

Upper South Creek

Advanced Water Recycling Centre and Pipelines

Groundwater Monitoring Report

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Revisions and Distribution

Distribution

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Revisions

Draft issues of this document shall be identified as Revision 01, 02, 03 etc. Upon initial issue (generally Contract Award) this shall be changed to a sequential number commencing at Revision A. Revision numbers shall commence at Rev. A, B etc.

Date	Rev	Remarks	Section	Prepared By	Reviewed By & Approved By
26/09/2025	1	Initial version for review	All	R. Maxwell	A. Harrington
12/11/2025	2	Updated following ENRS review	All	R. Maxwell M. Lemcke	A. Harrington
15/01/2026	3	Updated to address SW and ER comments	All	R. Maxwell	A. Harrington

Glossary and Abbreviations

Abbreviation	Term	Definition
AWRC	Advanced Recycling Water Centre	Proposed centre for treatment of the wastewater prior to reuse applications or discharge, which includes liquids treatment, advanced water treatment, solids treatment, odour treatment, and residuals management
AHD	Australian Height Datum	A common reference level used in Australia which is approximately equivalent to the height above sea level in metres.
-	Brine Pipeline	A pipeline to transport brine (salty/concentrated wastewater). Brine water is a byproduct of reverse osmosis in the wastewater treatment process.
DMP	Dewatering Management Plan	A DMP is generally developed as a sub-plan under an overarching Construction Environmental Management Plan to document the management procedures and controls to mitigate potential environmental impacts associated with dewatering activities during construction.
DO	Dissolved Oxygen	Dissolved oxygen refers to the level of free, non-compound oxygen present in water or other liquids
EC	Electrical Conductivity	The ability of a material to conduct an electric current. In groundwater studies, electrical conductivity is used as an indicator of water quality, as it relates to the concentration of charged particles in water. Electrical conductivity provides an indication of the amount of total dissolved solids and the amount of salts in the water. Typically measured in $\mu\text{S}/\text{cm}$.
EIS	Environmental Impact Statement	An Environmental Impact Statement is a publicly available document that provides technical information on a project, including a summary of the environmental setting, its environmental impacts and mitigation measures, and is used to inform development consent decisions
ENRS	Environment and Natural Resource Solutions Pty Ltd	
GMR	Groundwater Monitoring Report	-
GWMoP	Groundwater Monitoring Program	-
-	Hydraulic Conductivity	The measure of how easily water can pass through a porous material. High values indicate permeable material through which water can pass easily and low values indicate a less permeable material. Hydraulic conductivity is dependent upon the intrinsic permeability of the material, the degree of saturation and the fluid properties (i.e. density and viscosity).
HSU	Hydrostratigraphic unit	A general grouping of geologic materials that form a distinct hydrogeological unit with respect to the flow and behaviour of groundwater.
MCoA	Ministers Conditions of Approval	-
LNAPL	Light Non-Aqueous Phase Liquid	A LNAPL is a groundwater contaminant, specifically they are "hydrocarbons that exist as a separate, immiscible phase when in contact with water and/or air
LOR	Limit of reporting	The smallest concentration of a chemical that can be reported by the laboratory using the adopted analytical methodology. Also commonly referred to as the Estimated Quantitation Limit (EQL) or detection limit.
NATA	National Association of Testing Authorities	The leading accreditation body in Australia that assesses laboratories and testing services against international standards, ensuring quality and reliability
PAHs	Polycyclic aromatic hydrocarbons	A polycyclic aromatic hydrocarbon (PAH) is any member of a class of organic compounds that is composed of multiple fused aromatic rings.
TDS	Total dissolved solids	TDS is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular (colloidal sol) suspended form
TOC	Top of Casing	Refers to the top of the groundwater monitoring well casing. This is used as a consistent datum from which groundwater levels are measured against. Surveyed elevation of the top of casing is also measured for each monitoring well, to enable groundwater level measurements to be converted to m AHD.

TSS	Total suspended solids	TSS is the dry-weight of suspended particles, that are not dissolved, in a sample of water that can be trapped by a filter.
-	Treated water pipeline	The pipelines that will convey the highly treated water to the receiving environment. The pipelines will transport water from the AWRC to the discharge points at the Nepean River. These pipelines will range in size from about 0.6 m to 1.5 m in diameter and will generally consist of steel, glass reinforced plastic and polyethylene pipe materials.
µS/cm	microsiemens per centimeter	Unit for measuring electrical conductivity, representing the ability of a solution (like water) to conduct current, indicating its ionic content or "saltiness"
USC	Upper South Creek	The catchment in which the AWRC will be located. South Creek discharges to the Nepean River which flows directly into the Hawkesbury River and then discharges out to the Pacific Ocean
WQO	Water Quality Objectives	Water Quality Objectives are long-term goals for water quality management. They are measures, levels or narrative statements of indicators of water quality that protect environmental values.. They define what the water quality should be to protect the environmental values—after consideration of the socio-economic assessment of protecting the water quality.
°C	Degrees Celsius	Measure of temperature
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GWMoP	Groundwater Monitoring Program	-
-	Hydraulic Conductivity	The measure of how easily water can pass through a porous material. High values indicate permeable material through which water can pass easily and low values indicate a less permeable material. Hydraulic conductivity is dependent upon the intrinsic permeability of the material, the degree of saturation and the fluid properties (i.e. density and viscosity).
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LNAPL	Light Non-Aqueous Phase Liquid	A LNAPL is a groundwater contaminant, specifically they are "hydrocarbons that exist as a separate, immiscible phase when in contact with water and/or air
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PAHs	Polycyclic aromatic hydrocarbons	A polycyclic aromatic hydrocarbon (PAH) is any member of a class of organic compounds that is composed of multiple fused aromatic rings.
TDS	Total dissolved solids	TDS is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular (colloidal sol) suspended form
TOC	Top of Casing	Refers to the top of the groundwater monitoring well casing. This is used as a consistent datum from which groundwater levels are measured against. Surveyed elevation of the top of casing is also measured for each monitoring well, to enable groundwater level measurements to be converted to m AHD.
TSS	Total suspended solids	TSS is the dry-weight of suspended particles, that are not dissolved, in a sample of water that can be trapped by a filter.
-	Treated water pipeline	The pipelines that will convey the highly treated water to the receiving environment. The pipelines will transport water from the AWRC to the discharge points at the Nepean River. These pipelines will range in size from about 0.6 m to 1.5 m in diameter and will generally consist of steel, glass reinforced plastic and polyethylene pipe materials.
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USC	Upper South Creek	The catchment in which the AWRC will be located. South Creek discharges to the Nepean River which flows directly into the Hawkesbury River and then discharges out to the Pacific Ocean
WQO	Water Quality Objectives	Water Quality Objectives are long-term goals for water quality management. They are measures, levels or narrative statements of indicators of water quality that protect environmental values.. They define what the water quality should be to protect the environmental values—after consideration of the socio-economic assessment of protecting the water quality.
°C	Degrees Celsius	Measure of temperature

1 Background

The Upper South Creek (USC) Advanced Water Recycling Centre and Pipelines project (the project) has been proposed to support the population growth and economic development of the Western Sydney Aerotropolis Growth Area (WSAGA or Aerotropolis), South West Growth Area and the new Western Sydney International Airport. The project will provide wastewater services to Western Sydney to produce high-quality treated water for non-drinking reuse and for release to local waterways.

The project will comprise the following components:

- A new Advanced Water Recycling Centre (AWRC) to collect wastewater from businesses and homes and treat it, producing high-quality treated water, renewable energy and biosolids for beneficial reuse
- A new green space area around the AWRC, adjacent to South Creek and Kemps Creek, to support the ongoing development of a green spine through Western Sydney
- New infrastructure from the AWRC to South Creek, to release excess treated water during significant wet weather events, estimated to occur about 3 – 14 days each year
- A new treated water pipeline from the AWRC to Nepean River at Wallacia Weir, to release high-quality treated water to the river during normal weather conditions
- A new brine pipeline from the AWRC connecting into Sydney Water's existing wastewater system to transport brine to the Malabar Wastewater Treatment Plant
- A range of ancillary infrastructure.

2 Purpose

The purpose and scope of the Groundwater Monitoring Program (Appendix F of the Surface Water and Groundwater CEMP Sub-plan) is to monitor the effectiveness of mitigation measures applied during the construction phase of the AWRC site as it relates to the groundwater resources. This program is based on baseline studies developed for the USC AWRC Environmental Impact Statement (EIS) dated September 2021. Construction works at AWRC commenced on the 28th of August 2023.

As specified in Section 7.3 of the Groundwater Monitoring Program (GWMoP), this Groundwater Monitoring Report (GMR, or this 'report') will reflect data gathered in 6-monthly intervals, in accordance with the Ministers Conditions of Approval (MCoA) C18. This report presents the findings for the reporting period of March 2025 to August 2025 (inclusive). This report captures the following details:

- The location and description of monitoring undertaken
- A summary of groundwater data collected within the monitoring period
- Summary and analysis of any measurements exceeding the project acceptable ranges.

3 Construction Update

Construction activities undertaken across the AWRC site during the reporting period are provided below. It is noted that there were no works undertaken which required extraction or interaction with groundwater.

- Bulk earthworks
- Construction of the solar farm
- Construction of the internal access roads and perimeter fire roads.
- Rehabilitation works in the South Creek riparian zone i.e. Vegetation Management Plan, including ongoing maintenance of rehabilitated areas.
- Construction (including landscaping of the overland discharge swale and southern drainage swale, and tie-in works to South Creek)
- Structure construction works including:
 - Piling Works
 - Steel fixing
 - Installation of structural elements
 - Form, reo, pour works

- Hydrostatic testing of structures
- Commissioning works and energisation of specific areas
- Electrical, mechanical, plumbing, carpentry fit-out of various buildings and structures.

4 Groundwater Quality Monitoring

4.1 Monitoring Network

During the reporting period, groundwater quality monitoring was carried out at the locations specified in Table 4-1 at the AWRC. These monitoring locations are also presented in Figure 4-1.

Table 4 - 1: Groundwater Quality Monitoring Locations

Monitoring Well ID	Easting	Northing	Location Description	Screened Material Description	Targeted Hydrostratigraphic Unit
AWRC_MW01	293922.34	6251905.16	North of the AWRC site, mid-way between South Creek and Kemps Creek	Claystone, sandstone, coal.	Upper Wianamatta Group (weathered/fractured Bringelly Shale)
AWRC_MW03D	294412.94	6251662.78	Well pairing east of the AWRC site, towards Kemps Creek (deeper well).	Claystone, sandstone.	Upper Wianamatta Group (weathered/fractured Bringelly Shale)
AWRC_MW03S	294412.37	6251662.41	Well pairing east of the AWRC site, towards Kemps Creek (shallower well)	Clayey sand, clayey sandy gravel, silty clay.	Unconsolidated Quaternary alluvium and residual / regolith soils
AWRC_MW04	293791.88	6251518.90	Adjacent to the western boundary of the AWRC site. This monitoring well was redrilled in March 2025.	Gravelly sandy clay, sandy silty clay	Unconsolidated Quaternary alluvium and residual / regolith soils
AWRC_MW04D	293791.88	6251518.90	Adjacent to the western boundary of the AWRC site. This monitoring well was redrilled in March 2025.	Siltstone, sandstone	Upper Wianamatta Group (weathered/fractured Bringelly Shale)
AWRC_MW05D	293469.19	6251417.88	Well pairing west of the AWRC site, towards South Creek (deeper well).	Claystone	Upper Wianamatta Group (weathered/fractured Bringelly Shale)
AWRC_MW05S	293468.17	6251417.73	Well pairing west of the AWRC site, towards South Creek (shallower well).	Sandy clay, clayey gravel, sandy gravelly clay.	Unconsolidated Quaternary alluvium and residual / regolith soils
AWRC_MW06	293727.84	6251197.57	Adjacent to the south-western boundary of the AWRC site.	Sandy clay, sandy gravelly clay, gravelly clay	Unconsolidated Quaternary alluvium and residual / regolith soils
AWRC_MW08D	293737.44	3748301.91	Adjacent to the western boundary of the AWRC site.	Siltstone, sandstone	Upper Wianamatta Group (weathered/fractured Bringelly Shale)
AWRC_MW08S	293737.44	3748301.91	Adjacent to the western boundary of the AWRC site.	Sandy clay	Upper Wianamatta Group (weathered/fractured Bringelly Shale)

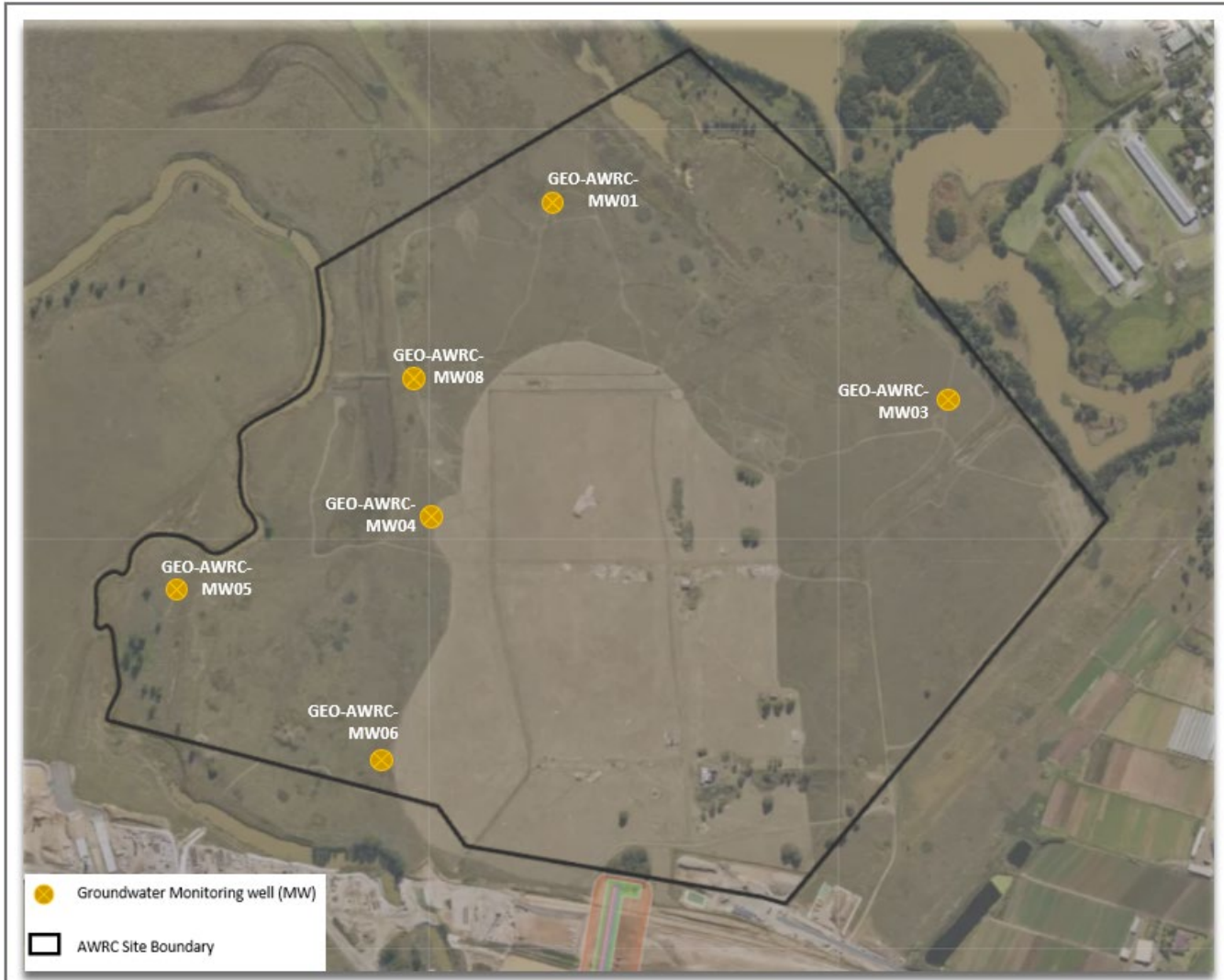


Figure 4 - 1 Groundwater Monitoring Location Map Monitored Parameters

4.2 Monitored parameters

Measurements of the following groundwater parameters were taken during the reporting period at each groundwater monitoring location (Section 4.1) using a calibrated water quality meter and interface probe.

- Depth to water (meters below Top of Casing (TOC));
- Presence/absence of Light Non-Aqueous Phase Liquid (LNAPL) and thickness if present (meters below TOC);
- Water Temperature (°C);
- pH;
- Electrical Conductivity ($\mu\text{S}/\text{cm}$);
- Dissolved Oxygen (%);
- Redox Potential;
- Visual and olfactory indicators (colour, turbidity, odour, sheen, discolouration, free phase liquids, foaming waters);
- Evidence of stressed or dead flora and / or fauna (for example, fish kills) in downstream receiving environments.

Representative groundwater samples were obtained and submitted to a NATA laboratory for analysis of the following parameters.

- Total dissolved solids (TDS).
- Total suspended solids (TSS).
- Nutrients (including ammonia, nitrate, nitrite, total nitrogen and total phosphorous).
- Major ions (chloride, sulfate, sodium, potassium, magnesium, calcium, carbonate and bicarbonate); and
- Dissolved heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) and polycyclic aromatic hydrocarbons (PAHs).

4.3 Monitoring events and timing

Routine groundwater quality monitoring has been completed quarterly throughout the reporting period and upon commencement of construction at the AWRC in accordance with Section 5.4.3 of the GWMoP. Quarterly monitoring was undertaken between March and August 2025. Due to repeated significant rainfall events at the AWRC site impacting the project's ability to safely access the monitoring locations in July and August 2025, the quarterly groundwater monitoring event scheduled for August 2025 was postponed and undertaken instead in September 2025. This data will be presented in the next 6-monthly groundwater construction monitoring report (to be prepared for the September 2025 – February 2026 reporting period).

Routine water level gauging has been undertaken at groundwater monitoring wells MW04 and MW08 via nested piezometers which continuously log groundwater levels.

There were no incidents or events which occurred during the reporting period with the potential to impact groundwater quality therefore event triggered sampling was not required.

No Project trigger value or acceptable range reporting was undertaken during the reporting period. While there were some exceedances noted, these were not attributable to the Project, as detailed in Section 6.

5 Groundwater Monitoring Results

5.1 March and April 2025

Groundwater monitoring for wells MW4-S, MW4-D, MW8-S and MW8-D was carried out on 31 March 2025, while monitoring for wells MW1, MW3-D, MW3-S, MW5-S, MW5-D and MW6 was carried out on 9 April 2025 by Matt Lemcke – Hydrogeologist and Environmental Scientist from Environment and Natural Resource Solutions (ENRS). It's noted that groundwater sampling was undertaken across two separate days due to inclement weather resulting in access issues. Field sampling monitoring results are provided in Table 5-1 while laboratory results are provided in Table 5-2. Monitoring wells which have Bringelly Shale project acceptable ranges are denoted by brown text while monitoring wells with alluvial/residual soil project acceptable ranges are denoted in white text. Exceedances of acceptable ranges are noted in red in Tables 5-1 and 5-2.

Table 5 – 1: Field sampling monitoring results for March/April 2025

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial/Residual Soils	Bringelly Shale											
Depth to Water	32.76	32.77	mAHD	34.51	37.17	36.38	36.51	34.95	34.30	34.57	35.97	35.43	36.70
Electrical Conductivity	117.3 – 25,974	195.6 – 20,241	us/cm	18,070	18,947	20,577	15,948	24,219	1,249	19,473	19,159	18,202	343
Dissolved Oxygen	1.4 – 8.38	0.65 – 6.32	mg/L	0.08	0.1	0.06	3.54	0.17	0.15	0.03	0.07	0.03	0.05
pH	5.74 – 8.04	6.42 – 7.83	-	6.7	6.79	6.02	6.15	6.59	6.51	6.52	5.69	6.68	6.05
ORP (Redox Potential)	-	-	mV	-197	-228	-204	108	-148	-189	-129	72	-178	-8
Temperature	-	-	°C	17.4	18.6	19.3	18.1	18	19.3	18.3	19.4	18.8	19.3
Light Non-Aqueous Phase Liquid	-	-	Presence/absence	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Field sampling carried out during March and April 2025 identified that groundwater monitoring results were largely within the Project acceptable range for each parameter. Some exceedances were identified in several monitoring locations for pH, dissolved oxygen and electrical conductivity. Analysis of these exceedances are provided in Section 6.

Table 5-2: Laboratory groundwater monitoring results for March/April 2025

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial /Residual Soils	Bringelly Shale											
Total Dissolved Solids (TDS)	59 - 18500	182 – 17100	mg/L	13,400	14,000	14,600	11,000	18,600	886	15,800	14,100	14,600	238
Total Suspended Solids (TSS)	0 - 50	0 - 50	mg/L	30	64	55	28	412	168	56	52	149	8
Ammonia as N	<0.48	<3.3	mg/L	1.52	1.67	0.62	0.25	1.98	0.84	3.36	0.14	3.9	0.02
Nitrate as N	-	-	mg/L	<0.01	<0.01	<0.01	0.19	<0.01	0.19	<0.01	<0.01	<0.01	0.15
Nitrite as N	-	-	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Nitrogen as N	<11	<11.8	mg/L	1.5	1.6	0.6	0.7	3.1	1	3.5	0.2	4.2	0.2
Total Phosphorus as P	<2.15	<0.29	mg/L	0.03	0.05	0.08	0.08	0.24	0.27	0.02	0.07	0.12	0.04
Chloride	-	-	mg/L	6550	6740	7340	5470	7880	386	7130	6830	6480	76
Sulfate	-	-	mg/L	290	<1	446	229	243	7	<10	284	<10	10
Calcium	-	-	mg/L	309	259	100	70	461	25	666	108	570	<1
Magnesium	-	-	mg/L	493	457	456	343	707	26	684	525	484	1
Sodium	-	-	mg/L	3140	3400	3930	3080	4340	187	2760	3760	2950	71
Potassium	-	-	mg/L	18	17	6	10	25	<1	36	3	40	<1
Carbonate Alkalinity as CaCO ₃	-	-	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial /Residual Soils	Bringelly Shale											
Bicarbonate Alkalinity as CaCO ₃	-	-	mg/L	581	781	193	90	598	114	771	91	574	26
Arsenic	<0.005	<0.015	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001
Cadmium	<0.0013	<0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	<0.022	<0.01	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	<0.021	<0.01	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	<0.016	<0.014	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	<0.032	<0.028	mg/L	0.002	<0.001	0.007	0.042	0.001	0.003	<0.001	0.05	0.018	<0.001
Zinc	<0.471	<0.18	mg/L	<0.005	<0.005	<0.005	0.095	0.012	<0.005	0.031	0.035	0.026	<0.005
Mercury	<0.0001	<0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Polycyclic aromatic hydrocarbons (PAHs)	<0.5	<0.5	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Laboratory samples for monitoring undertaken in March and April 2025 identified that groundwater monitoring results were largely within the Project acceptable range for each parameter. Some exceedances were identified at several monitoring locations for TSS, ammonia and nickel. Analysis of these exceedances is provided in Section 6.

5.2 June 2025

Groundwater monitoring was carried out on 11 June 2025 by Matt Lemcke – Hydrogeologist and Environmental Scientist from ENRS. Field sampling monitoring results are provided in Table 5-3 while laboratory results are provided in Table 5-4. Monitoring wells which have Bringelly Shale project acceptable ranges are denoted in brown text while monitoring wells with alluvial/residual soil project acceptable ranges are denoted by white text. Exceedances of acceptable ranges are highlighted red in Tables 5-3 and 5-4. It is noted that monitoring at MW5-S and MW5-D was inaccessible due to significant rainfall and therefore monitoring of those groundwater monitoring wells was not undertaken.

Table 5–3: Field Sampling Results for June 2025

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial/Residual Soils	Bringelly Shale											
Depth to Water	32.76	32.77	mAHD	34.73	37.41	36.95	36.45	35.30	-	-	36.24	35.48	36.80
Electrical Conductivity	117.3 – 25,974	195.6 – 20,241	us/cm	11,260	19,267	19,618	24,126	25,250	-	-	16,650	18,160	469
Dissolved Oxygen	1.4 – 8.38	0.65 – 6.32	mg/L	0.05	0.01	0.1	0.17	0.06	-	-	1.15	0.09	0.14
pH	5.74 – 8.04	6.42 – 7.83	-	6.95	6.94	6.21	6.22	6.74	-	-	6.05	6.82	6.07
ORP (Redox Potential)	-	-	mV	-215	-191	1	195	-194	-	-	72	-156	52
Temperature	-	-	°C	17	17.3	17.6	16.1	17	-	-	17.7	17.4	17.8
Light Non-Aqueous Phase Liquid	-	-	Presence/absence	Absent	Absent	Absent	Absent	Absent	-	-	Absent	Absent	Absent

Field sampling carried out during June 2025 identified that groundwater monitoring results were largely within the Project acceptable range for each parameter. Some exceedances were identified in several monitoring locations for electrical conductivity and dissolved oxygen. Analysis of these exceedances are provided in Section 6.

Table 5-4: Laboratory groundwater monitoring results for June 2025

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial /Residual Soils	Bringelly Shale											
Total Dissolved Solids (TDS)	59 – 18,500	182 – 17,100	mg/L	7,580	11,800	12,000	15,200	17,100	-	-	11,000	12,800	304
Total Suspended Solids (TSS)	0 - 50	0 - 50	mg/L	8	<5	17	238	147	-	-	<5	32	<5
Ammonia as N	<0.48	<3.3	mg/L	1.07	1.98	0.11	0.34	2.06	-	-	0.1	3.76	0.03
Nitrate as N	-	-	mg/L	<0.01	0.02	0.18	0.08	<0.01	-	-	0.03	<0.01	0.6
Nitrite as N	-	-	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01
Total Nitrogen as N	<11	<11.8	mg/L	3.7	2.9	<1	2	2.6	-	-	<1	6	<1
Total Phosphorus as P	<2.15	<0.29	mg/L	<0.1	0.12	<0.01	0.18	0.14	-	-	<0.1	0.31	<0.1
Chloride	-	-	mg/L	4,190	6,580	6,740	8,260	8,570	-	-	5,950	6,320	150
Sulfate	-	-	mg/L	192	<1	500	464	251	-	-	270	<100	6
Calcium	-	-	mg/L	174	287	102	177	474	-	-	85	540	<1
Magnesium	-	-	mg/L	260	464	424	664	710	-	-	422	464	2
Sodium	-	-	mg/L	1,940	1,600	3,700	4,230	4,350	-	-	3,020	2,850	93
Potassium	-	-	mg/L	16	18	5	7	24	-	-	2	37	<1
Carbonate Alkalinity as CaCO ₃	-	-	mg/L	<1	<1	<1	<1	<1	-	-	<1	<1	<1

Parameter	Project Acceptable Range		Unit	MW1	MW3-D	MW3-S	MW4-S	MW4-D	MW5-S	MW5-D	MW8-S	MW8-D	MW6
	Alluvial /Residual Soils	Bringelly Shale											
Bicarbonate Alkalinity as CaCO ₃	-	-	mg/L	377	165	731	233	657	-	-	98	610	31
Arsenic	<0.005	<0.015	mg/L	0.003	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	0.004	<0.001
Cadmium	<0.0013	<0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0008	<0.0001	-	-	0.0003	<0.0001	<0.0001
Chromium	<0.022	<0.01	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001
Copper	<0.021	<0.01	mg/L	<0.001	<0.001	<0.001	0.004	<0.001	-	-	<0.001	<0.001	<0.001
Lead	<0.016	<0.014	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001
Nickel	<0.032	<0.028	mg/L	0.003	<0.001	0.006	0.035	<0.001	-	-	0.041	0.017	0.001
Zinc	<0.471	<0.18	mg/L	<0.005	0.006	0.006	0.54	<0.005	-	-	0.037	0.028	<0.005
Mercury	<0.0001	<0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Polycyclic aromatic hydrocarbons (PAHs)	<0.5	<0.5	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05

Laboratory samples for monitoring undertaken in June 2025 identified that groundwater monitoring results were largely within the Project acceptable range for each parameter. Some exceedances were identified in several monitoring locations for TSS, ammonia, total phosphorous, nickel and zinc. Analysis of these exceedances is provided in Section 6.

6 Discussion of exceedances

Exceedances of project acceptable ranges were observed during the reporting period for pH, electrical conductivity, dissolved oxygen, TSS, ammonia, total phosphorous and some heavy metals. An analysis and review of the exceedances was undertaken by ENRS, which is summarised below.

- **pH** – One minor exceedance was recorded during the March/April 2025 monitoring event. pH at MW8-S was recorded to be 5.69, which is marginally below the project acceptable range of 5.74. Baseline groundwater monitoring data collected prior to the commencement of construction (pre-August 2023) also identified exceedances of the pH project acceptable ranges at several monitoring locations. This exceedance is not considered significant, however will continue to be monitored to identify any trends.
- **Total suspended solids (TSS)** – TSS for the reporting period was measured at values between the laboratory limit of reporting (LOR) and 412 mg/L (MW4-D March/April 2025). A majority of the exceedances were considered to be minor ranging from 55 mg/L to 412 mg/L. The larger exceedances were recorded for MW4-D and MW4-S which were redrilled in March 2025, and immediately prior to groundwater monitoring event and therefore is not likely to be representative of true TSS of the groundwater.
- **Dissolved oxygen (DO)** – DO for the reporting period was measured at values between 0.01mg/L (MW3-D June 2025) and 1.15mg/L saturation (MW8-S June 2025). While groundwaters are generally depleted in DO, the multiple low DO readings were caused by insufficient flow rates and volumes able to be collected from the groundwater well, which are required to avoid depletion of DO during the testing process. Construction works undertaken during the reporting period would not have an impact on groundwater DO levels. Baseline groundwater monitoring data collected prior to the commencement of construction (pre-August 2023) also identified exceedances of the DO project acceptable ranges at several monitoring locations.
- **Electrical conductivity (EC)** – Two (2) exceedances of EC were recorded at monitoring location MW4-D during the March/April 2025 and June 2025 monitoring events, with results of 24,219 μ S/cm and 25,250 μ S/cm respectively which are above the project acceptable range of 20,241 μ S/cm (upper limit). It is noted that MW4-D is a new installation and as such variations in EC are likely attributed to some heterogeneity within the aquifer. Baseline groundwater monitoring data collected prior to the commencement of construction (pre-August 2023) also identified exceedances of the EC project acceptable range at several monitoring locations, suggesting that fluctuations in groundwater EC are expected to occur, particularly due to the saline groundwater conditions.
- **Ammonia** – Ammonia for the reporting period was measured at values between the LOR (0.02 mg/L) and 3.76mg/L (MW8-D June 2025). Four (4) exceedances of the upper project acceptance range were measured at several monitoring locations in the March/April 2025 and June 2025 monitoring events. Baseline groundwater monitoring data collected prior to the commencement of construction (pre-August 2023) also identified exceedances of the ammonia project acceptable ranges at several monitoring locations.
- **Heavy metals** – Review of heavy metals results for the reporting period generally reports concentrations within the project acceptance range, with exceptions of zinc and nickel, with several minor exceedances of the project acceptable range (upper limit). Construction works undertaken during the reporting period would not have had an impact on groundwater heavy metal levels. Baseline groundwater monitoring data collected prior to the commencement of construction (pre-August 2023) also identified exceedances of various heavy metal project acceptable ranges (upper limit) at several monitoring locations.
- **Phosphorous** – One (1) minor exceedance of total phosphorous was measured at MW8-D in June 2025, which recorded 0.31mg/L which is marginally above the project acceptable range (upper limit) of 0.29mg/L. This minor exceedance will continue to be monitored to identify any long-term trends.
- **Groundwater levels** – There were several occasions where groundwater levels were recorded by the automated logger as being below the project acceptable range. This was due to purging of groundwater wells during monitoring events and/or pressure logger malfunctions. On each occasion, the logger temporarily dipped below the project acceptable range and then returned to its usual level. These exceedances do not reflect actual groundwater levels.

Following identification of the above exceedances, an investigation was undertaken in accordance with Section 5.5 of the GWMoP which concluded that these exceedances were not attributed to or caused by the Project for the following reasons:

- As detailed above, baseline groundwater monitoring undertaken throughout 2023 prior to the commencement of construction (pre-August 2023) identified exceedances of project acceptable ranges for various parameters, including most of those parameters listed above i.e. pH, EC, DO, TSS, heavy metals and ammonia.
- There has been no extraction, abstraction, groundwater dewatering or injection of groundwater during the reporting period at AWRC.
- Construction activities have not reported any release of contamination or spill of a magnitude with the potential to cause groundwater contamination, including those parameters which exceeded the project acceptable ranges.