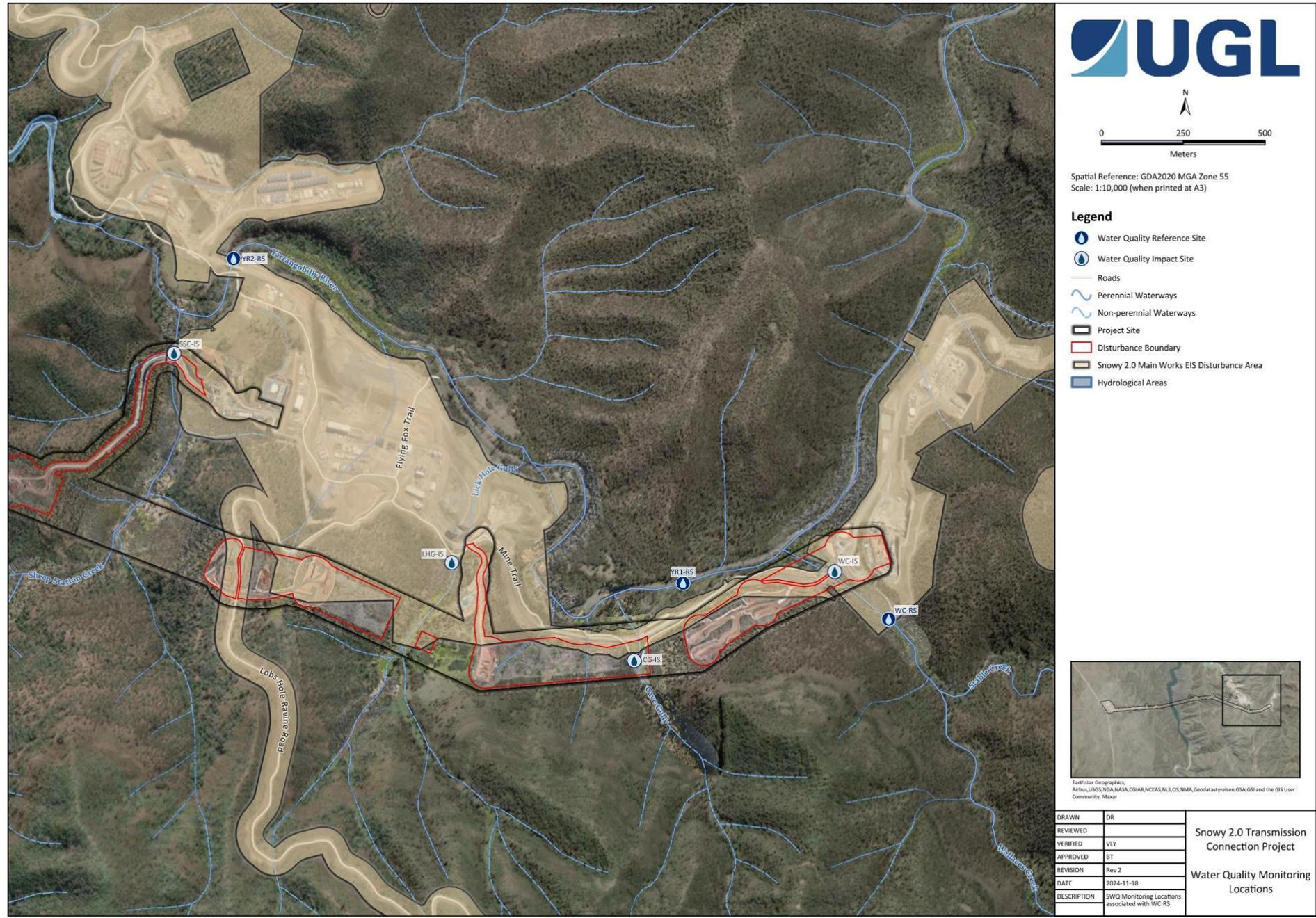


FIGURE 3 WATER QUALITY MONITORING LOCATIONS ASSOCIATED WITH REFERENCE SITE WC-RS IN RELATION TO THE PROJECT

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 <sup>+</sup>	9.08	10.28	8.79	11.53	8.35	10.2	-
Specific Electrical Conductivity (EC)***	SPC <sup>^</sup> μS/cm <sup>^^</sup>	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 <sup>##</sup>	79.1	98.4	91.2	95.4	94.6	106.1	-
Turbidity***	NTU <sup>**</sup>	0.37	5.12	0.09	1.56	9	7.87	2-25
Dissolved Aluminium (Al)	mg/L <sup>++</sup>	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 <sub>3</sub> )	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 <sup>@</sup>	mg/L	-	-	-	-	-	-	0.027
Total As <sup>@</sup>	mg/L	-	-	-	-	-	-	0.0008
Total Cd <sup>@</sup>	mg/L	-	-	-	-	-	-	0.0006
Total Cr <sup>@</sup>	mg/L	-	-	-	-	-	-	0.00001
Total Cu <sup>@</sup>	mg/L	-	-	-	-	-	-	0.001
Total Pb <sup>@</sup>	mg/L	-	-	-	-	-	-	0.001
Total Mn <sup>@</sup>	mg/L	-	-	-	-	-	-	1.2
Total Ni <sup>@</sup>	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 <sup>@</sup>	mg/L	-	-	-	-	-	-	0.00002
Total Zn <sup>@</sup>	mg/L	-	-	-	-	-	-	0.0024
Total Fe <sup>@</sup>	mg/L	-	-	-	-	-	-	0.3
Total Hg <sup>@</sup>	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. AUGUST 2024 MONITORING

SW sampling was undertaken at 12 monitoring locations on 25 and 26 August 2024.

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 ( $\mu\text{S}/\text{cm}$ )
- 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) and '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		
<b>Date</b>	25.08.2024 and 26.08.2024	
<b>Weather</b>	Weather conditions were relatively dry for the first 13 days of the month, with just 0.4 mm of rainfall. During the weekend of 17 and 18 August, 23.0 mm of rainfall was received along with a total of 16.2 mm of rain spread across 22 to 24 August. Conditions during sampling on 25 August were sunny with partial clouds, with light rain (1.8 mm total) observed on the day, but not specifically during sampling. In contrast, overcast conditions and rain were observed on 26 August, with a total of 23.0 mm received prior to 9 am.	
<b>ID</b>	<b>Observations</b>	<b>Photo</b>
WC-RS	<ul style="list-style-type: none"> <li>• High flow rate, white caps over rocks</li> <li>• Vegetation along banks</li> <li>• Clear water</li> </ul>	

## FIELD OBSERVATIONS

<b>Date</b>	25.08.2024 and 26.08.2024	
<b>Weather</b>	Weather conditions were relatively dry for the first 13 days of the month, with just 0.4 mm of rainfall. During the weekend of 17 and 18 August, 23.0 mm of rainfall was received along with a total of 16.2 mm of rain spread across 22 to 24 August. Conditions during sampling on 25 August were sunny with partial clouds, with light rain (1.8 mm total) observed on the day, but not specifically during sampling. In contrast, overcast conditions and rain were observed on 26 August, with a total of 23.0 mm received prior to 9 am.	
<b>ID</b>	<b>Observations</b>	<b>Photo</b>
WC-IS	<ul style="list-style-type: none"> <li>• High flow rate, clear water</li> <li>• Strong weed/vegetation growth on northern bank</li> <li>• Surrounding rocks wet from light rain</li> <li>• Greater depth than normal</li> </ul>	
CG-IS	<ul style="list-style-type: none"> <li>• Creek completely dry, no water present</li> </ul>	
YR1-IS	<ul style="list-style-type: none"> <li>• High flow rate, clear water</li> <li>• Greater depth than usual, water rising into banks</li> </ul>	

## FIELD OBSERVATIONS

<b>Date</b>	25.08.2024 and 26.08.2024	
<b>Weather</b>	Weather conditions were relatively dry for the first 13 days of the month, with just 0.4 mm of rainfall. During the weekend of 17 and 18 August, 23.0 mm of rainfall was received along with a total of 16.2 mm of rain spread across 22 to 24 August. Conditions during sampling on 25 August were sunny with partial clouds, with light rain (1.8 mm total) observed on the day, but not specifically during sampling. In contrast, overcast conditions and rain were observed on 26 August, with a total of 23.0 mm received prior to 9 am.	
<b>ID</b>	<b>Observations</b>	<b>Photo</b>
LHG-IS	<ul style="list-style-type: none"> <li>• High silt deposition on bottom of the waterbody</li> <li>• Slightly milky colouration with sediment slightly disturbed</li> <li>• Vegetation growing in and around gully</li> <li>• Low flow rate</li> </ul>	
YR2-IS	<ul style="list-style-type: none"> <li>• High flow rate, high volume flow</li> <li>• Slight milky to light brown colouration to water</li> <li>• Some small white bubbles appearing on the surface</li> </ul>	
SSC-IS	<ul style="list-style-type: none"> <li>• Minimal depth, slow flow rate</li> <li>• Notable milky colouration to water, more than previous month</li> <li>• Sticks and debris in the waterway</li> <li>• Vegetation along both banks</li> </ul>	

## FIELD OBSERVATIONS

<b>Date</b>	25.08.2024 and 26.08.2024	
<b>Weather</b>	Weather conditions were relatively dry for the first 13 days of the month, with just 0.4 mm of rainfall. During the weekend of 17 and 18 August, 23.0 mm of rainfall was received along with a total of 16.2 mm of rain spread across 22 to 24 August. Conditions during sampling on 25 August were sunny with partial clouds, with light rain (1.8 mm total) observed on the day, but not specifically during sampling. In contrast, overcast conditions and rain were observed on 26 August, with a total of 23.0 mm received prior to 9 am.	
<b>ID</b>	<b>Observations</b>	<b>Photo</b>
TR-RS	<ul style="list-style-type: none"> <li>High water level, relatively clear</li> </ul>	
YK-IS (D/S)	<ul style="list-style-type: none"> <li>Slight milky colouration to water</li> <li>Greater depth than previously observed</li> <li>Thick vegetation cover on either bank</li> </ul>	
NZG-IS	<ul style="list-style-type: none"> <li>Thick vegetation cover on either banks</li> <li>Notable flow into gully compared to previous months</li> <li>Hoof marks on bank several meters up from the sampling point</li> </ul>	

## FIELD OBSERVATIONS

<b>Date</b>	25.08.2024 and 26.08.2024	
<b>Weather</b>	Weather conditions were relatively dry for the first 13 days of the month, with just 0.4 mm of rainfall. During the weekend of 17 and 18 August, 23.0 mm of rainfall was received along with a total of 16.2 mm of rain spread across 22 to 24 August. Conditions during sampling on 25 August were sunny with partial clouds, with light rain (1.8 mm total) observed on the day, but not specifically during sampling. In contrast, overcast conditions and rain were observed on 26 August, with a total of 23.0 mm received prior to 9 am.	
<b>ID</b>	<b>Observations</b>	<b>Photo</b>
YK-IS	<ul style="list-style-type: none"> <li>• Greater volume than previous months, relatively high flow rate</li> <li>• Visible milky brown colouration to water</li> <li>• Sticks/debris along Creek</li> <li>• Vegetation present along both banks</li> </ul>	
YK-RS	<ul style="list-style-type: none"> <li>• Greater volume than previous months, notable flow rate</li> <li>• Milky brown colouration to water</li> <li>• almost reaching top of the banks</li> <li>• Grasses/vegetation on either bank</li> <li>• Settled sediment at the bottom</li> </ul>	

## 5.2. Results

The data obtained during the construction SWQ monitoring program have been divided into the Yarrangobilly 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

In August 2024, temperatures in the Yarrangobilly catchment ranged from 8.6 °C to 12.1 °C, refer to Figure 4. In the Talbingo Reservoir, temperatures rose from 6.0 °C in July to 12.7 °C in August, refer to Figure 5. Similarly, temperatures in the Yorkers Creek catchment increased slightly, ranging from 7.2 °C to 7.3 °C in August 2024, refer to Figure 6.

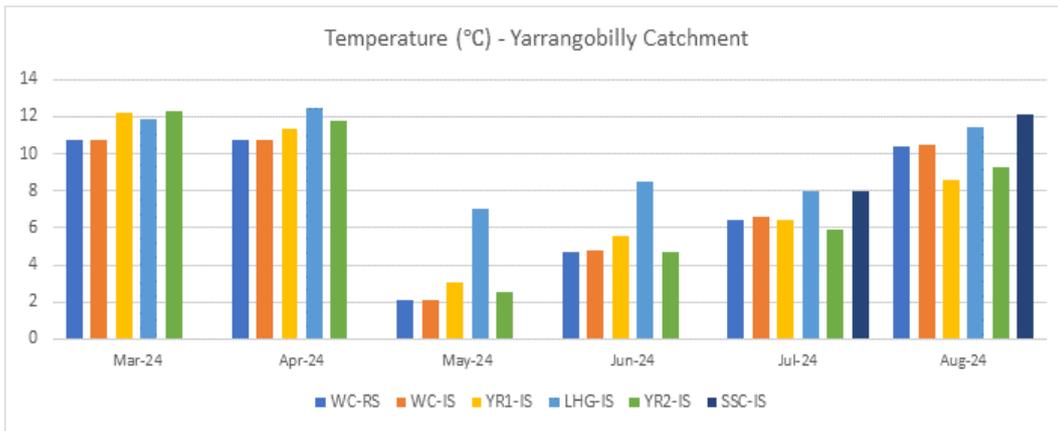


FIGURE 4 : TEMPERATURE FOR YARRANGOBILLY CATCHMENT

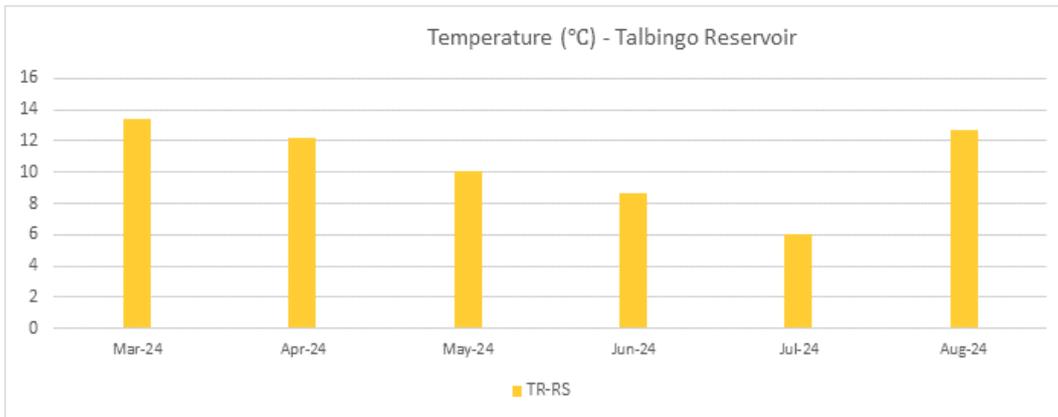


FIGURE 5: TEMPERATURE FOR TALBINGO RESERVOIR

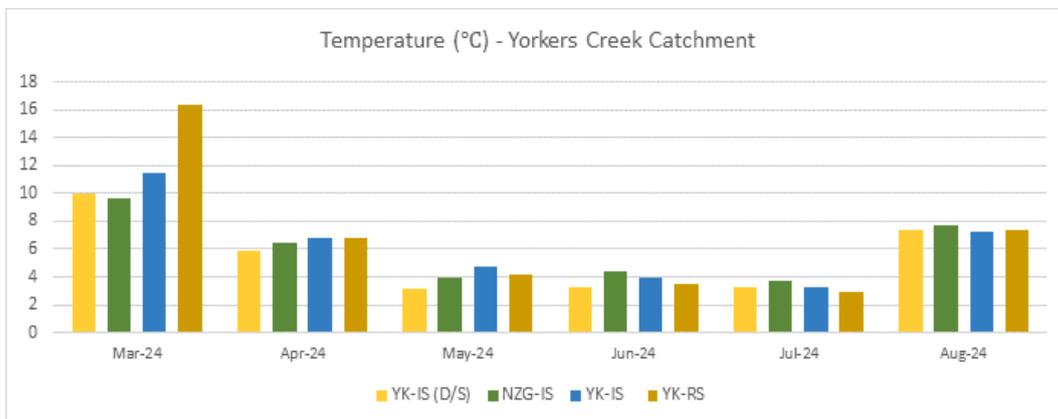


FIGURE 6: TEMPERATURE FOR YORKERS CREEK CATCHMENT

## pH

In August 2024, all sites recorded pH values within the SSGV range of 6.5 to 8.0, refer Figure 7 to Figure 9.

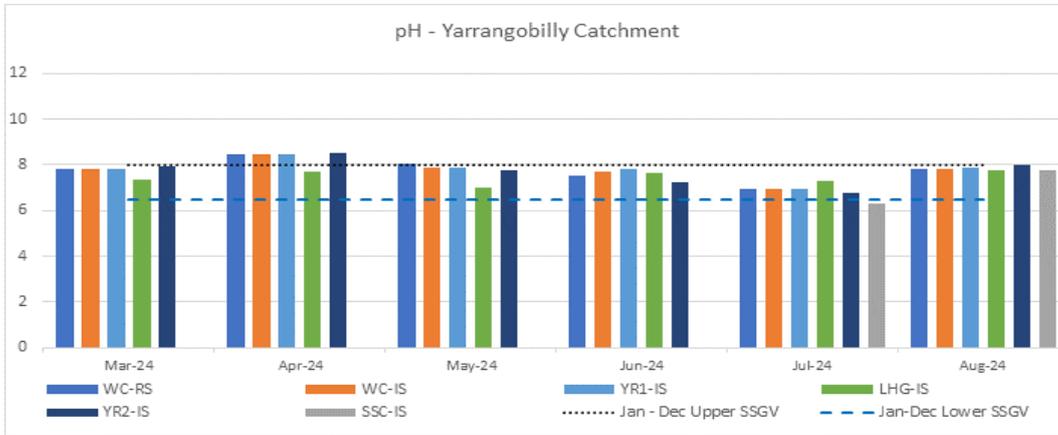


FIGURE 7: PH FOR YARRANGOBILLY CATCHMENT

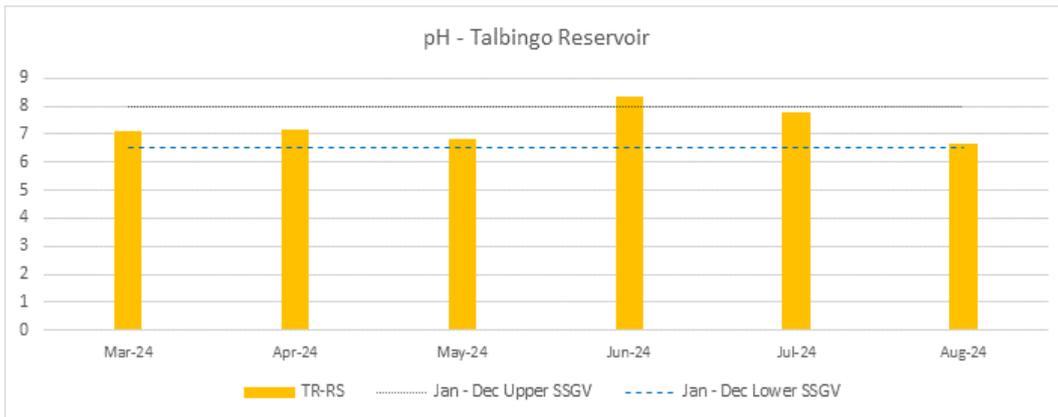


FIGURE 8: PH FOR TALBINGO RESERVOIR

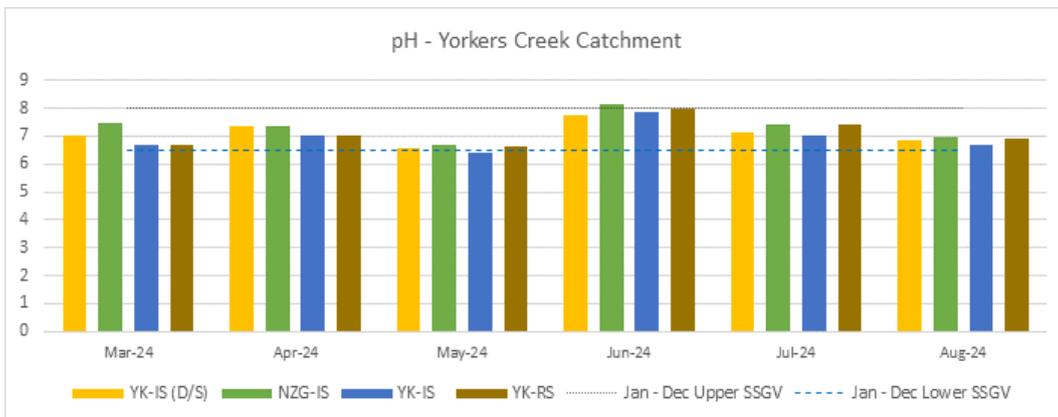


FIGURE 9: PH FOR YORKERS CREEK CATCHMENT

### Dissolved Oxygen

DO (%) levels at WC-RS in the Yarrangobilly catchment were below the SSGV range (90% to 110%), recording 80.6%. Two impact sites in the catchment, YR1-IS (89.8%) and LHG-IS (83%), also fell below the SSGV, refer to Figure 10. In the Talbingo Reservoir, DO levels were within the SSGV range at 91.5%, refer Figure 11. All DO results for the Yorkers Creek catchment remained below the SSGV range, consistent with baseline monitoring for this period, refer to Figure 12.

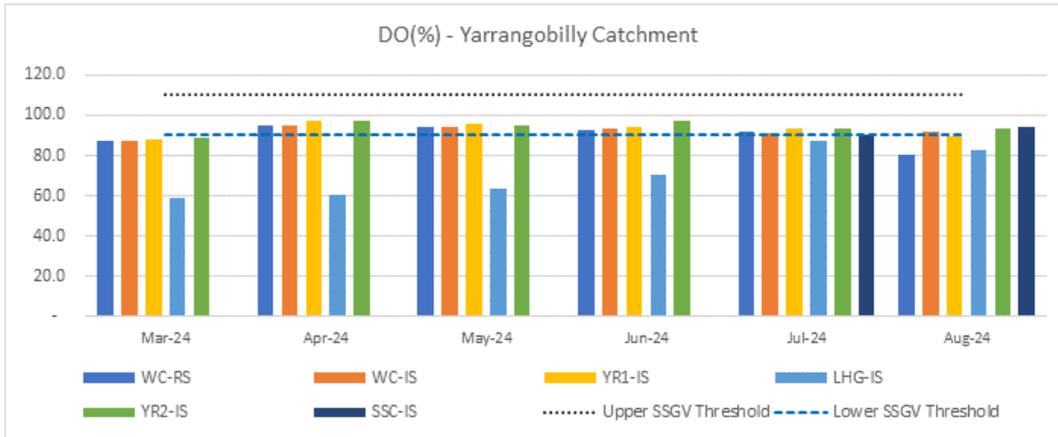


FIGURE 10: DO FOR YARRANGOBILLY CATCHMENT

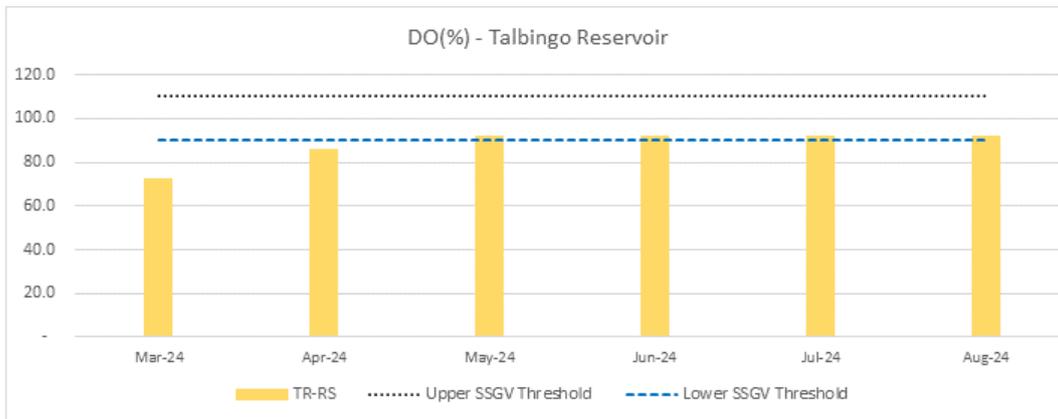


FIGURE 11: DO FOR TALBINGO RESERVOIR

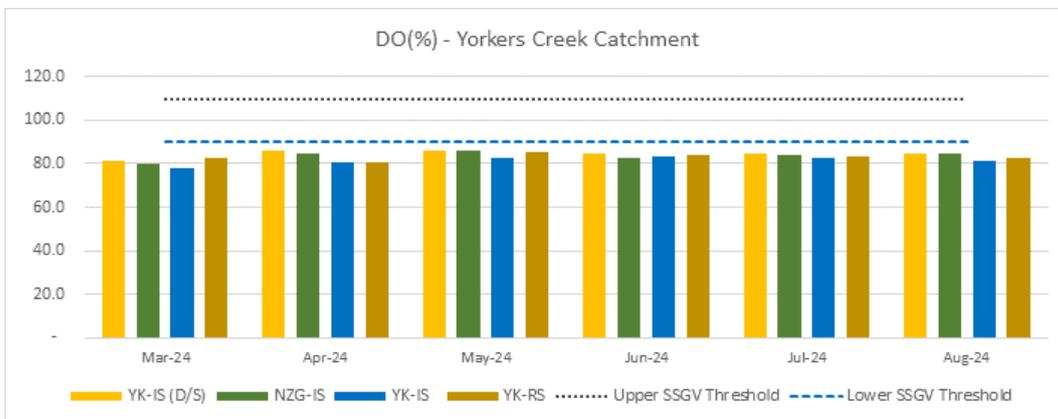


FIGURE 12: DO FOR YORKERS CREEK CATCHMENT

### Specific Conductance

Results for SPC ( $\mu\text{S}/\text{cm}$ ) show that all sites were below the respective June to November SSGV, with the exception of LHG-IS (408.8  $\mu\text{S}/\text{cm}$ ) which was notably higher than the SSGV (88  $\mu\text{S}/\text{cm}$ ), SSC-IS (120.9  $\mu\text{S}/\text{cm}$ ) which was moderately higher than the SSGV (88  $\mu\text{S}/\text{cm}$ ), and NZG-IS (28.9  $\mu\text{S}/\text{cm}$ ) which was marginally above the SSGV (27.9  $\mu\text{S}/\text{cm}$ ), refer to Figure 13 to Figure 15.

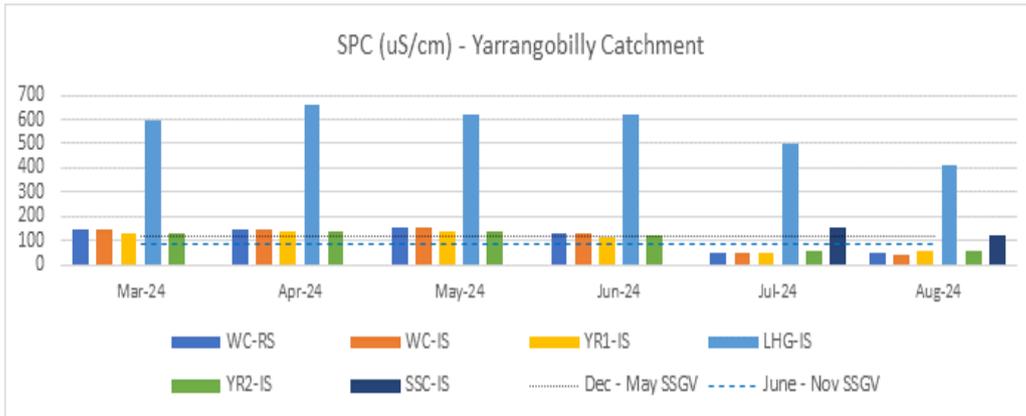


FIGURE 13: SPC FOR YARRANGOBILLY CATCHMENT

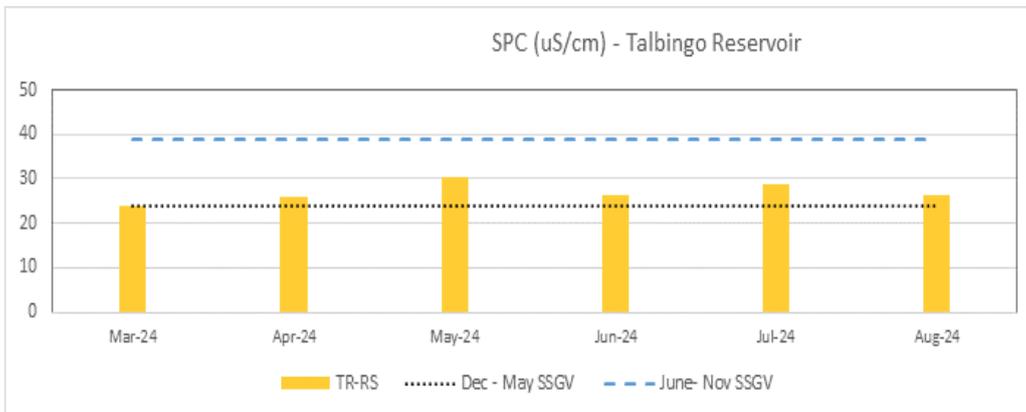


FIGURE 14: SPC FOR TALBINGO RESERVOIR

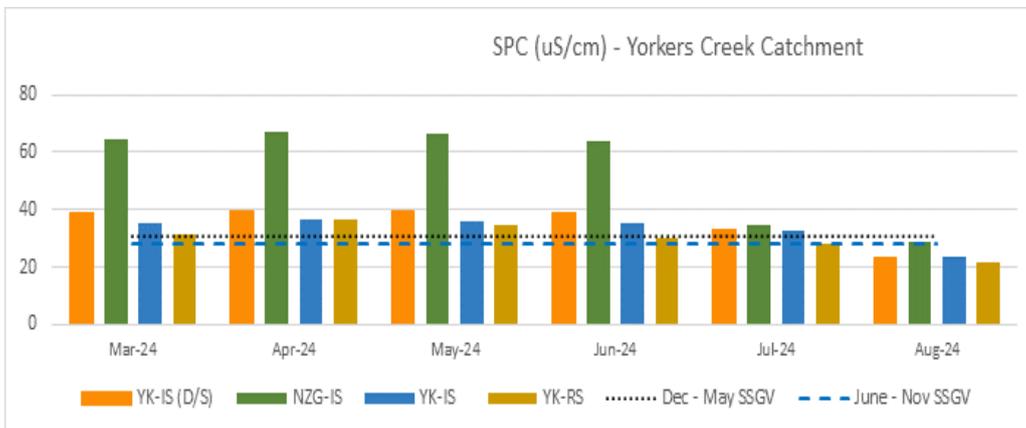


FIGURE 15: SPC FOR YORKERS CREEK CATCHMENT

### Turbidity

Turbidity (NTU) at three impact sites in the Yarrangobilly catchment exceeded the June to November SSGV (5.12 NTU). WC-IS recorded 5.85 NTU and YR2-IS 6.97 NTU, both slightly above the SSGV, while LHG-IS recorded a significantly higher value of 76.59 NTU, refer Figure 16. At the reference sites, Talbingo Reservoir (TR-RS) exceeded the SSGV of 1.56 NTU, and Yorkers Creek (YK-RS) exceeded its SSGV of 7.87 NTU. Additionally, all impact sites in the Yorkers Creek catchment were moderately above the SSGV, refer Figure 17 and Figure 18.

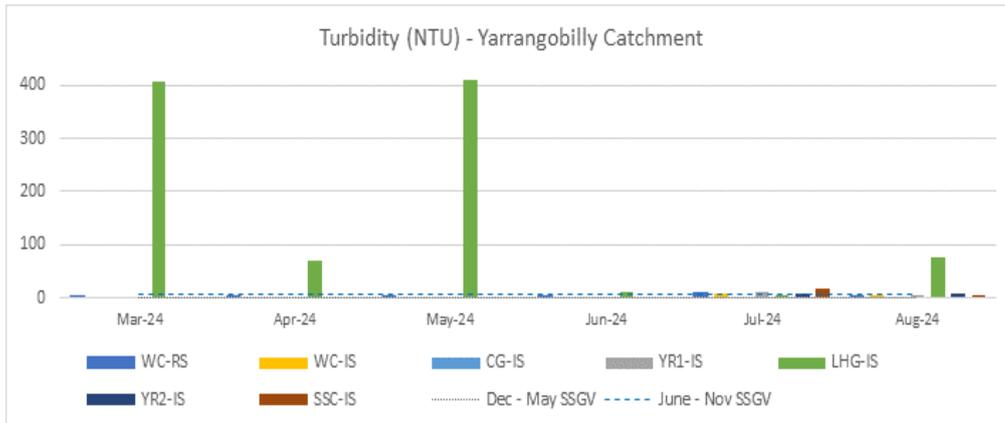


FIGURE 16: TURBIDITY FOR YARRANGOBILLY CATCHMENT

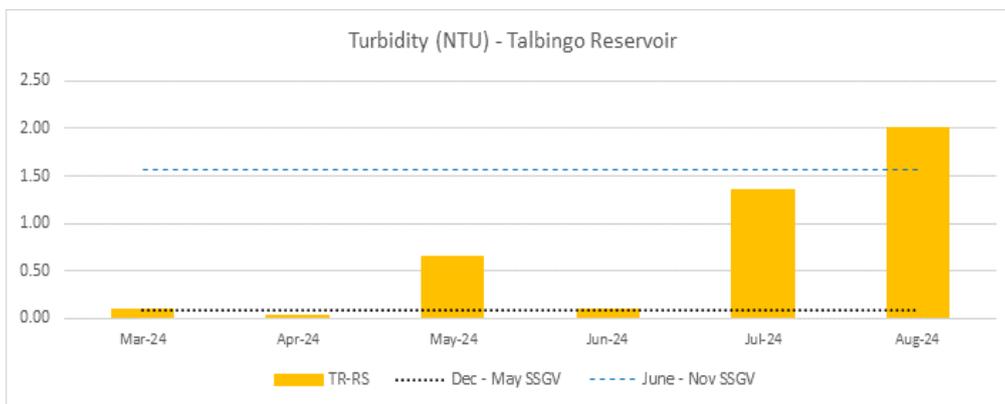


FIGURE 17: TURBIDITY FOR TALBINGO RESERVOIR

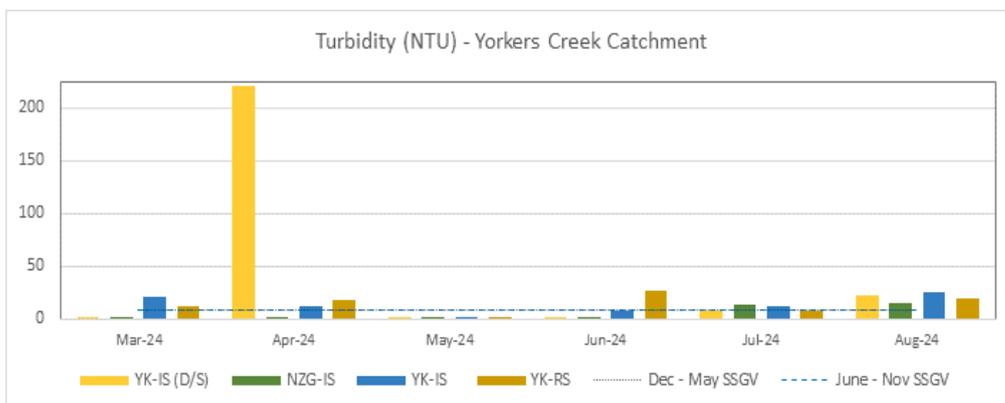


FIGURE 18: TURBIDITY FOR YORKERS CREEK CATCHMENT

### Total Suspended Solids

TSS (mg/L) levels exceeded the June to November SSGV at all reference and impact sites, except for Talbingo Reservoir (TR-RS), which remained below the LOR, refer Figure 19 to Figure 21.

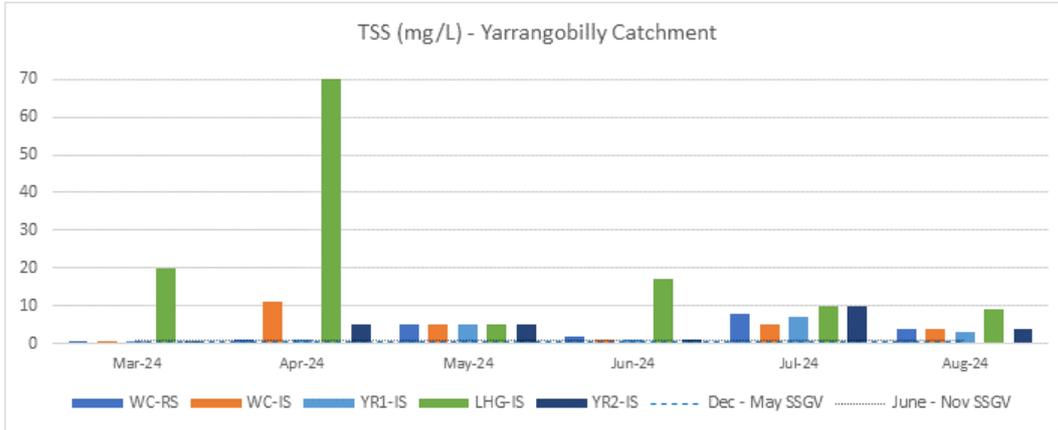


FIGURE 19: TSS FOR YARRANGOBILLY CATCHMENT

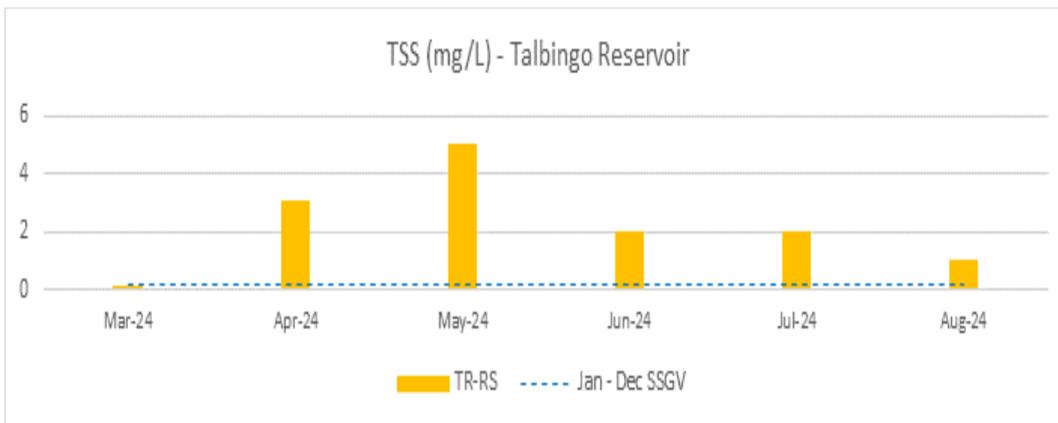


FIGURE 20: TSS FOR TALBINGO RESERVOIR

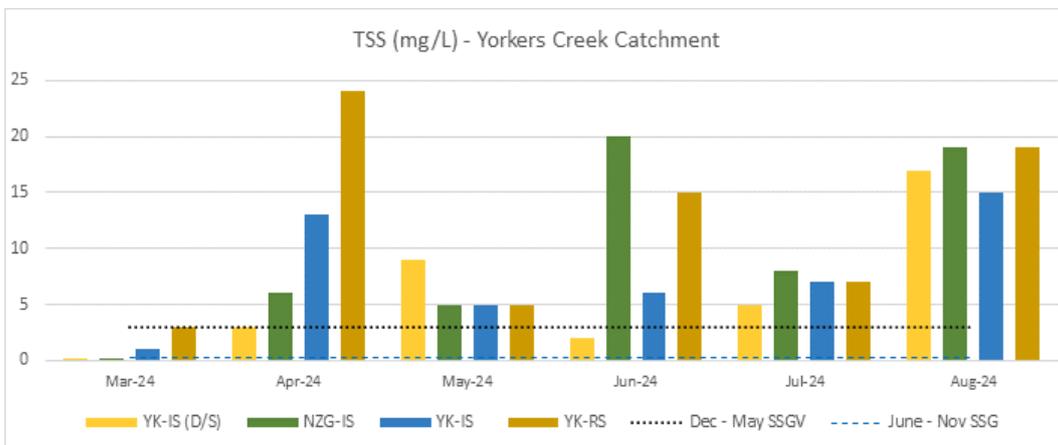


FIGURE 21: TSS FOR YORKERS CREEK CATCHMENT

## Ammonia

Ammonia (mg/L) levels were below the LOR at most sites, except for LHG-IS (0.02 mg/L), TR-RS (0.02 mg/L), and YK-IS (0.03 mg/L), which exceeded the SSGV of 0.013 mg/L, refer Figure 22 to Figure 24.

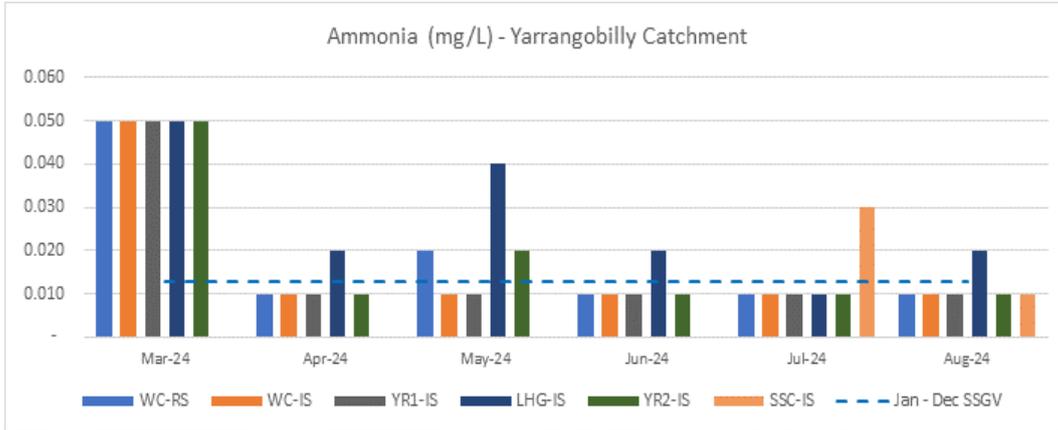


FIGURE 22: AMMONIA FOR YARRANGOBILLY CATCHMENT

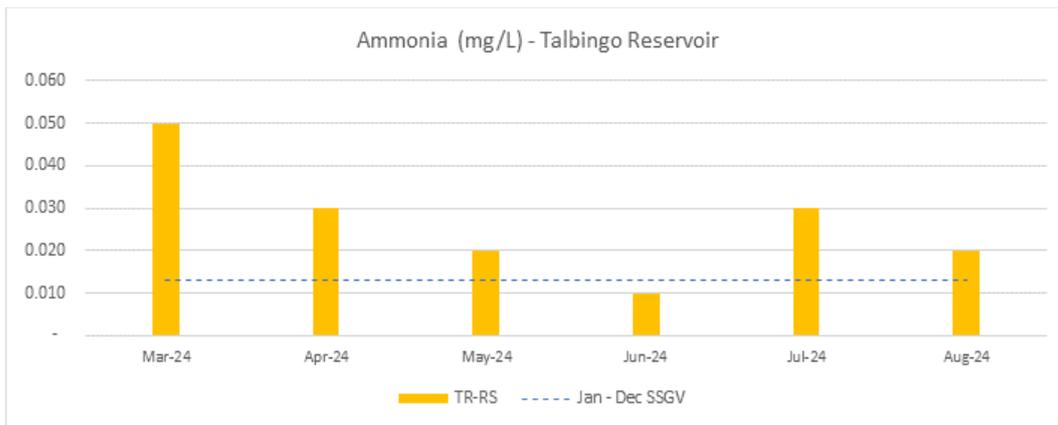


FIGURE 23: AMMONIA FOR TALBINGO RESERVOIR

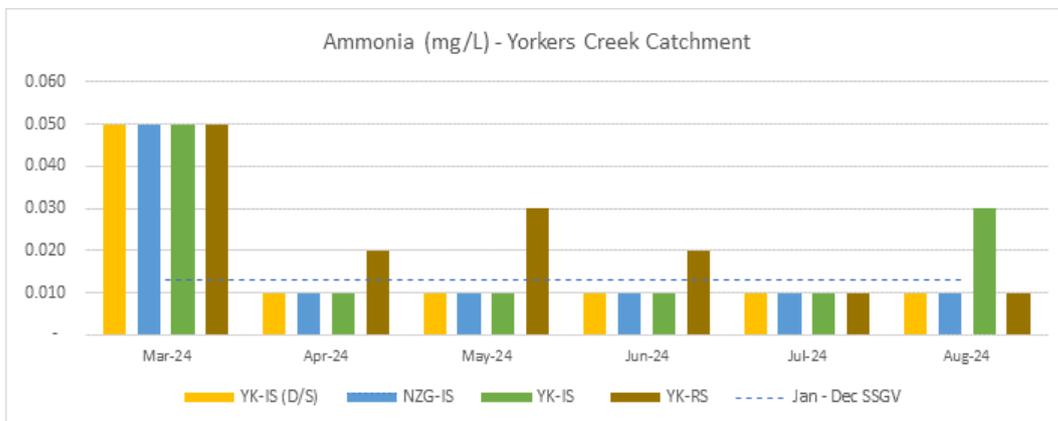


FIGURE 24: AMMONIA FOR YORKERS CREEK CATCHMENT

### Nitrogen Oxides

Nitrogen Oxides (mg/L) values were below the LOR at most sites, except for WC-IS (0.03 mg/L), TR-RS (0.07 mg/L), and YK-IS (D/S) (0.09 mg/L), all of which exceeded the June to November SSGV of 0.015 mg/L, refer to Figure 25 to Figure 27.

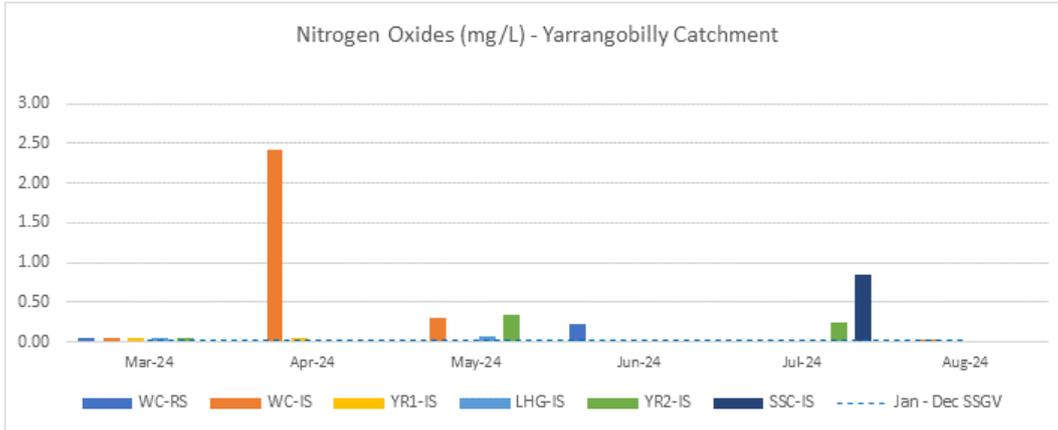


FIGURE 25: NITROGEN OXIDES FOR YARRANGOBILLY CATCHMENT

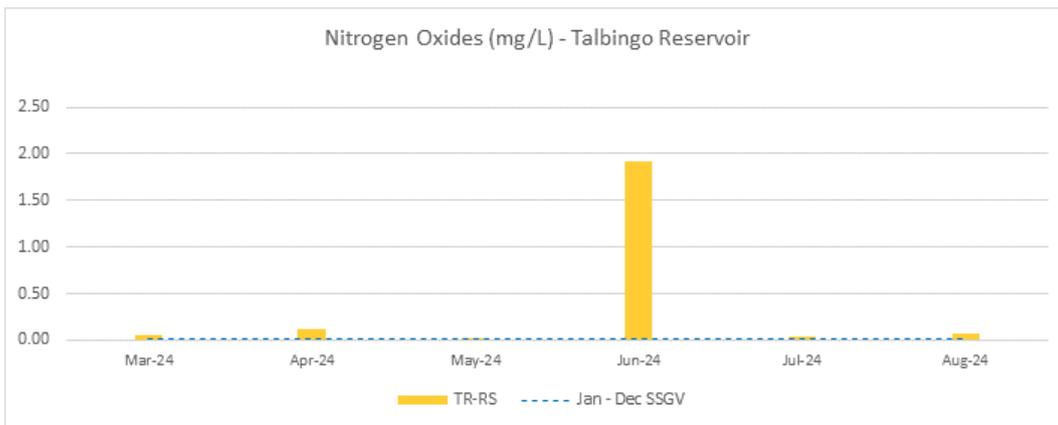


FIGURE 26: NITROGEN OXIDES FOR TALBINGO RESERVOIR

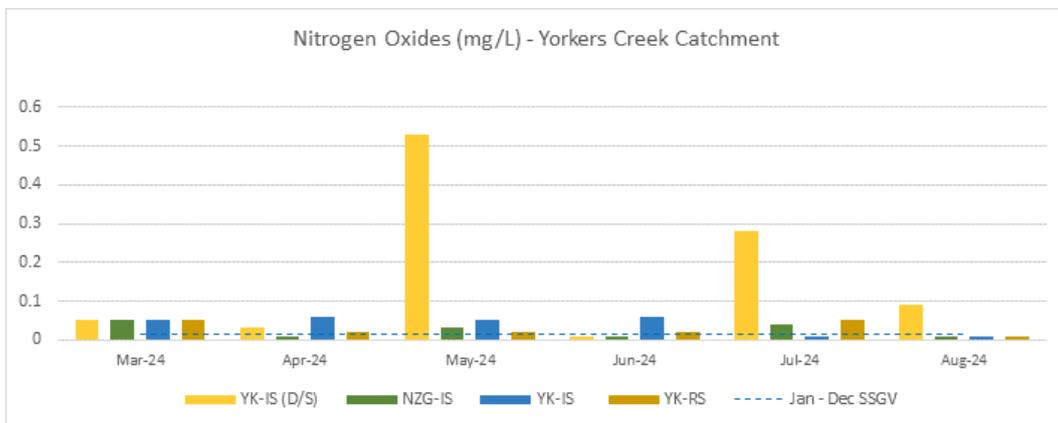


FIGURE 27: NITROGEN OXIDES FOR YORKERS CREEK CATCHMENT

### Total Kjeldahl Nitrogen

TKN (mg/L) values in the Yarrangobilly catchment were either below the LOR or below the SSGV of 0.2 mg/L, refer Figure 28. In the Talbingo Reservoir (TR-RS), levels were slightly above the SSGV at 0.3 mg/L, refer Figure 29. Within the Yorkers Creek catchment, all sites exceeded the June to November SSGV, with the reference site (YK-RS) recording the highest value at 0.9 mg/L, refer to Figure 30.

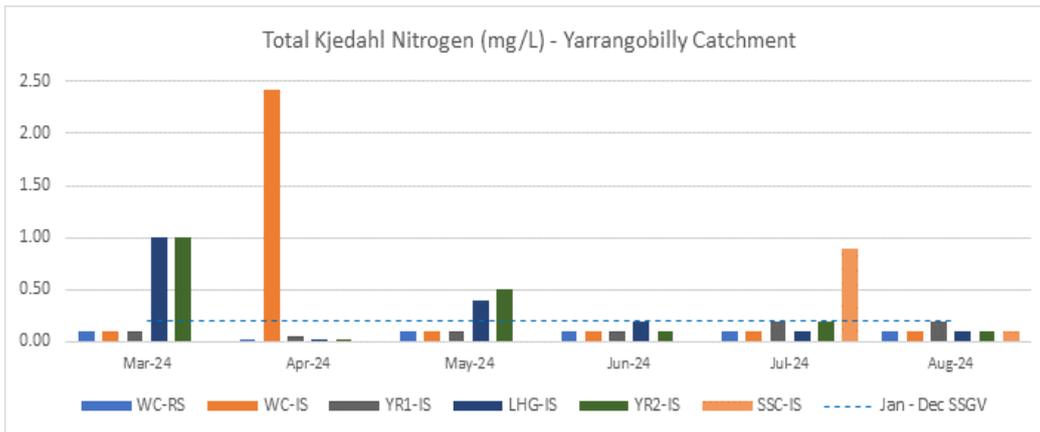


FIGURE 28: TOTAL KJELDAHL NITROGEN FOR YARRANGOBILLY CATCHMENT

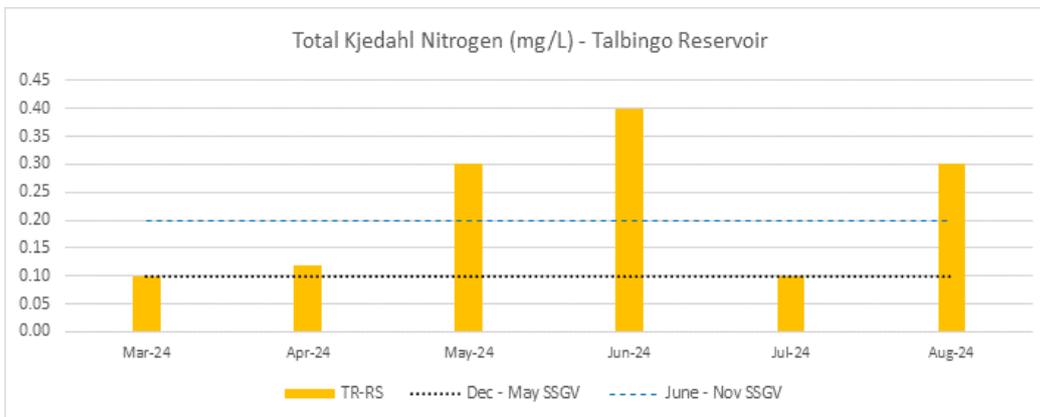


FIGURE 29: TOTAL KJELDAHL NITROGEN FOR TALBINGO RESERVOIR

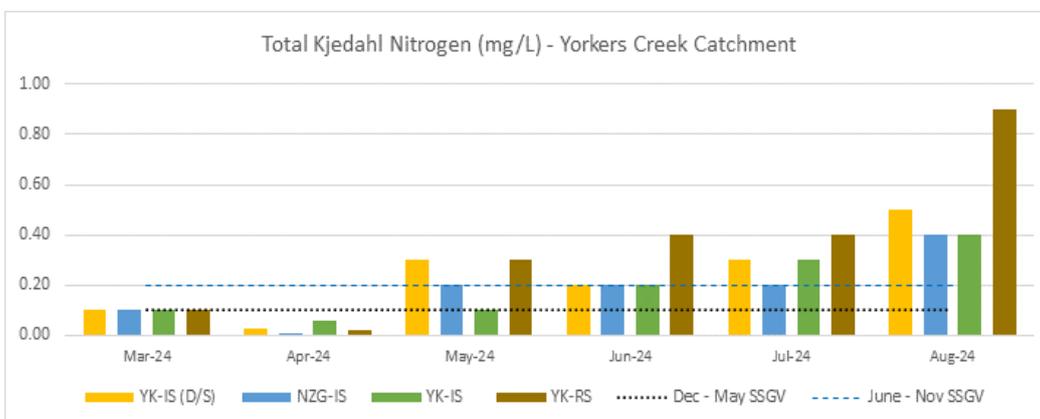


FIGURE 30: TOTAL KJELDAHL NITROGEN FOR YORKERS CREEK CATCHMENT

## Reactive Phosphorous

Reactive phosphorous (mg/L) was below the LOR at all sites, refer Figure 31 to Figure 33.

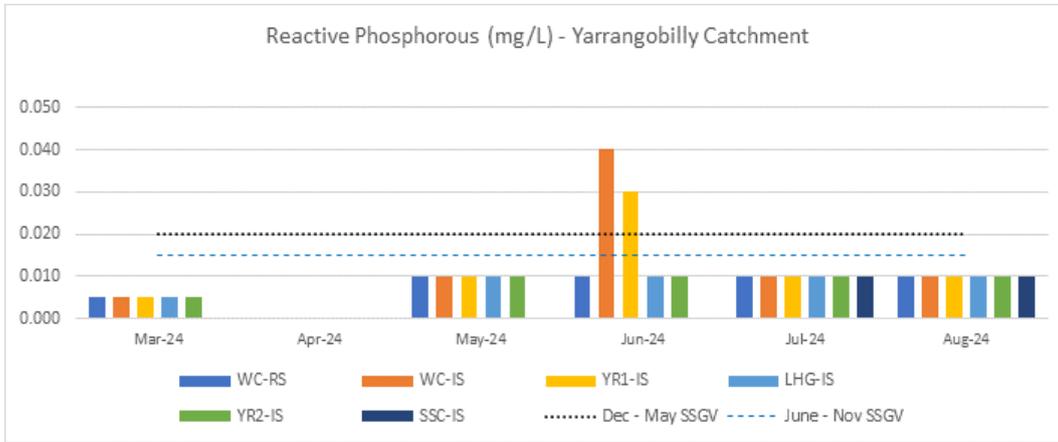


FIGURE 31: REACTIVE PHOSPHOROUS FOR YARRANGOBILLY CATCHMENT

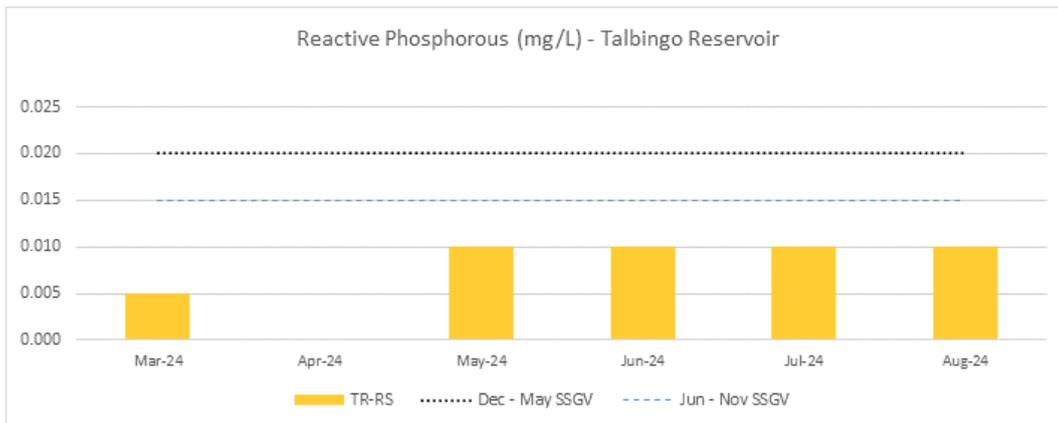


FIGURE 32: REACTIVE PHOSPHOROUS FOR TALBINGO RESERVOIR

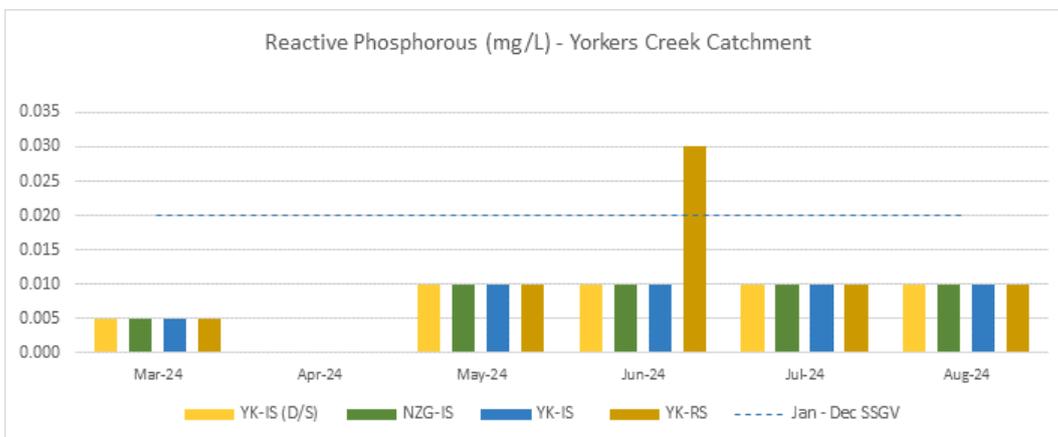


FIGURE 33: REACTIVE PHOSPHOROUS FOR YORKERS CREEK CATCHMENT

### Total Hardness

CaCO<sub>3</sub> (mg/L) results were below the June to November SSGV (30 mg/L) at the Yarrangobilly reference site (WC-RS) and the impact site (WC-IS). However, all other sites in the Yarrangobilly catchment exceeded the SSGV, with LHG-IS recording a significantly elevated value of 282 mg/L and SSC-IS moderately above the SSGV at 62 mg/L, refer Figure 34. In the Talbingo Reservoir (TR-RS), the recorded value of 12 mg/L exceeded the June to November SSGV of 8 mg/L, refer Figure 35. Within the Yorkers Creek catchment, all sites recorded values above the June to November SSGV of 7 mg/L, refer Figure 36.

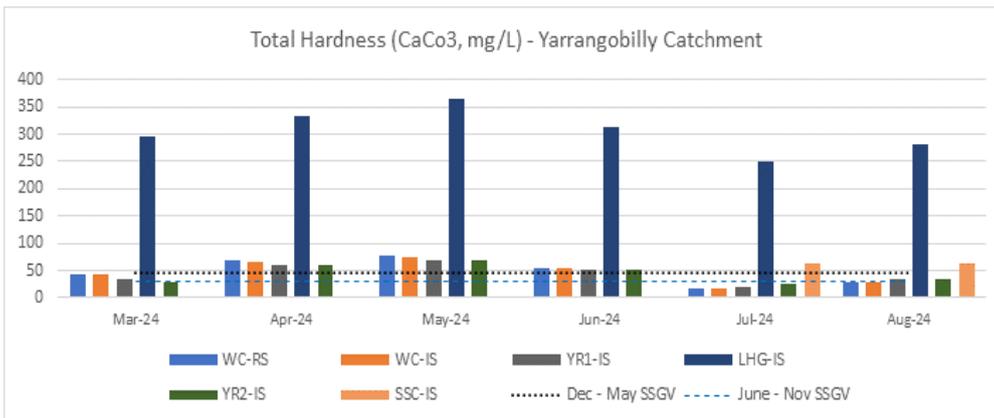


FIGURE 34: TOTAL HARDNESS FOR YARRANGOBILLY CATCHMENT

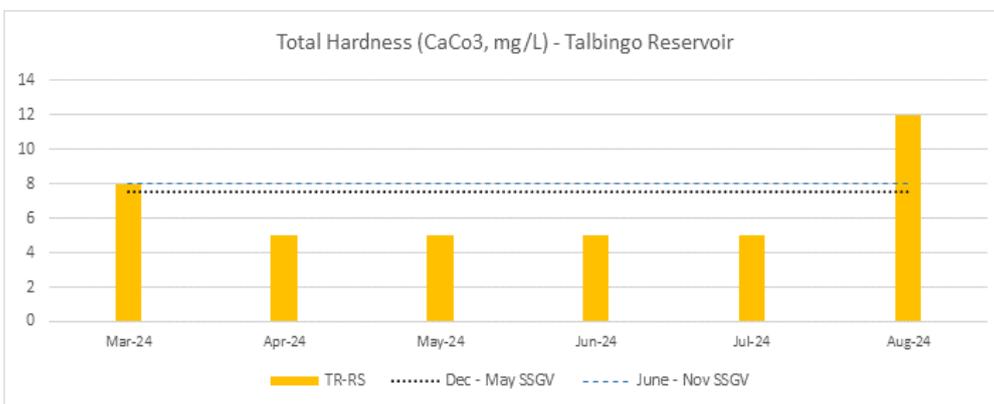


FIGURE 35: TOTAL HARDNESS FOR TALBINGO RESERVOIR

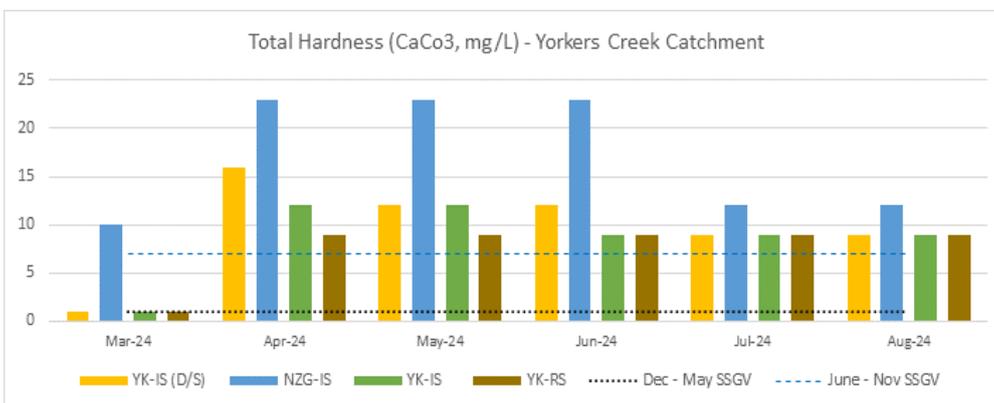


FIGURE 36: TOTAL HARDNESS FOR YORKERS CREEK CATCHMENT

### Total Nitrogen

TN (mg/L) values were either below the LOR or the June to November SSGV (0.2 mg/L) at all sites within the Yarrangobilly catchment, refer Figure 37. At the Talbingo Reservoir (TR-RS) reference site, TN was slightly above the SSGV at 0.4 mg/L, refer Figure 38. In the Yorkers Creek catchment, all sites exceeded the June to November SSGV, with the reference site (YK-RS) recording the highest value at 0.9 mg/L, refer to Figure 39.

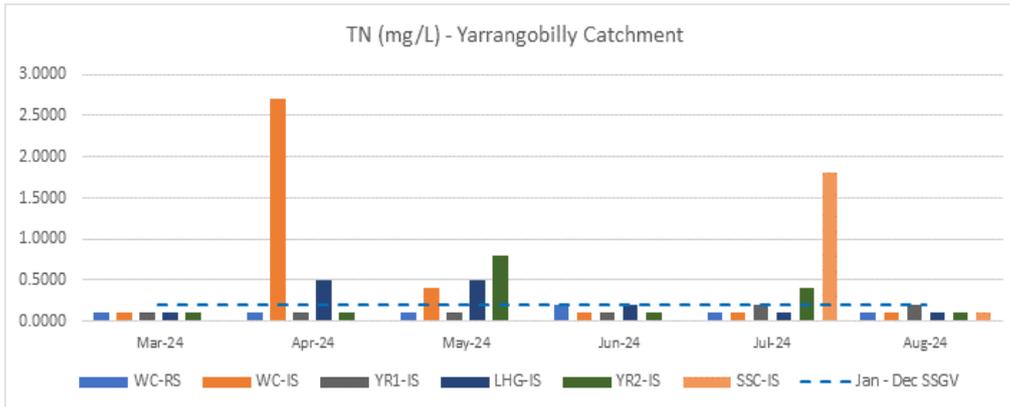


FIGURE 37: TOTAL NITROGEN FOR YARRANGOBILLY CATCHMENT

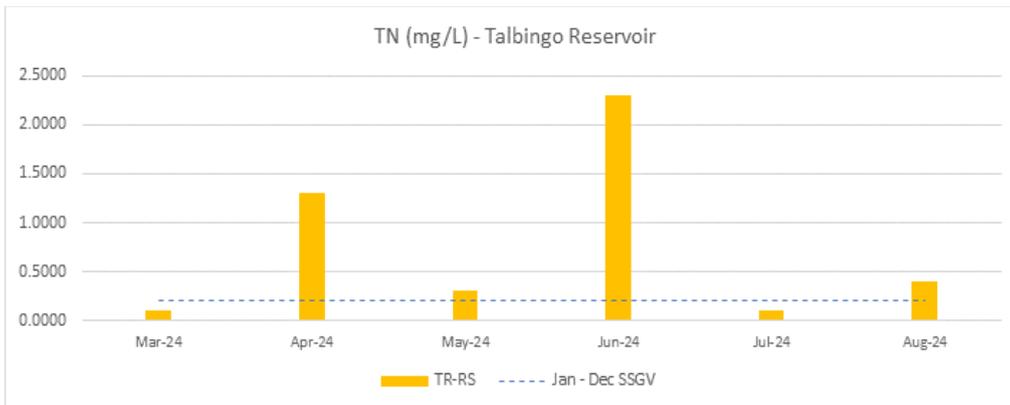


FIGURE 38: TOTAL NITROGEN FOR TALBINGO RESERVOIR

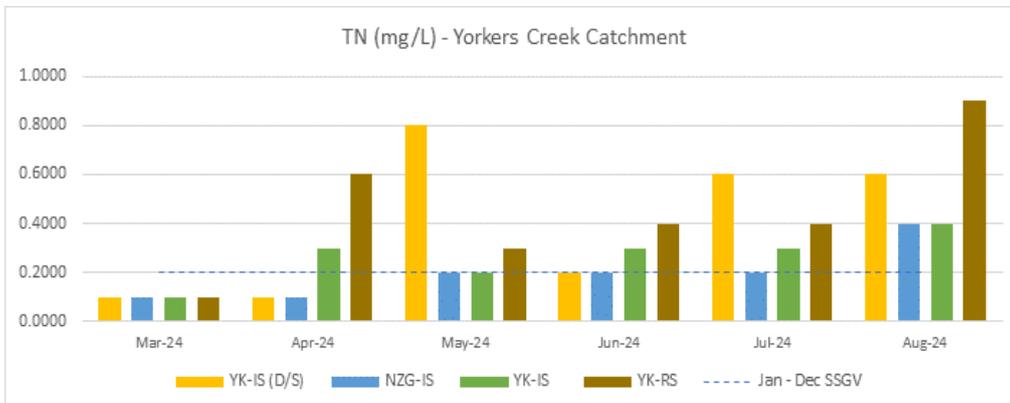


FIGURE 39: TOTAL NITROGEN FOR YORKERS CREEK CATCHMENT

### Total Phosphorous

TP (mg/L) values were either below the LOR or the June to November SSGV (0.02 mg/L) at all sites in the Yarrangobilly catchment and Talbingo Reservoir, refer Figure 40 and Figure 41. In the Yorkers Creek Catchment, all sites exceeded the June to November SSGV, with the reference site (YK-RS) recording the highest value at 0.07 mg/L, refer to Figure 42.

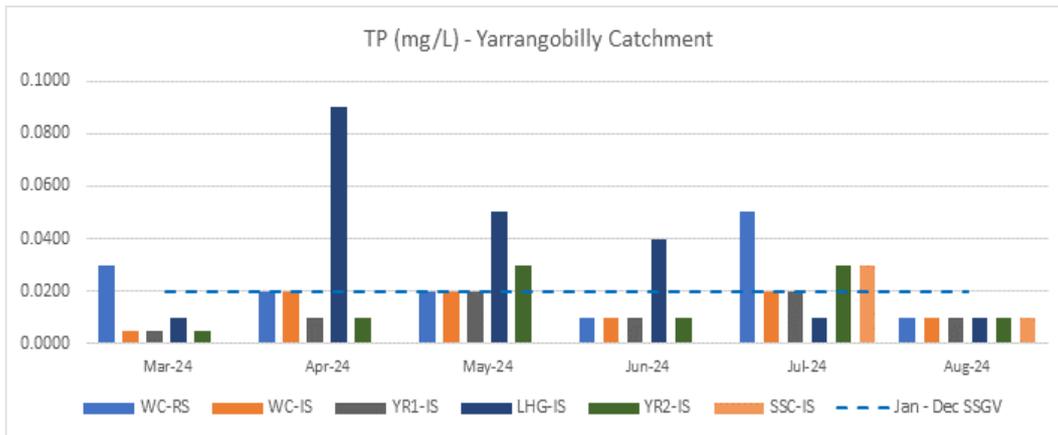


FIGURE 40: TOTAL PHOSPHOROUS FOR YARRANGOBILLY CATCHMENT

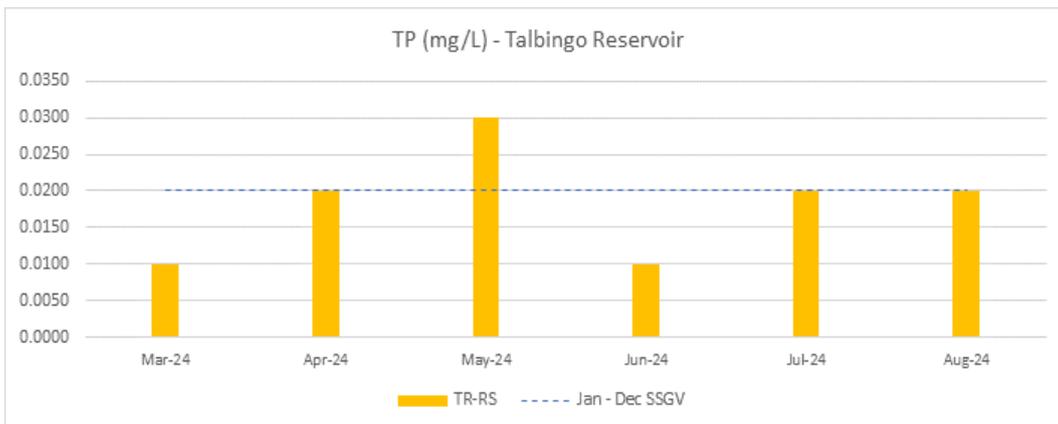


FIGURE 41: TOTAL PHOSPHOROUS FOR TALBINGO RESERVOIR

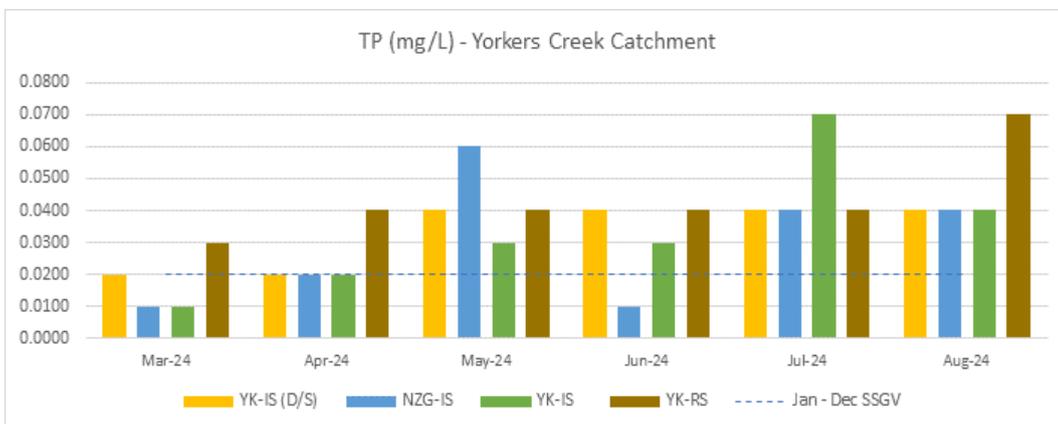


FIGURE 42: TOTAL PHOSPHOROUS FOR YORKERS CREEK CATCHMENT

### 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
Al	YR1-IS	0.07	0.04	Al (mg/L) levels were either below the LOR or the June to November SSGV for all sites within the Yarrangobilly catchment, except for YR1-IS and YR2-IS, which were slightly above the SSGV. Both reference sites, Talbingo Reservoir (TR-RS) and Yorkers Creek (YK-RS), exceeded their respective SSGVs, along with all impact sites in the Yorkers Creek catchment.
	YR2-IS	0.06		
	TR-RS	0.020	0.015	
	YK-RS	0.33	0.32	
	YK-IS (D/S)	0.51		
	NZG-IS	0.44		
	YK-IS	0.67		
Fe	LHG-IS	0.07	0.02	Fe (mg/L) levels were either below the LOR or the June to November SSGV at all sites in the Yarrangobilly catchment and Talbingo Reservoir, except for LHG-IS, which was slightly above the SSGV. In the Yorkers Creek catchment, Fe levels exceeded the SSGV at all sites.
	YK-RS	0.29		
	YK-IS (D/S)	0.34		
	NZG-IS	0.31		
	YK-IS	0.46		
Mn	LHG-IS	0.020	0.002	The June to November SSGV for Mn (mg/L) was exceeded at all sites within the Yorkers Creek catchment, as well as at LHG-IS in the Yarrangobilly catchment, which recorded the highest value of 0.02 mg/L.
	YK-RS	0.017	0.003	
	YK-IS (D/S)	0.011		
	NZG-IS	0.008		
	YK-IS	0.015		

### 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	WC-RS	0.06	0.027	Al (mg/L) levels exceeded the DGV at all reference and impact sites. Results in the Yorkers Creek catchment were significantly higher compared to those in the Yarrangobilly catchment and Talbingo Reservoir, with the Yorkers Creek reference site (YK-RS) recording the highest value of 1.82 mg/L.
	WC-IS	0.06		
	YR1-IS	0.12		
	LHG-IS	0.09		
	YR2-IS	0.11		
	SSC-IS	0.21		
	TR-RS	0.04		
	YK-RS	1.82		
	YK-IS (D/S)	1.02		
	YC-IS	1.22		
Cr	YK-RS	0.003	0.00001	Cr (mg/L) levels in the Yorkers Creek Catchment exceeded the DGV, including at the reference site (YK-RS). All other sites recorded values below the LOR.
	YK-IS (D/S)	0.005		
	YK-IS	0.003		
Zn	TR-RS	0.008	0.0024	The DGV for Zn (mg/L) was exceeded at Talbingo Reservoir. All other sites were below the LOR.
Fe	YK-RS	1.77	0.3	Fe (mg/L) levels were below the DGV or the LOR at all sites, except within the Yorkers Creek Catchment, where the reference site (YK-RS) recorded the highest value of 1.77 mg/L.
	YK-IS (D/S)	0.89		
	NZG-IS	0.85		
	YK-IS	0.99		

### 5.3. Discussion

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

- Construction activities on the transmission line were paused in June, July and August 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) impact site within the Yarrangobilly catchment was dry at the time of sampling.
- Visible milky discolouration to the water was observed at YK-RS and YK-IS, in the Yorkers Creek catchment.

- Horse hoof marks were evident close to 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, visible turbidity and low flow at the time of sampling.
- 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.
- 62.2 mm of rain was received between 17 and 26 August, prior to the sampling being undertaken on 25 and 26 August
- In August, temperatures exhibited a significant upward trend, with Yarrangobilly increasing to 8.6 °C to 12.1 °C, Talbingo Reservoir rising sharply to 12.7 °C, and Yorkers Creek slightly warming to 7.2 °C to 7.3 °C.
- In August, all sites recorded pH values within the SSGV range.
- In August, DO% levels at Yarrangobilly sites, including WC-RS, YR1-IS, and LHG-IS, fell below the SSGV, while Talbingo Reservoir stayed within the range. Yorkers Creek remained below the guideline.
- August saw heightened turbidity and TSS exceedances, particularly at LHG-IS and across Yorkers Creek.
- TKN and TN remained elevated, particularly in Yorkers Creek, with minimal improvement between months.
- Persistent exceedances for Al, Fe, and Mn across sites, with Yorkers Creek remaining the most impacted catchment.

## 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<sub>3</sub>, TN, TP and metals (both dissolved and total) were analysed.

In August 2024, temperatures across the catchments exhibited an upward trend. The Yarrangobilly catchment ranged between 8.6 °C and 12.1 °C, the Talbingo Reservoir increased significantly from 6.0 °C in July to 12.7 °C, and Yorkers Creek catchment temperatures rose slightly to 7.2 °C to 7.3 °C. All sites recorded pH values within the SSGV range of 6.5 to 8.0.

DO(%) levels were generally below the SSGV in the Yarrangobilly and Yorkers Creek catchments, with WC-RS, YR1-IS, and LHG-IS showing levels below the guideline. In contrast, Talbingo Reservoir remained within the SSGV range at 91.5%. SPC values were predominantly below the June to November SSGV, except for LHG-IS (408.8 µS/cm), SSC-IS (120.9 µS/cm), and NZG-IS (28.9 µS/cm), which exceeded their respective thresholds.

Turbidity levels were elevated at impact sites in Yarrangobilly, notably at LHG-IS (76.59 NTU), and at all sites within the Yorkers Creek catchment, where YK-RS slightly exceeded its SSGV. TSS exceeded the SSGV at all sites except Talbingo Reservoir (TR-RS), which remained below detection limits.

Ammonia levels were below the LOR for most sites but exceeded the SSGV at LHG-IS, TR-RS, and YK-IS. Nitrogen oxide levels were similarly low at most sites but exceeded the SSGV at WC-IS, TR-RS, and YK-IS (D/S). TKN values were either below the LOR or the SSGV in Yarrangobilly but exceeded the SSGV at Talbingo Reservoir and all Yorkers Creek sites, with YK-RS recording the highest value of 0.9 mg/L. TN was below the SSGV at most sites in Yarrangobilly but slightly exceeded it at Talbingo Reservoir and was consistently elevated in Yorkers Creek, where YK-RS recorded the highest value of 0.9 mg/L.

TP was below the SSGV in Yarrangobilly and Talbingo Reservoir but exceeded it across all sites in Yorkers Creek. Reactive phosphorus remained below the LOR at all sites.

Total Hardness exceeded the SSGV at most sites, with LHG-IS showing a notably high value of 282 mg/L. Talbingo Reservoir (TR-RS) and Yorkers Creek sites also exceeded their respective SSGVs.

Dissolved metals revealed exceedances for Al, Fe and Mn. Al exceeded the SSGV at several sites, including YR1-IS, YR2-IS, TR-RS, and all Yorkers Creek sites, where YK-RS recorded the highest value of 0.33 mg/L. Fe exceeded the SSGV in Yorkers Creek, with YK-RS recording 0.29 mg/L, while Mn was slightly above the SSGV at LHG-IS and all Yorkers Creek sites. Total metals showed consistent exceedances of the DGV for Al, Cr, Zn, and Fe, particularly in Yorkers Creek, where the reference site (YK-RS), recorded the highest Fe value of 1.77 mg/L and Al levels peaked at 1.82 mg/L.

## REFERENCES

- ALS. (2024a). ES2428198. *Certificate of Analysis*. NSW, Australia: ALS Limited.
- ALS. (2024b). ES2428198. *QA/QC Compliance Assessment to assist with Quality Review*. NSW, Australia: ALS Limited.
- ALS. (2024c). ES2428198. *Quality Control Report*. NSW, Australia: ALS Limited.
- ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. ACT, Australia: Australian and New Zealand Governments and Australian state and territory governments.
- Jacobs. (2020). *Environmental Impact Statement*. NSW: Transgrid.
- NGH. (2022). *Pre-construction Water Quality Monitoring Program and Methodology*. NSW: NGH Pty Ltd.
- NGH. (2024). *Baseline Water Quality Report*. NSW: NGH Pty Ltd.
- UGL. (2024a). August 2024. *Water Quality Monitoring Field Data Sheet*. NSW, Australia: UGL Limited.



## Appendix A: Field Sheet (UGL, 2024a)

## Water Quality Monitoring Field Data Sheet

25<sup>th</sup> & 26<sup>th</sup> AugustDate: ~~25/8/2018~~ ~~26/8/2018~~Sample Run/Event No.: ~~6C~~ 6C

Sampling Purpose: Monthly Water Sampling Event Samplers: Lachlan Whitford

Sample ID	Sample Location	Time	Temp (°C)	Water Pressure (mmHg)	Dissolved Oxygen (%)	Conductivity (SPC-µS/cm)	pH	Turbidity <del>FMF</del> NTU	TSS (mg/L)	Water level <input checked="" type="checkbox"/>	Description
WC-RS			10.4	66.1	80.0	47.1	7.90	1.8			5.9s - high flow rate, relatively clear
WC-RS			10.5	66.3	91.5	45.6	7.83	5.85			5.2s - "similar, clear, no visible sediment"
YR1-RS			8.6	66.7	89.8	55.8	7.87	3.62			9.7s - slower rate, rising on bank, & clear
YR1-RS			11.4	66.7	83.0	40.6	7.74	76.54			Flow rate slow, practically unmeasured flow, slight brown tinge
YR2-RS			9.3	66.3	93.5	58.5	7.98	6.99			7.2s flow little white bubbles, tannons?
SSG-RS			12.1	66.1	94.0	120.9	7.79	3.90			murkier than usual
TR-RS			12.7	66.1	91.50	26.3	6.67	2.00			Green algae on base of rock. Low flow 14.7s
YK-RS			7.3	66.3	82.7	21.6	6.89	19.36			10.3s, create elevated volume, brown tinge, no bubbles, flowing
YK-RS			7.2	66.7	81.3	23.5	6.70	25.12			6.5s Darker water than usual. Turbid, high flow rate.
YK-RSD			7.3	66.9	84.7	23.3	6.85	22.58			similar to above, increased volume few white caps
NZG-RS			7.7	67.0	84.4	28.9	6.95	15.47			Scummed flow <del>to</del> feeding into NTC-RS. <del>murky</del>
SR-RS			8.5	66.4	85.5	62.5	6.80	135.13			very visible suspended solids, red orange tinge to water

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



## CERTIFICATE OF ANALYSIS

Work Order	: <b>ES2428198</b>	Page	: 1 of 11
Client	: <b>UGL LIMITED</b>	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	: 28-Aug-2024 16:00
Order number	: 4501837828	Date Analysis Commenced	: 29-Aug-2024
C-O-C number	: 71874	Issue Date	: 04-Sep-2024 11:19
Sampler	: CAMILLE PALMER		
Site	: August Event Sampling		
Quote number	: ES24UGLLIM0001_V3		
No. of samples received	: 14		
No. of samples analysed	: 14		



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

### Signatories

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

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



## General Comments

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

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

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

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

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

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

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

- EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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	WC-RS	WC-IS	YR1-IS	LHG-IS	YR2-RS
Sampling date / time				25-Aug-2024 11:47	25-Aug-2024 12:03	25-Aug-2024 12:35	25-Aug-2024 12:54	25-Aug-2024 13:14	
Compound	CAS Number	LOR	Unit	ES2428198-001	ES2428198-002	ES2428198-003	ES2428198-004	ES2428198-005	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	---	0.01	pH Unit	7.45	7.59	7.72	8.17	7.66	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	---	1	µS/cm	61	61	74	567	81	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	---	10	mg/L	51	45	55	360	59	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	---	1	mg/L	4	4	3	9	4	
<b>EA045: Turbidity</b>									
Turbidity	---	0.1	NTU	2.0	2.0	1.9	8.5	2.2	
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	---	1	mg/L	28	28	33	282	33	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.07	<0.01	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	0.032	0.006	0.005	0.006	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.002	0.001	0.001	0.020	0.002	
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	0.07	<0.05	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.12	0.09	0.11	
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	



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	WC-RS	WC-IS	YR1-IS	LHG-IS	YR2-RS
Sampling date / time				25-Aug-2024 11:47	25-Aug-2024 12:03	25-Aug-2024 12:35	25-Aug-2024 12:54	25-Aug-2024 13:14	
Compound	CAS Number	LOR	Unit	ES2428198-001	ES2428198-002	ES2428198-003	ES2428198-004	ES2428198-005	
				Result	Result	Result	Result	Result	
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
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	<b>0.007</b>	<b>0.006</b>	<b>0.004</b>	<b>0.026</b>	<b>0.005</b>	
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	<b>0.07</b>	<b>0.06</b>	<b>0.09</b>	<b>0.17</b>	<b>0.09</b>	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EK026SF: Total CN by Segmented Flow Analyser</b>									
Total Cyanide	57-12-5	0.002	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	<b>0.01</b>	<0.01	<0.01	<b>0.02</b>	<0.01	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	<b>0.01</b>	<b>0.03</b>	<b>0.01</b>	<0.01	<b>0.01</b>	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	<b>0.01</b>	<b>0.03</b>	<b>0.01</b>	<0.01	<b>0.01</b>	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<b>0.1</b>	<b>0.2</b>	<b>0.1</b>	<0.1	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	<b>0.1</b>	<b>0.2</b>	<b>0.1</b>	<0.1	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	<b>0.01</b>	<0.01	<0.01	<0.01	<0.01	



### Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	WC-RS	WC-IS	YR1-IS	LHG-IS	YR2-RS
Sampling date / time				25-Aug-2024 11:47	25-Aug-2024 12:03	25-Aug-2024 12:35	25-Aug-2024 12:54	25-Aug-2024 13:14	
Compound	CAS Number	LOR	Unit	ES2428198-001	ES2428198-002	ES2428198-003	ES2428198-004	ES2428198-005	
				Result	Result	Result	Result	Result	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EP025: Oxygen - Dissolved (DO)</b>									
Dissolved Oxygen	----	0.1	mg/L	9.9	10.2	10.0	9.4	10.3	



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	SSC-IS	SP-IS	QAQC BLANK	TR-RS-1	YK-RS-1
Sampling date / time				25-Aug-2024 13:29	26-Aug-2024 12:07	26-Aug-2024 16:43	25-Aug-2024 15:25	26-Aug-2024 09:30	
Compound	CAS Number	LOR	Unit	ES2428198-006	ES2428198-007	ES2428198-008	ES2428198-015	ES2428198-016	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	---	0.01	pH Unit	7.77	7.24	6.23	7.24	6.89	
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	---	1	µS/cm	164	82	<1	34	27	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	---	10	mg/L	110	129	<10	30	34	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	---	1	mg/L	5	50	<1	1	19	
<b>EA045: Turbidity</b>									
Turbidity	---	0.1	NTU	6.9	119	<0.1	1.1	26.8	
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	---	1	mg/L	62	25	<1	12	9	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	0.04	2.28	<0.01	0.02	0.33	
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	0.002	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	<0.001	0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	<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	0.011	0.012	
Manganese	7439-96-5	0.001	mg/L	<0.001	0.046	<0.001	0.002	0.017	
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	1.30	<0.05	<0.05	0.29	
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	0.21	5.43	<0.01	0.04	1.82	
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	



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	SSC-IS	SP-IS	QAQC BLANK	TR-RS-1	YK-RS-1
Sampling date / time				25-Aug-2024 13:29	26-Aug-2024 12:07	26-Aug-2024 16:43	25-Aug-2024 15:25	26-Aug-2024 09:30	
Compound	CAS Number	LOR	Unit	ES2428198-006	ES2428198-007	ES2428198-008	ES2428198-015	ES2428198-016	
				Result	Result	Result	Result	Result	
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
Chromium	7440-47-3	0.001	mg/L	<0.001	0.006	<0.001	<0.001	0.003	
Copper	7440-50-8	0.001	mg/L	<0.001	0.003	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.005	<0.001	<0.001	0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	0.002	<0.001	<0.001	0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.009	<0.005	0.008	<0.005	
Manganese	7439-96-5	0.001	mg/L	<0.001	0.089	<0.001	0.004	0.076	
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	0.09	4.17	<0.05	<0.05	1.77	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EK026SF: Total CN by Segmented Flow Analyser</b>									
Total Cyanide	57-12-5	0.002	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.02	<0.01	0.02	<0.01	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.10	<0.01	0.07	<0.01	
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.10	<0.01	0.07	<0.01	
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.2	<0.1	0.3	0.9	
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	0.1	0.3	<0.1	0.4	0.9	
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.10	<0.01	0.02	0.07	



### Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	SSC-IS	SP-IS	QAQC BLANK	TR-RS-1	YK-RS-1
Sampling date / time				25-Aug-2024 13:29	26-Aug-2024 12:07	26-Aug-2024 16:43	25-Aug-2024 15:25	26-Aug-2024 09:30	
Compound	CAS Number	LOR	Unit	ES2428198-006	ES2428198-007	ES2428198-008	ES2428198-015	ES2428198-016	
				Result	Result	Result	Result	Result	
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
<b>EP025: Oxygen - Dissolved (DO)</b>									
Dissolved Oxygen	----	0.1	mg/L	9.9	10.2	9.9	9.8	9.8	



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	YK-IS-1	YK-IS(d/s)-1	NZG-IS-1	NZG-IS REPLICATE-1	----
Sampling date / time				26-Aug-2024 09:57	26-Aug-2024 11:09	26-Aug-2024 11:33	26-Aug-2024 11:38	----	----
Compound	CAS Number	LOR	Unit	ES2428198-017	ES2428198-018	ES2428198-019	ES2428198-020	-----	----
				Result	Result	Result	Result	----	----
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	<b>6.85</b>	<b>6.95</b>	<b>7.12</b>	<b>7.17</b>	----	----
<b>EA010P: Conductivity by PC Titrator</b>									
Electrical Conductivity @ 25°C	----	1	µS/cm	<b>30</b>	<b>30</b>	<b>38</b>	<b>38</b>	----	----
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	<b>62</b>	<b>70</b>	<b>44</b>	<b>42</b>	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>									
Suspended Solids (SS)	----	1	mg/L	<b>15</b>	<b>17</b>	<b>19</b>	<b>18</b>	----	----
<b>EA045: Turbidity</b>									
Turbidity	----	0.1	NTU	<b>29.4</b>	<b>23.1</b>	<b>18.3</b>	<b>15.9</b>	----	----
<b>ED093F: SAR and Hardness Calculations</b>									
Total Hardness as CaCO3	----	1	mg/L	<b>9</b>	<b>9</b>	<b>12</b>	<b>12</b>	----	----
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<b>0.67</b>	<b>0.51</b>	<b>0.44</b>	<b>0.44</b>	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<b>0.001</b>	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<b>0.002</b>	<b>0.001</b>	<b>0.001</b>	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<b>0.005</b>	<0.005	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L	<b>0.015</b>	<b>0.011</b>	<b>0.008</b>	<b>0.008</b>	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Iron	7439-89-6	0.05	mg/L	<b>0.46</b>	<b>0.34</b>	<b>0.31</b>	<b>0.31</b>	----	----
<b>EG020T: Total Metals by ICP-MS</b>									
Aluminium	7429-90-5	0.01	mg/L	<b>1.22</b>	<b>1.02</b>	<b>0.92</b>	<b>0.86</b>	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	----



## Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	YK-IS-1	YK-IS(d/s)-1	NZG-IS-1	NZG-IS REPLICATE-1	----
Sampling date / time				26-Aug-2024 09:57	26-Aug-2024 11:09	26-Aug-2024 11:33	26-Aug-2024 11:38	----	----
Compound	CAS Number	LOR	Unit	ES2428198-017	ES2428198-018	ES2428198-019	ES2428198-020	-----	----
				Result	Result	Result	Result	----	----
<b>EG020T: Total Metals by ICP-MS - Continued</b>									
Chromium	7440-47-3	0.001	mg/L	0.003	0.005	0.001	0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L	0.026	0.026	0.023	0.022	----	----
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	----
Iron	7439-89-6	0.05	mg/L	0.99	0.89	0.85	0.80	----	----
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	----
<b>EK026SF: Total CN by Segmented Flow Analyser</b>									
Total Cyanide	57-12-5	0.002	mg/L	<0.002	<0.002	<0.002	<0.002	----	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	<0.01	<0.01	<0.01	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.09	0.01	0.07	----	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.09	0.01	0.07	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.5	0.4	0.3	----	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>									
^ Total Nitrogen as N	----	0.1	mg/L	0.4	0.6	0.4	0.4	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>									
Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.02	----	----



**Analytical Results**

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	YK-IS-1	YK-IS(d/s)-1	NZG-IS-1	NZG-IS REPLICATE-1	----
Sampling date / time					26-Aug-2024 09:57	26-Aug-2024 11:09	26-Aug-2024 11:33	26-Aug-2024 11:38	----
Compound	CAS Number	LOR	Unit		ES2428198-017	ES2428198-018	ES2428198-019	ES2428198-020	-----
					Result	Result	Result	Result	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	0.01	0.01	0.01	----
<b>EP025: Oxygen - Dissolved (DO)</b>									
Dissolved Oxygen	----	0.1	mg/L		9.7	9.8	9.9	9.9	----



## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2428198	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	: 28-Aug-2024
Site	: August Event Sampling	Issue Date	: 04-Sep-2024
Sampler	: CAMILLE PALMER	No. of samples received	: 14
Order number	: 4501837828	No. of samples analysed	: 14

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

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



**Outliers : Analysis Holding Time Compliance**

Matrix: WATER

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EA005P: pH by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	----	----	----	30-Aug-2024	25-Aug-2024	5
<b>Clear Plastic Bottle - Natural</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	----	----	----	30-Aug-2024	26-Aug-2024	4
<b>EA045: Turbidity</b>							
<b>Clear Plastic Bottle - Natural</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	----	----	----	29-Aug-2024	27-Aug-2024	2
<b>Clear Plastic Bottle - Natural</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	----	----	----	29-Aug-2024	28-Aug-2024	1
<b>EK057G: Nitrite as N by Discrete Analyser</b>							
<b>Clear Plastic Bottle - Natural</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	----	----	----	31-Aug-2024	27-Aug-2024	4
<b>Clear Plastic Bottle - Natural</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	----	----	----	31-Aug-2024	28-Aug-2024	3
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>							
<b>Clear Plastic Bottle - Natural</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	----	----	----	31-Aug-2024	27-Aug-2024	4



Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EK071G: Reactive Phosphorus as P by discrete analyser - Analysis Holding Time Compliance</b>							
<b>Clear Plastic Bottle - Natural</b> SP-IS,                                      QAQC BLANK, YK-RS-1,                                    YK-IS-1, YK-IS(d/s)-1,                                NZG-IS-1, NZG-IS REPLICATE-1	----	----	----		31-Aug-2024	28-Aug-2024	3
<b>EP025: Oxygen - Dissolved (DO)</b>							
<b>Clear Plastic Bottle - Natural</b> WC-RS,                                      WC-IS, YR1-IS,                                        LHG-IS, YR2-RS,                                        SSC-IS, TR-RS-1	----	----	----		29-Aug-2024	25-Aug-2024	4
<b>Clear Plastic Bottle - Natural</b> SP-IS,                                      QAQC BLANK, YK-RS-1,                                    YK-IS-1, YK-IS(d/s)-1,                                NZG-IS-1, NZG-IS REPLICATE-1	----	----	----		29-Aug-2024	26-Aug-2024	3

**Outliers : Frequency of Quality Control Samples**

Matrix: <b>WATER</b>						
Quality Control Sample Type	Method	Count		Rate (%)		Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected	
<b>Laboratory Control Samples (LCS)</b>						
Conductivity by Auto Titrator	EA010-P	4	54	7.41	8.33	NEPM 2013 B3 & ALS QC Standard

**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	Sample Date	Extraction / Preparation			Analysis		
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis



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	
<b>EA005P: pH by PC Titrator</b>								
Clear Plastic Bottle - Natural (EA005-P) WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	25-Aug-2024	✘
Clear Plastic Bottle - Natural (EA005-P) SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	26-Aug-2024	✘
<b>EA010P: Conductivity by PC Titrator</b>								
Clear Plastic Bottle - Natural (EA010-P) WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	22-Sep-2024	✔
Clear Plastic Bottle - Natural (EA010-P) SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	23-Sep-2024	✔
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Clear Plastic Bottle - Natural (EA015H) WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	01-Sep-2024	✔
Clear Plastic Bottle - Natural (EA015H) SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	02-Sep-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	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
<b>Clear Plastic Bottle - Natural (EA025)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	01-Sep-2024	✔
<b>Clear Plastic Bottle - Natural (EA025)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	02-Sep-2024	✔
<b>EA045: Turbidity</b>								
<b>Clear Plastic Bottle - Natural (EA045)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	29-Aug-2024	27-Aug-2024	✖
<b>Clear Plastic Bottle - Natural (EA045)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	29-Aug-2024	28-Aug-2024	✖
<b>ED093F: SAR and Hardness Calculations</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	22-Sep-2024	✔
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	23-Sep-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	
<b>EG020F: Dissolved Metals by ICP-MS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	21-Feb-2025	✓
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	22-Feb-2025	✓
<b>EG020T: Total Metals by ICP-MS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	30-Aug-2024	21-Feb-2025	✓	30-Aug-2024	21-Feb-2025	✓
<b>Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	30-Aug-2024	22-Feb-2025	✓	30-Aug-2024	22-Feb-2025	✓
<b>EG035F: Dissolved Mercury by FIMS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	02-Sep-2024	22-Sep-2024	✓
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	02-Sep-2024	23-Sep-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	
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
<b>Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	02-Sep-2024	22-Sep-2024	✓
<b>Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	02-Sep-2024	23-Sep-2024	✓
<b>EK026SF: Total CN by Segmented Flow Analyser</b>								
<b>Black Opaque Plastic Bottle - NaOH (EK026SF)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	02-Sep-2024	08-Sep-2024	✓
<b>Black Opaque Plastic Bottle - NaOH (EK026SF)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	02-Sep-2024	09-Sep-2024	✓
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
<b>Clear Plastic Bottle - Sulfuric Acid (EK055G)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1	WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	22-Sep-2024	✓
<b>Clear Plastic Bottle - Sulfuric Acid (EK055G)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1	QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	23-Sep-2024	✓



Matrix: **WATER** Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EK057G: Nitrite as N by Discrete Analyser</b>									
<b>Clear Plastic Bottle - Natural (EK057G)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1		WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	31-Aug-2024	27-Aug-2024	✘
<b>Clear Plastic Bottle - Natural (EK057G)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1		QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	31-Aug-2024	28-Aug-2024	✘
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>									
<b>Clear Plastic Bottle - Sulfuric Acid (EK059G)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1		WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	----	----	----	30-Aug-2024	22-Sep-2024	✔
<b>Clear Plastic Bottle - Sulfuric Acid (EK059G)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1		QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	----	----	----	30-Aug-2024	23-Sep-2024	✔
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>									
<b>Clear Plastic Bottle - Sulfuric Acid (EK061G)</b> WC-RS, YR1-IS, YR2-RS, TR-RS-1		WC-IS, LHG-IS, SSC-IS,	25-Aug-2024	30-Aug-2024	22-Sep-2024	✔	31-Aug-2024	22-Sep-2024	✔
<b>Clear Plastic Bottle - Sulfuric Acid (EK061G)</b> SP-IS, YK-RS-1, YK-IS(d/s)-1, NZG-IS REPLICATE-1		QAQC BLANK, YK-IS-1, NZG-IS-1,	26-Aug-2024	30-Aug-2024	23-Sep-2024	✔	31-Aug-2024	23-Sep-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
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>							
Clear Plastic Bottle - Sulfuric Acid (EK067G) YR1-IS, LHG-IS, YR2-RS, SSC-IS	25-Aug-2024	30-Aug-2024	22-Sep-2024	✔	30-Aug-2024	22-Sep-2024	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) WC-RS, WC-IS, TR-RS-1	25-Aug-2024	30-Aug-2024	22-Sep-2024	✔	31-Aug-2024	22-Sep-2024	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) QAQC BLANK	26-Aug-2024	30-Aug-2024	23-Sep-2024	✔	30-Aug-2024	23-Sep-2024	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) SP-IS, YK-RS-1, YK-IS-1, YK-IS(d/s)-1, NZG-IS-1, NZG-IS REPLICATE-1	26-Aug-2024	30-Aug-2024	23-Sep-2024	✔	31-Aug-2024	23-Sep-2024	✔
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>							
Clear Plastic Bottle - Natural (EK071G) WC-RS, WC-IS, YR1-IS, LHG-IS, YR2-RS, SSC-IS, TR-RS-1	25-Aug-2024	----	----	----	31-Aug-2024	27-Aug-2024	✘
Clear Plastic Bottle - Natural (EK071G) SP-IS, QAQC BLANK, YK-RS-1, YK-IS-1, YK-IS(d/s)-1, NZG-IS-1, NZG-IS REPLICATE-1	26-Aug-2024	----	----	----	31-Aug-2024	28-Aug-2024	✘
<b>EP025: Oxygen - Dissolved (DO)</b>							
Clear Plastic Bottle - Natural (EP025) WC-RS, WC-IS, YR1-IS, LHG-IS, YR2-RS, SSC-IS, TR-RS-1	25-Aug-2024	----	----	----	29-Aug-2024	25-Aug-2024	✘
Clear Plastic Bottle - Natural (EP025) SP-IS, QAQC BLANK, YK-RS-1, YK-IS-1, YK-IS(d/s)-1, NZG-IS-1, NZG-IS REPLICATE-1	26-Aug-2024	----	----	----	29-Aug-2024	26-Aug-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	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Ammonia as N by Discrete analyser	EK055G	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	6	54	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	30	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	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	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	36	11.11	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	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	37	10.81	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	4	54	7.41	8.33	✖	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	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	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	3	14	21.43	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	14	21.43	12.50	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	36	16.67	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	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	37	16.22	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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Laboratory Control Samples (LCS) - Continued</b>							
Turbidity	EA045	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	3	54	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids	EA025	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	36	5.56	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	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Ammonia as N by Discrete analyser	EK055G	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	36	5.56	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	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	37	5.41	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 (SnCl <sub>2</sub> )(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 SnCl <sub>2</sub> 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 (SnCl <sub>2</sub> )(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 SnCl <sub>2</sub> 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-NH <sub>3</sub> 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-NO <sub>2</sub> - 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-NO <sub>3</sub> - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately 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 (NO <sub>x</sub> ) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO <sub>3</sub> - F. Combined oxidised Nitrogen (NO <sub>2</sub> +NO <sub>3</sub> ) 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-NO <sub>3</sub> -. 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)



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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 orthophosphate 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)

<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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	: <b>ES2428198</b>	Page	: 1 of 9
Client	: <b>UGL LIMITED</b>	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	: 28-Aug-2024
Order number	: 4501837828	Date Analysis Commenced	: 29-Aug-2024
C-O-C number	: 71874	Issue Date	: 04-Sep-2024
Sampler	: CAMILLE PALMER		
Site	: August Event Sampling		
Quote number	: ES24UGLLIM0001_V3		
No. of samples received	: 14		
No. of samples analysed	: 14		



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

This Quality Control Report contains the following information:

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

### Signatories

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

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



## General Comments

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

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

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

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC  
 \* = 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 (%)
<b>EA005P: pH by PC Titrator (QC Lot: 6025546)</b>									
ES2428198-005	YR2-RS	EA005-P: pH Value	----	0.01	pH Unit	7.66	7.77	1.4	0% - 20%
ES2428312-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.15	7.38	3.2	0% - 20%
<b>EA010P: Conductivity by PC Titrator (QC Lot: 6025545)</b>									
EN2409908-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4150	4240	2.1	0% - 20%
EN2409908-010	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7880	7820	0.8	0% - 20%
ES2428198-005	YR2-RS	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	81	80	1.8	0% - 20%
ES2428435-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3140	3150	0.1	0% - 20%
ES2428312-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1010	989	2.5	0% - 20%
ES2428312-015	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2570	2620	1.9	0% - 20%
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 6024859)</b>									
ES2428198-017	YK-IS-1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	62	74	18.0	No Limit
ES2428198-001	WC-RS	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	51	51	0.0	No Limit
<b>EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 6024860)</b>									
ES2428198-016	YK-RS-1	EA025: Suspended Solids (SS)	----	1	mg/L	19	14	30.4	0% - 50%
ES2428198-001	WC-RS	EA025: Suspended Solids (SS)	----	1	mg/L	4	4	0.0	No Limit
<b>EA045: Turbidity (QC Lot: 6022353)</b>									
ES2428096-001	Anonymous	EA045: Turbidity	----	0.1	NTU	0.2	0.3	0.0	No Limit
ES2428198-008	QAQC BLANK	EA045: Turbidity	----	0.1	NTU	<0.1	<0.1	0.0	No Limit
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 6025416)</b>									
ES2428124-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit



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 (%)
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 6025416) - continued</b>									
ES2428124-001	Anonymous	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	0.008	0.008	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	0.047	0.046	2.4	0% - 20%
		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	0.006	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	0.10	0.09	16.7	No Limit
ES2428198-005	YR2-RS	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.0	No Limit
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit		
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 6025418)</b>									
ES2428198-005	YR2-RS	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2428198-017	YK-IS-1	EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
<b>EG020T: Total Metals by ICP-MS (QC Lot: 6025120)</b>									
ES2428198-001	WC-RS	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2428198-017	YK-IS-1	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
<b>EG020T: Total Metals by ICP-MS (QC Lot: 6025121)</b>									
ES2428198-001	WC-RS	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	0.007	0.006	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	0.06	0.08	17.7	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.07	0.08	0.0	No Limit
ES2428198-017	YK-IS-1	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit



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 (%)
<b>EG020T: Total Metals by ICP-MS (QC Lot: 6025121) - continued</b>									
ES2428198-017	YK-IS-1	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	0.003	0.002	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	0.026	0.027	4.3	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	1.22	1.40	14.2	0% - 20%
EG020A-T: Iron	7439-89-6	0.05	mg/L	0.99	1.11	11.7	0% - 20%		
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 6025417)</b>									
ES2428131-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2428198-007	SP-IS	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
<b>EG035T: Total Recoverable Mercury by FIMS (QC Lot: 6025122)</b>									
ES2428188-005	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2428198-015	TR-RS-1	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
<b>EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 6026380)</b>									
EN2409636-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	<0.004	0.0	No Limit
ES2428198-015	TR-RS-1	EK026SF: Total Cyanide	57-12-5	0.004 (0.002) *	mg/L	<0.002	<0.002	0.0	No Limit
<b>EK055G: Ammonia as N by Discrete Analyser (QC Lot: 6023237)</b>									
ES2427591-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.06	15.3	No Limit
ES2428164-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.07	0.0	No Limit
<b>EK055G: Ammonia as N by Discrete Analyser (QC Lot: 6023239)</b>									
ES2428198-008	QAQC BLANK	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.0	No Limit
EW2403981-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	4.11	4.01	2.4	0% - 20%
<b>EK057G: Nitrite as N by Discrete Analyser (QC Lot: 6025850)</b>									
ES2428198-001	WC-RS	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2428198-016	YK-RS-1	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 6023238)</b>									
ES2427591-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.22	0.22	0.0	0% - 20%
ES2428164-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.07	0.07	0.0	No Limit
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 6023240)</b>									
ES2428198-008	QAQC BLANK	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EW2403981-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	28.9	28.6	0.7	0% - 20%
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6023234)</b>									
ES2427591-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.0	No Limit

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 Work Order : ES2428198  
 Client : UGL LIMITED  
 Project : 3200-0645



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 (%)
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6023234) - continued</b>									
ES2427972-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1 (1.0)*	mg/L	45.6	50.4	10.0	0% - 20%
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6023236)</b>									
ES2428198-004	LHG-IS	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.0	No Limit
ES2428198-020	NZG-IS REPLICATE-1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 6023233)</b>									
ES2427591-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.0	No Limit
ES2427972-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01 (0.10)*	mg/L	6.08	6.17	1.6	0% - 20%
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 6023235)</b>									
ES2428198-004	LHG-IS	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.02	76.9	No Limit
ES2428198-020	NZG-IS REPLICATE-1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.0	No Limit
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 6025849)</b>									
ES2428198-001	WC-RS	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2428198-016	YK-RS-1	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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
<b>EA005P: pH by PC Titrator (QCLot: 6025546)</b>									
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.8	101	
				----	7 pH Unit	99.8	99.2	101	
<b>EA010P: Conductivity by PC Titrator (QCLot: 6025545)</b>									
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	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 6024859)</b>									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.8	87.0	109	
				<10	293 mg/L	111	75.2	126	
				<10	2410 mg/L	102	83.0	124	
<b>EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 6024860)</b>									
EA025: Suspended Solids (SS)	----	1	mg/L	<1	150 mg/L	104	83.0	129	
				<1	1000 mg/L	91.4	81.0	111	
				<1	928 mg/L	89.6	83.0	118	
<b>EA045: Turbidity (QCLot: 6022353)</b>									
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	100	91.0	105	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 6025416)</b>									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	88.4	80.0	116	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	89.2	85.0	114	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	85.5	84.0	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.3	85.0	111	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	85.9	81.0	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	86.6	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	86.2	82.0	110	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.7	82.0	112	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.9	81.0	117	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	87.3	82.0	112	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 6025418)</b>									
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	81.3	70.0	130	
<b>EG020T: Total Metals by ICP-MS (QCLot: 6025120)</b>									
EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	78.4	70.0	130	
<b>EG020T: Total Metals by ICP-MS (QCLot: 6025121)</b>									



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
<b>EG020T: Total Metals by ICP-MS (QCLot: 6025121) - continued</b>								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	91.2	82.0	120
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.4	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.7	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.4	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.9	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.0	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.0	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.7	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	82.4	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.9	85.0	117
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 6025417)</b>								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.9	83.0	105
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 6025122)</b>								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.1	77.0	111
<b>EK026SF: Total CN by Segmented Flow Analyser (QCLot: 6026380)</b>								
EK026SF: Total Cyanide	57-12-5	0.004	mg/L	<0.004	0.2 mg/L	98.5	73.0	133
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 6023237)</b>								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	98.3	90.0	114
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 6023239)</b>								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	98.6	90.0	114
<b>EK057G: Nitrite as N by Discrete Analyser (QCLot: 6025850)</b>								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	95.5	82.0	114
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6023238)</b>								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.4	91.0	113
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6023240)</b>								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.0	91.0	113
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6023234)</b>								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	96.2	69.0	123
				<0.1	1 mg/L	114	70.0	123
				<0.1	5 mg/L	96.2	70.0	123
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6023236)</b>								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	111	69.0	123
				<0.1	1 mg/L	118	70.0	123
				<0.1	5 mg/L	101	70.0	123



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6023233)</b>								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	91.6	71.3	126
				<0.01	0.442 mg/L	88.7	71.3	126
				<0.01	1 mg/L	97.0	70.0	130
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6023235)</b>								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	95.3	71.3	126
				<0.01	0.442 mg/L	89.2	71.3	126
				<0.01	1 mg/L	96.5	70.0	130
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6025849)</b>								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	100	85.0	117

### Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	Spike Recovery(%) MS	Acceptable Limits (%) Low High
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 6025416)</b>						
ES2428124-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	86.9	70.0 130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	84.0	70.0 130
		EG020A-F: Chromium	7440-47-3	1 mg/L	85.7	70.0 130
		EG020A-F: Copper	7440-50-8	1 mg/L	87.0	70.0 130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.8	70.0 130
		EG020A-F: Manganese	7439-96-5	1 mg/L	84.1	70.0 130
		EG020A-F: Nickel	7440-02-0	1 mg/L	86.0	70.0 130
		EG020A-F: Zinc	7440-66-6	1 mg/L	89.1	70.0 130
<b>EG020T: Total Metals by ICP-MS (QCLot: 6025121)</b>						
ES2428198-002	WC-IS	EG020A-T: Arsenic	7440-38-2	1 mg/L	87.7	70.0 130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.7	70.0 130
		EG020A-T: Chromium	7440-47-3	1 mg/L	101	70.0 130
		EG020A-T: Copper	7440-50-8	1 mg/L	92.4	70.0 130
		EG020A-T: Lead	7439-92-1	1 mg/L	88.2	70.0 130
		EG020A-T: Manganese	7439-96-5	1 mg/L	93.7	70.0 130
		EG020A-T: Nickel	7440-02-0	1 mg/L	89.2	70.0 130
		EG020A-T: Zinc	7440-66-6	1 mg/L	84.5	70.0 130
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 6025417)</b>						
ES2428131-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	81.8	70.0 130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID		Sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low High
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 6025122)</b>							
ES2428188-004	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	94.8	70.0	130
<b>EK026SF: Total CN by Segmented Flow Analyser (QCLot: 6026380)</b>							
EN2409636-001	Anonymous	EK026SF: Total Cyanide	57-12-5	0.2 mg/L	95.6	70.0	130
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 6023237)</b>							
ES2427591-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	82.7	70.0	130
<b>EK055G: Ammonia as N by Discrete Analyser (QCLot: 6023239)</b>							
ES2428198-008	QAQC BLANK	EK055G: Ammonia as N	7664-41-7	1 mg/L	102	70.0	130
<b>EK057G: Nitrite as N by Discrete Analyser (QCLot: 6025850)</b>							
ES2428198-001	WC-RS	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	110	70.0	130
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6023238)</b>							
ES2427591-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	101	70.0	130
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6023240)</b>							
ES2428198-008	QAQC BLANK	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70.0	130
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6023234)</b>							
ES2427591-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100	70.0	130
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6023236)</b>							
ES2428198-005	YR2-RS	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	109	70.0	130
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6023233)</b>							
ES2427591-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	108	70.0	130
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6023235)</b>							
ES2428198-005	YR2-RS	EK067G: Total Phosphorus as P	----	1 mg/L	99.6	70.0	130
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6025849)</b>							
ES2428198-001	WC-RS	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	108	70.0	130



## Appendix C: August 2024 SWQ Monitoring Results

Parameter	Sheen/ oil/ grease	Temp. (°C)	Dissolved Oxygen (DO %)	DO (ppm)	Specific EC (SPC uS/cm)	EC (uS/cm)	pH	Redox (mV)	Turbidity (NTU)	Dissolved Al (mg/L)	Dissolved As (mg/L)	Dissolved Cd (mg/L)	Dissolved Cr (mg/L)	Dissolved Cu (mg/L)	Cyanide (mg/L)	Dissolved Fe (mg/L)	Dissolved Pb (mg/L)	Dissolved Mn (mg/L)	Dissolved Hg (mg/L)	Dissolved Ni (mg/L)	TN (mg/L)	TP (mg/L)	
<b>YARRANGOBILLY CATCHMENT</b>																							
Default Guideline Value (DGV)	No	-	90-110	-	30-350	30-350	6.5-8	-	2-25	0.027	0.0008	0.0006	0.00001	0.001	0.004	0.3	0.001	1.2	0.00006	0.008	0.25	0.02	
Limit of Reporting (LOR)									0.1	0.01	0.001	0.0001	0.001	0.002	0.05	0.001	0.001	0.001	0.0001	0.001	0.1	0.01	
Dec - May Site Specific Guideline Value (SSGV)			90-110	9.08	115	93.2	6.5-8	79.1	0.37	0.03	0.0003	0.00002	0.00001	0.0002	0.002	0.03	0.001	0.002	0.00003	0.001	0.2	0.02	
June - Nov SSGV			90-110	10.28	88	60.85	6.5-8	98.4	5.12	0.04	0.0003	0.00002	0.00001	0.0002	0.002	0.02	0.001	0.002	0.00003	0.001	0.2	0.02	
WC-RS	Mar-24	No	10.7	87.5	9.72	143.6	104.3	7.8	25.9	0.1	0.02	0.00015	0.00001	0.00001	0.002	0.001	0.03	0.002	0.003	0.00002	0.001	0.1	0.03
	Apr-24	No	10.7	94.8	-	145.6	-	8.44	-	1.05	0.01	0.001	0.0001	0.001	0.001	0.002	0.11	0.001	0.007	0.0001	0.001	0.1	0.02
	May-24	No	2.1	93.8	-	155	-	8.05	-	0.39	0.01	0.001	0.0001	0.001	0.001	0.004	0.05	0.001	0.009	0.0001	0.001	0.1	0.02
	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	0.005	0.0001	0.001	0.2	0.01
	Jul-24	No	6.4	91.9	-	46.6	-	6.96	-	9.24	0.07	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.002	0.0001	0.001	0.1	0.05
	Aug-24	No	10.4	80.6	-	47.1	-	7.8	-	1.6	0.02	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.002	0.0001	0.001	0.1	0.01
WC-IS	Mar-24	No	10.7	87.1	9.68	145.9	105.9	7.83	41.9	0.1	0.03	0.00015	0.00001	0.00001	0.002	0.001	0.03	0.002	0.003	0.00002	0.0005	0.1	0.005
	Apr-24	No	10.7	95.0	-	145.2	-	8.45	-	0.9	0.01	0.001	0.0001	0.001	0.001	0.002	0.07	0.001	0.006	0.0001	0.001	2.7	0.02
	May-24	No	2.1	94.1	-	154.9	-	7.86	-	0.3	0.01	0.001	0.0001	0.001	0.001	0.004	0.05	0.001	0.007	0.0001	0.001	0.4	0.02
	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	0.004	0.0001	0.001	0.1	0.01
	Jul-24	No	6.6	91.2	-	46.6	-	6.96	-	7.65	0.07	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.002	0.0001	0.001	0.1	0.02
	Aug-24	No	10.5	91.5	-	45.6	-	7.83	-	5.85	0.02	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.1	0.01
CG-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jul-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YR1-IS	Mar-24	No	12.2	88.2	9.47	129.4	97.7	7.81	53.8	0.1	0.05	0.00015	0.00001	0.000005	0.002	0.001	0.03	0.0005	0.002	0.000015	0.001	0.1	0.005
	Apr-24	No	11.3	97.4	-	136.1	-	8.49	-	1.23	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.002	0.0001	0.001	0.1	0.01
	May-24	No	3.1	95.6	-	138.8	-	7.91	-	0.42	0.01	0.001	0.0001	0.001	0.001	0.004	0.05	0.001	0.002	0.0001	0.001	0.1	0.02
	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	0.003	0.0001	0.001	0.1	0.01
	Jul-24	No	6.4	93.0	-	51.5	-	6.93	-	10.05	0.18	0.001	0.0001	0.001	0.001	0.002	0.11	0.001	0.002	0.0001	0.001	0.2	0.02
	Aug-24	No	8.6	89.8	-	55.8	-	7.87	-	3.62	0.07	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.2	0.01
LHG-IS	Mar-24	Yes	11.9	59.2	6.38	596	447.2	7.35	-17.2	408.5	0.2	0.00015	0.00001	0.001	0.003	0.001	0.18	0.005	0.040	0.000015	0.003	0.1	0.01
	Apr-24	No	12.5	60.1	-	658	-	7.69	-	69.72	0.01	0.001	0.0001	0.001	0.001	0.002	0.34	0.001	0.184	0.0001	0.001	0.5	0.09
	May-24	No	7	63.3	-	618	-	7	-	1003.7	0.01	0.001	0.0001	0.001	0.001	0.004	0.71	0.001	0.184	0.0001	0.001	0.5	0.05
	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	0.158	0.0001	0.001	0.2	0.04
	Jul-24	No	8	87.5	-	503	-	7.3	-	5.44	0.01	0.001	0.0001	0.001	0.001	0.002	0.07	0.001	0.025	0.0001	0.001	0.1	0.01
	Aug-24	No	11.4	83.0	-	408.8	-	7.74	-	76.59	0.01	0.001	0.0001	0.001	0.001	0.002	0.07	0.001	0.020	0.0001	0.001	0.1	0.01
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	0.0005	0.001	0.000015	0.001	0.1	0.005
	Apr-24	No	11.8	97.1	-	139.7	-	8.52	-	1.16	0.01	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.003	0.0001	0.001	0.1	0.01
	May-24	No	2.5	94.7	-	142.1	-	7.77	-	0.343	0.01	0.001	0.0001	0.001	0.001	0.024	0.05	0.001	0.004	0.0001	0.001	0.8	0.03
	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	0.003	0.0001	0.001	0.1	0.01
	Jul-24	No	5.9	93.5	-	58.4	-	6.78	-	8.87	0.17	0.001	0.0001	0.001	0.001	0.002	0.12	0.001	0.002	0.0001	0.001	0.4	0.03
	Aug-24	No	9.3	93.5	-	58.5	-	7.98	-	6.97	0.06	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.002	0.0001	0.001	0.1	0.01
SSC-IS	Mar-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apr-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jun-24	No Flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jul-24	No	8	90.1	-	152.6	-	6.29	-	17.88	0.1	0.001	0.0001	0.001	0.001	0.002	0.07	0.001	0.002	0.0001	0.001	1.8	0.03
	Aug-24	No	12.1	94.0	-	120.9	-	7.78	-	3.9	0.04	0.001	0.0001	0.001	0.001	0.002	0.05	0.001	0.001	0.0001	0.001	0.1	0.01

Parameter	Dissolved Ag (mg/L)	Dissolved Zn (mg/L)	Ammonia (mg/L)	Nitrogen Oxides (mg/L)	Reactive Phosphorus (mg/L)	Total Hardness (mg/L) (CaCO3)	Total Kjeldahl 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)	
<b>YARRANGOBILLY CATCHMENT</b>																						
Default Guideline Value (DGV)	0.00002	0.0024	0.013	0.015	0.015	-	-	-	0.2	0.027	0.0008	0.0006	0.00001	0.001	0.001	1.2	0.008	0.00002	0.0024	0.3	0.00006	
Limit of Reporting (LOR)	0.001	0.005	0.010	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	0.00002	0.002	0.013	0.015	0.020	47	0.2	52	0.2													
June - Nov SSGV	0.00002	0.002	0.013	0.015	0.015	30	0.2	39	1													
WC-RS	Mar-24	0.00001	0.001	0.050	0.05	0.005	42	0.1	70	0.1												
	Apr-24	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	0.001	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	0.001	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
	Jul-24	0.001	0.005	0.010	0.01	0.01	17	0.1	38	8	0.09	0.001	0.0001	0.001	0.001	0.001	0.01	0.001	0.001	0.005	0.09	0.0001
	Aug-24	0.001	0.032	0.010	0.01	0.01	28	0.1	51	4	0.06	0.001	0.0001	0.001	0.001	0.001	0.007	0.001	0.001	0.005	0.07	0.0001
WC-IS	Mar-24	0.00001	0.001	0.050	0.05	0.005	42	0.1	88	0.1												
	Apr-24	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	0.001	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	0.001	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
	Jul-24	0.001	0.005	0.010	0.01	0.01	17	0.1	42	5	0.11	0.001	0.0001	0.001	0.001	0.001	0.011	0.001	0.001	0.005	0.1	0.0001
	Aug-24	0.001	0.006	0.010	0.03	0.01	28	0.1	45	4	0.06	0.001	0.0001	0.001	0.001	0.001	0.006	0.001	0.001	0.005	0.06	0.0001
CG-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Jun-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Jul-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Aug-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
YR1-IS	Mar-24	0.00001	0.001	0.050	0.05	0.005	34	0.1	66	0.1												
	Apr-24	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	0.001	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	0.001	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	0.001	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
	Aug-24	0.001	0.005	0.010	0.01	0.01	33	0.2	55	3	0.12	0.001	0.0001	0.001	0.001	0.001	0.004	0.001	0.001	0.005	0.09	0.0001
LHG-IS	Mar-24	0.00001	0.006	0.050	0.05	0.005	297	1	330	20												
	Apr-24	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	0.001	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	0.001	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
	Jul-24	0.001	0.005	0.010	0.01	0.01	250	0.1	324	10	0.53	0.001	0.0001	0.001	0.002	0.001	0.033	0.001	0.001	0.005	0.16	0.0001
	Aug-24	0.001	0.006	0.020	0.01	0.01	282	0.1	360	9	0.09	0.001	0.0001	0.001	0.001	0.001	0.026	0.001	0.001	0.005	0.17	0.0001
YR2-IS	Mar-24	0.00001	0.001	0.050	0.05	0.005	27	1	58	0.1												
	Apr-24	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	0.001	0.007	0.020	0.34	0.01	66	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	0.001	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
	Jul-24	0.001	0.005	0.010	0.24	0.01	26	0.2	46	10	0.17	0.001	0.0001	0.001	0.001	0.001	0.012	0.001	0.001	0.007	0.16	0.0001
	Aug-24	0.001	0.005	0.010	0.01	0.01	33	0.1	59	4	0.11	0.001	0.0001	0.001	0.001	0.001	0.005	0.001	0.001	0.005	0.09	0.0001
SSC-IS	Mar-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Apr-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	May-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Jun-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Jul-24	0.001	0.024	0.030	0.85	0.01	62	0.9	110	1	0.09	0.001	0.0001	0.001	0.001	0.001	0.006	0.001	0.001	0.025	0.4	0.0001
	Aug-24	0.001	0.005	0.010	0.01	0.01	62	0.1	110	5	0.21	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.09	0.0001







## Appendix D: Calibration Certificate

