Appendix H Inland Water Environmental Quality – Assessment of Discharge and Seepage (EGi 2026)

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NT EPA – Inland Water Environmental Quality (assessment of discharge and seepage)

Lei Lithium Project

J000966 / R1827

Environmental Geochemistry International

ENVIRONMENTAL GEOCHEMISTRY INTERNATIONAL PTY LTD
ABN 48 600 298 271

9/44 CARRINGTON ROAD
CASTLE HILL, NSW 2154 AUSTRALIA

T +61 2 9810 8100
E EGI@GEOCHEMISTRY.COM.AU
W WWW.GEOCHEMISTRY.COM.AU

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LEI LITHIUM PROJECT

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LIST OF ABBREVIATIONS

ABBREVIATIONS USED IN GEOCHEMICAL ASSESSMENT

ARD	Acid Rock Drainage
AMD	Acid, Metalliferous and Saline Drainage
NMD	Neutral and Metalliferous Drainage
ABA	Acid Base Account
$pH_{1:2}$	pH of a sample slurry with a solid to water ratio of 1:2 (by weight)
$EC_{1:2}$	Electrical Conductivity of a sample slurry with a solid to water ratio of 1:2 (by weight)
ESP	Exchangeable Sodium Percentage
ECEC	Effective Cation Exchange Capacity
S	Sulphur
CRS	Chromium Reducible Sulphur
KCl	Potassium Chloride
H_2SO_4	Sulphuric Acid
SO_4	Sulphate
$CaCO_3$	Calcium Carbonate
ANC	Acid Neutralising Capacity in kg H_2SO_4/t
ANC_{ABCC}	Acid Neutralising Capacity in kg H_2SO_4/t estimated from ABCC testing
MPA	Maximum Potential Acidity, calculated from total S in kg H_2SO_4/t
NAPP	Net Acid Producing Potential, calculated from ANC and total S (or MPA) in kg H_2SO_4/t.
NAG	Net Acid Generation (test)
NAGpH	pH of NAG solution before titration
$NAG_{(pH4.5)}$	NAG acidity titrated to pH 4.5 in kg H_2SO_4/t
$NAG_{(pH7.0)}$	NAG acidity titrated to pH 7.0 in kg H_2SO_4/t
ABCC	Acid Buffering Characteristic Curve
GAI	Geochemical Abundance Index based on multi-elements of solids
PAF	Potentially Acid Forming
PAF-LC	Potentially Acid Forming - Low Capacity
NAF	Non Acid Forming
UC	Uncertain

UNITS OF MEASUREMENTS

%	Percentage
°C	Degrees Celsius
dS	Deci Siemen
µm	Micrometre
mm	Millimetre
m	Metre
mg	Milligram
g	Gram
kg	Kilogram
t	Tonne
L	Litre
ml	Millilitre

EXECUTIVE SUMMARY

The Lei Lithium Project, proposed by Lithium Plus Minerals, is an underground spodumene mine located about 30 km south of Darwin on the Cox Peninsula. The project would mine approximately 3.1 Mt of ore to a depth of 700 m over a seven-year life, producing direct shipping ore for export through Darwin Port. Infrastructure includes crushing and screening facilities, waste rock storage, water supply dams, sediment basins, roads, solar power infrastructure and wastewater management systems. Following referral to the NT EPA in 2024, the project was determined to require a Supplementary Environmental Report (SER).

The NT EPA assessment identified elevated aluminium, arsenic and zinc in groundwater, and arsenic enrichment in waste rock and process residues, including elevated arsenic in water and peroxide extracts. It also identified potential impacts from seepage and runoff from waste rock and ore stockpiles, and groundwater discharge from dewatering operations, including mobilisation of metals, metalloids (particularly arsenic) and nutrients to surface water and groundwater, and migration of mine-impacted water through the shallow alluvial aquifer to the Charlotte River. This report addresses the NT EPA's additional information requirements for surface and groundwater quality (Inland Water Environmental Quality, Items 12–16) and a summary of those information requirements is provided below.

Baseline monitoring (January 2023 to December 2025) indicates the project area drains westward via ephemeral tributaries to the Charlotte River and Bynoe Harbour. Freshwater and tidal surface waters are characterised by low turbidity, slightly acidic to slightly alkaline pH, and negligible to low concentrations of most metals and metalloids. Occasional elevated concentrations of some constituents reflect tidal influence, with no strong evidence of adverse effects from acid sulphate soils. Groundwater is representative of a fractured rock aquifer with regional flow toward the Charlotte River. Water quality is slightly acidic to slightly alkaline, with negligible dissolved concentrations of most metals and metalloids. Slightly elevated electrical conductivity reflects bicarbonate alkalinity rather than salinity. Slightly elevated arsenic and zinc are common, with no evidence of seawater intrusion. Screening criteria used to evaluate these data sets are specified in Table 7, Section 4.1.

Dewatered groundwater was identified as the principal life-of-mine source of arsenic, iron and zinc to the mine water dam, with its influence increasing as dewatering volumes rise. Preliminary water quality modelling indicates releases from operational water storages and diffuse seepage from waste rock and ore storage areas are not expected to generate particularly adverse water quality under expected, dry or wet rainfall scenarios. Predicted water quality prior to reception will be similar to baseline conditions in the non-tidal Charlotte River: slightly acidic, with negligible to low metal and metalloid concentrations. Nitrate from blast residues may be slightly elevated but is predicted to remain of a similar order of magnitude to concentrations in the Charlotte River. Thus, although cumulative impacts from existing upstream mining and this project were not assessed, project discharges are unlikely to have a significant adverse effect on Charlotte River water quality. Modelling remains subject to uncertainty regarding, water balance volumes, nitrate concentrations, shallow groundwater chemistry and potential groundwater drawdown effects on acid sulphate soils.

Mitigation measures include restricting mine water releases to the wet season and high-intensity rainfall events where practicable, increasing mine water reuse, implementing a four-level Trigger Action Response Plan (TARP), and contingency treatment using groundwater aeration, ferric salt addition and lime dosing, with activated carbon filtration or reverse osmosis considered if required.

1. INTRODUCTION

1.1. Background and purpose

The Lei Lithium Project, proposed by Lithium Plus Minerals, is an underground spodumene lithium mine located approximately 30 km south of Darwin on the Cox Peninsula. The project proposes to mine approximately 3.1 Mt of ore to a depth of about 700 m, producing direct shipping ore (DSO) for export through Darwin Port. Associated infrastructure includes crushing and screening facilities, waste rock storage, water supply dams, sediment control structures, roads, solar power infrastructure, and wastewater management systems (Figure 1). The proposed life of mine is approximately seven years, including construction, operations, rehabilitation and closure (Lithium Plus 2024; Lithium Plus 2026; NT EPA 2024).

The project was referred to the Northern Territory Environment Protection Authority (NT EPA) in 2024. Following public consultation, the NT EPA determined on 5 February 2025 that the project required assessment through a Supplementary Environmental Report (SER) rather than a full Environmental Impact Statement (EIS). This decision followed submissions from government agencies, the Northern Land Council and Environment Centre NT (NT EPA 2025; and Environment Centre NT 2025). The NT EPA's assessment identified the need for additional information before environmental approval can be considered via submission of a Supplementary Environmental Report (SER).

The purpose of this report was to address the additional information request in relation to potential impacts to surface and groundwater quality, specifically items 12 to 16 in Table 1.

Table 1: Lithium Plus Minerals Ltd – Lei Lithium Project SER, request for information, surface and groundwater quality.

Topic	Comment	Additional Information Required
Inland water environmental quality	**Surface and groundwater quality** The referral identifies: • elevated aluminium, arsenic and zinc in groundwater • enrichment of arsenic in waste rock and process residues elevated arsenic in water extracts and peroxide extracts. Seepage and run off from waste rock and ore stockpiles, and discharge of groundwater through dewatering operations has the potential to, directly and cumulatively, significantly impact on: • surface water quality from the fate of metals, metalloids (particularly arsenic) and nutrients present in the groundwater and geology of the area, • groundwater quality from the fate of metals and metalloids present in waste rock and ore stockpiles the ecological health of the Charlotte River from the migration of mine impacted water through the shallow alluvial aquifer.	12. Detail the chemical and physical characteristics of surface waters and groundwater within the predicted ZOI, through the collection of an appropriate baseline dataset. Identify any water quality standards and guidelines that would be used to describe the ecological values and health of surface water environments. 13. Identify the quantity, quality (including anions, cations, pH, EC, metals, arsenic and nutrients) and location of all potential discharges of water and wastewater by the proposal, to groundwater and surface water, whether as point sources (such as controlled discharges from regulated dams) or diffuse sources (such as seepage from waste rock dumps/ ore stockpiles or irrigation to land of wastewater). 14. Demonstrate how water would be managed and treated to achieve a quality that provides for the protection of aquatic ecosystems prior to discharge. Provide a tabulated comparison of the predicted water quality and the standards and guidelines identified in item 12. 15. Identify, describe and assess the potential impacts of any discharges on the quality and quantity of receiving waters taking into consideration cumulative impacts from other proposals and the practices and procedures that would be used to avoid or minimise impacts. 16. Describe the avoidance and mitigation measures to manage the impacts and risks of water discharges on the receiving environment identified by item 15. Provide details of a monitoring program, including trigger thresholds and response (corrective) actions.

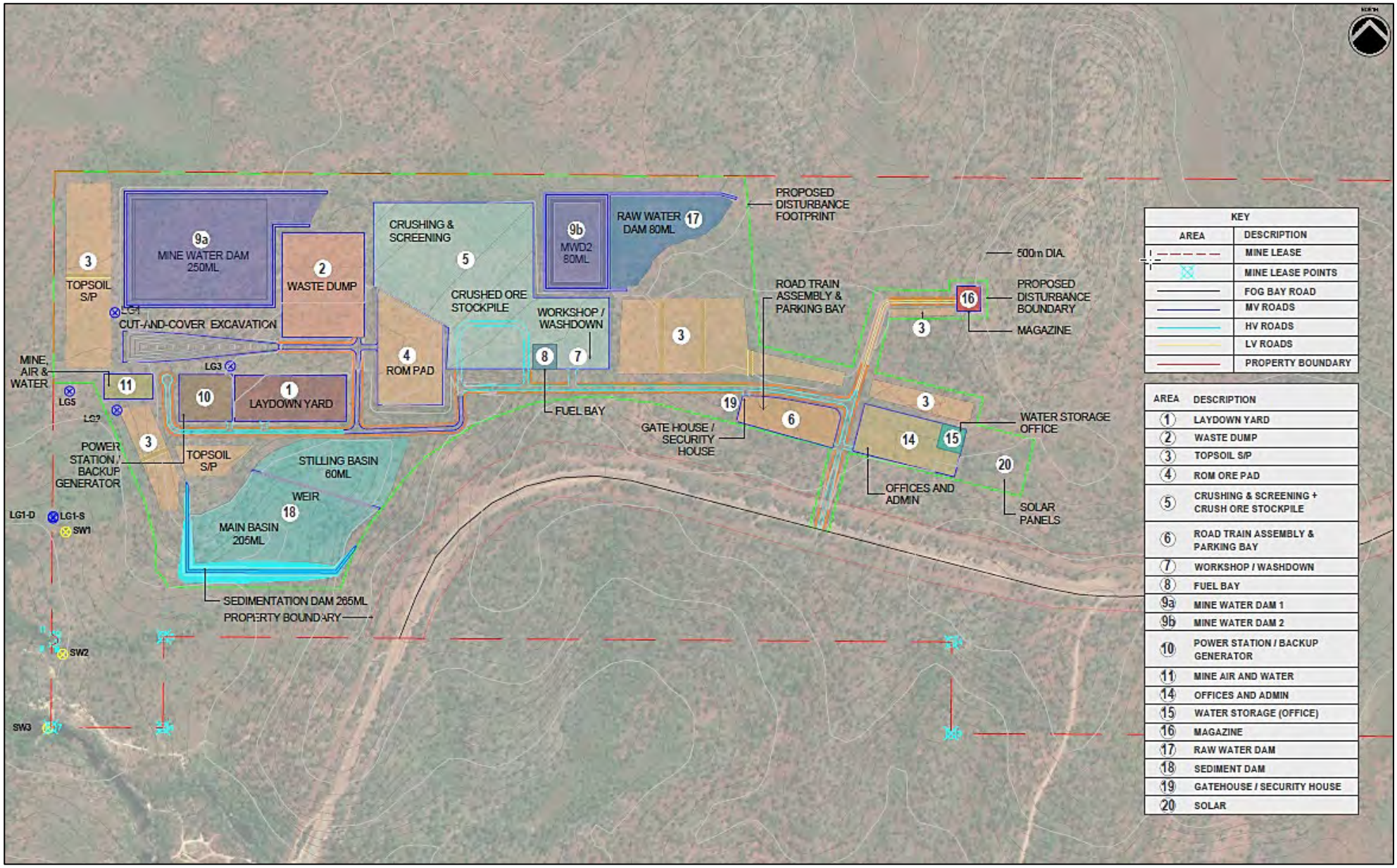


Figure 1: Mine layout (Projectick 2024).

1.2. Guidelines and standards

Acid and metalliferous drainage (AMD) is a collective term that can be used to describe acid rock drainage (ARD), pH neutral metalliferous drainage (NMD) and saline drainage (SD). AMD is associated with the oxidation of sulphidic materials that can occur within waste rock landforms, ore stockpiles, tailings storage areas, open pit walls and underground mine voids (where present). ARD is characterised by low pH and elevated concentrations of sulphate and dissolved metals/metalloids that may be environmentally significant. Furthermore, even in situations where acid generated by primary oxidation of sulphides is neutralised there may still be potential for mobilisation of elevated metals/metalloids and/or salinity, which may require management.

This report has been prepared in accordance with the methodologies of the following guidelines and standards pertinent to geochemical assessment and management of potentially sulphidic rock materials that may be disturbed by a project:

- ARD Test Handbook. Project P387A Prediction & Kinetic Control of Acid mine Drainage [AMIRA (EGi & IWRI) 2002].
- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND 2009).
- Preventing Acid and Metalliferous Drainage (LPSDP 2016).
- The Global Acid Rock Drainage Guide (INAP 2014).
- Tool for Acid Rock Drainage and Metal Leaching Prevention and Management (INAP & ICMM 2025).

1.3. Scope of work

The scope of work comprised:

- Review and collation of key project (Section 2) and environmental setting information (Section 3).
- Preliminary assessment of discharge and water quality issues to address the NT EPA's informational requirements 12 to 16 (Section 4).

2. PROJECT OVERVIEW

2.1. Local mining activities and land use

The project is located within the Bynoe Pegmatite Field on the Cox Peninsula, approximately 30 km south of Darwin, near the operating Grants Lithium Mine and the approved BP33 underground lithium project (NT EPA 2025; Lithium Plus 2024).

The surrounding area is dominated by mineral exploration and mining tenements, with undeveloped Crown land, native vegetation and drainage corridors associated with the Charlotte River catchment. The project disturbance footprint covers approximately 65 hectares within a 296-hectare mining lease on elevated terrain underlain by the Burrell Creek Formation (NT EPA 2025; Eco Logical Australia 2026).

The Charlotte River and its tributaries are the principal environmental features, flowing southwest to Bynoe Harbour and supporting riparian vegetation, estuarine habitats and downstream mangrove communities. Tributaries within the project area are largely ephemeral, flowing seasonally during the wet season. Acid sulphate soils and tidally influenced wetlands occur along parts of the Charlotte River corridor, while mapped groundwater-dependent ecosystems and Eucalypt woodland communities are present within 5 km of the project (NT EPA 2025; Eco Logical Australia 2026).

2.2. Deposit geology and geochemical attributes of mine rock

The Lei Deposit is part of Lithium Plus Minerals' Bynoe Lithium Project within the Bynoe Pegmatite Field of the Litchfield Pegmatite Belt, approximately 40 km southwest of Darwin, Northern Territory. The deposit is hosted within the Paleoproterozoic Pine Creek Orogen and comprises lithium-caesium-tantalum (LCT) pegmatites emplaced into metasedimentary rocks and associated granitoids (Lithium Plus 2026a; NT Gov 2026).

Lithium mineralisation occurs within spodumene-bearing pegmatite dykes and lenses that are interpreted to be genetically related to highly fractionated granitic magmatism. The deposit forms part of a district containing several significant lithium deposits, including Core Lithium's Finniss Project.

The Lei Mineral Resource extends along strike and at depth, with mineralisation remaining open in places. Spodumene is the dominant lithium-bearing mineral and the principal economic target. The principal rock units comprise spodumene-rich LCT pegmatites, metasedimentary rocks of the Pine Creek Orogen (including schists and related metamorphic units), and granitic intrusions considered to be the source of the pegmatite-forming melts.

Geochemical characterisation of mine rock for the project (EGi 2024) comprised test work to determine the acid-forming characteristics, elemental enrichment and leaching characteristics of 122 samples representative of ore and waste rock types that included phyllite, psammite, quartz veins, ore-bearing pegmatite, barren pegmatite and lateritic soils from the box cut, decline and production areas.

Approximately 95% of the samples tested had negligible total sulphur content[1], and fewer than 2.5% of samples were identified as potentially problematic for acid generation. They comprised one phyllite waste rock sample with moderate-sulphur content that was classified as PAF (Potentially Acid Forming) and two low-sulphur phyllite waste rock samples classified as PAF-LC (low-capacity PAF).

Elemental analyses indicated that pegmatite ore may be significantly enriched, relative to typical background soil concentration, in bismuth, while waste rock may be significantly enriched in arsenic, beryllium, tin and tungsten. To assess the potential for release of these and other elements, single-stage water extraction tests (1:2 solid water) were

[1] Descriptors for total sulphur: negligible (less than 0.05%); very low (0.05% to 0.1%); low (greater than 0.1% to 0.3%); moderate (greater than 0.3% to 1%); high (greater than 1% to 5%) and very high (greater than 5%).

completed on a selection of 20 samples that included oxide, transition and fresh rock samples representing the principal lithologies, including the PAF and PAF-LC samples (Table 2).

The results of testing indicated most mined materials will likely produce moderately alkaline contact water (25th to 90th percentile pH values of 8.20 and 9.01 respectively) that has negligible to low concentrations of most metals and metalloids. However, minor portions of mined materials may generate contact water that has one or more of the following:

- Contact with some mined materials may result in slightly elevated aluminium and arsenic concentrations, with median values of 0.24 mg/L and 0.031 mg/L, respectively.
- A minor proportion of materials may generate contact water with slightly elevated iron and zinc concentrations, with a 90th percentile value of 0.39 mg/L for iron and a 95th percentile value of 0.011 mg/L for zinc.
- A very minor proportion of materials may generate contact water with slightly elevated chromium and cobalt concentrations as reflected by maximum concentrations of 0.002 mg/L and 0.009 mg/L respectively.
- Slightly elevated lithium (90th percentile value of 0.512 mg/L) but potentially higher (maximum value of 6.34 mg/L) for a very small amount of mined material.

Table 2: Summary of de-ionised water extract (1 part solid: 2 parts water) test work (EGi 2024).

Parameter	Unit	No	Min	Max	5th Percentile	10th Percentile	25th Percentile	Median	75th Percentile	90th Percentile	95th Percentile
pH	-	20	7.70	**9.30**	7.80	7.89	8.20	8.40	**8.80**	**9.01**	**9.11**
Electrical Conductivity	µS/cm	20	82	139	89	89	104	114	123	135	139
Bicarbonate Alkalinity	mg/L	20	13.0	58.0	14.0	14.0	15.8	22.0	31.0	39.9	48.5
Sulphate	mg/L	20	1	26	1	1	1	2	5	16	17
Chloride	mg/L	20	2	9	2	3	3	5	5	7	8
Calcium	mg/L	20	0.5	6	0.5	0.5	0.5	0.5	2	3	4
Magnesium	mg/L	20	0.5	2	0.5	0.5	0.5	0.5	0.5	1	2
Sodium	mg/L	20	5	16	5	6	7	9	10	10	11
Potassium	mg/L	20	1	16	1	1	1	3	7	10	10
Aluminium	mg/L	20	0.01	**1.16**	0.03	0.04	0.09	**0.24**	**0.53**	**0.75**	**0.99**
Arsenic	mg/L	20	0.0005	**0.565**	0.001	0.002	0.007	**0.031**	**0.074**	**0.098**	**0.222**
Beryllium	mg/L	20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Barium	mg/L	20	0.032	0.876	0.053	0.054	0.146	0.240	0.443	0.529	0.554
Boron	mg/L	20	0.03	0.17	0.03	0.03	0.05	0.08	0.12	0.15	0.15
Cadmium	mg/L	20	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Chromium	mg/L	20	0.0005	**0.002**	0.0005	0.0005	0.0005	0.0005	0.0006	0.001	0.001
Cobalt	mg/L	20	0.0005	**0.009**	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001
Copper	mg/L	20	0.0005	0.005	0.0005	0.0005	0.0005	0.0005	0.001	0.002	0.002
Iron	mg/L	20	0.025	**0.71**	0.025	0.025	0.025	0.13	0.23	**0.39**	**0.50**
Lead	mg/L	20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lithium	mg/L	20	0.003	**6.34**	0.009	0.023	0.032	0.073	0.208	**0.512**	**1.12**
Manganese	mg/L	20	0.001	0.136	0.002	0.003	0.003	0.008	0.015	0.052	0.068
Mercury	mg/L	20	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel	mg/L	20	0.0005	0.0260	0.0005	0.0005	0.0005	0.0005	0.0013	0.0063	0.0099
Selenium	mg/L	20	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc	mg/L	20	0.0025	**0.027**	0.0025	0.0025	0.0025	0.0025	0.005	**0.008**	**0.011**

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria defined in Table 7, Section 4.1. Black bold and tan shaded values are above the 'elevated' threshold criteria as defined in Table 7, Section 4.1.

Peroxide extractions were carried out on the only sample that was classified as PAF and the two samples classified as PAF-LC. These samples are considered representative of material that will be only a very minor fraction of total waste rock generated by the project. The purpose of the peroxide extractions was to provide an indication of potential drainage water quality if such materials were subject to strongly oxidising conditions. The data presented in Table 3 are peroxide extract concentrations multiplied by 5 to account for dilution by the peroxide solution (1:100 solid: liquid extract ratio), making them comparable to levels of release that might be expected from free draining kinetic leach column test work. Results infer the following upon exposure of PAF and PAF-LC waste rock to strong oxidising conditions:

- Release of elevated concentrations[2] of sulphate (which is to be expected for sulphidic rock), especially with higher sulphur PAF material.
- Elevated concentrations of some metals/metalloids released under acidic conditions which may include aluminium, cadmium, copper, lithium, manganese and zinc.

Table 3: Scaled chemical compositions of peroxide extractions on PAF and PAF-LC samples.

Parameter		EGi Code	26509	26510	26534
		Oxidation	Fresh	Fresh	Fresh
		Rock Type	Phyllite	Phyllite	Phyllite
		Total S %	0.29	0.89	0.27
		AMD Classification	PAF-LC	PAF	PAF-LC
Sulphate	mg/L		340	**1165**	440
Calcium	mg/L		20	190	40
Magnesium	mg/L		15	40	30
Sodium	mg/L		40	15	10
Potassium	mg/L		70	50	65
Aluminium	mg/L		**18**	**38**	**12**
Arsenic	mg/L		0.04	0.035	0.015
Beryllium	mg/L		0.005	0.02	0.01
Barium	mg/L		0.525	0.85	0.69
Boron	mg/L		0.8	0.25	0.25
Cadmium	mg/L		0.0025	0.0035	**0.0205**
Chromium	mg/L		0.02	0.03	0.015
Cobalt	mg/L		0.325	0.51	0.45
Copper	mg/L		**1.235**	**4.39**	**1.845**
Iron	mg/L		0.25	2.65	0.25
Lead	mg/L		0.005	0.43	0.185
Lithium	mg/L		**1.625**	0.92	**1.71**
Manganese	mg/L		**1.36**	**14.85**	**4.42**
Nickel	mg/L		0.585	0.585	0.49
Selenium	mg/L		0.05	0.1	0.05
Zinc	mg/L		**3.03**	**2.205**	**11.4**

[2] Elevated concentrations as suggested by the order of magnitude of the scaled peroxide extraction results and highlighted in **bold** and grey, e.g. greater than 1000 mg/L for sulphate; greater than 1 mg/L for metals and metalloids such as aluminium, barium, iron, manganese, arsenic, chromium, cobalt, copper, lead, lithium, nickel, and zinc; greater than 100 µg/L for metals and metalloids such as beryllium and selenium; and greater than 10 µg/L for metals and metalloids such as cadmium. These threshold concentrations are based on our experience of significant parameter concentrations associated with column leachate data sets over the last 30 years.

3. ENVIRONMENTAL SETTING

3.1. Climate

The project is located on the Cox Peninsula approximately 30 km south of Darwin within a tropical monsoonal climate zone characterised by hot, humid wet seasons and warm dry seasons (Eco Logical Australia 2026). Long-term climate data indicate average temperatures ranging from approximately 22.4 °C to 33.3 °C, with maximum temperatures commonly exceeding 40 °C during October. Rainfall is strongly seasonal, with the majority occurring between November and March. Mean annual rainfall is approximately 1,680 to 1,800 mm based on nearby Bureau of Meteorology stations at Berry Springs Rangers and Southport. Maximum monthly rainfall occurs during January, reaching approximately 493 mm, while June to September is typically very dry with minimal rainfall. Evaporation is highest during the late dry season and early wet season transition, particularly in October. These climatic conditions strongly influence groundwater recharge, surface water flow, seasonal water level fluctuations, and ephemeral stream behaviour throughout the project area.

3.2. Topography, drainage and surface water quality

The project area has generally low relief, with elevations decreasing from approximately 38 m AHD in the east to 14 m AHD in the west toward the Charlotte River. Drainage is controlled by ephemeral tributaries that discharge to the Charlotte River and ultimately Bynoe Harbour. The Charlotte River is non-perennial in its upper reaches but becomes tidally influenced downstream, with mangrove-lined estuarine conditions occurring close to the mining lease boundary (Eco Logical Australia 2026).

Baseline water quality data are summarised in Tables 4 and 5. Freshwater quality was compiled using monitoring data from New Upstream, SW1, SW4 and New2, while tidal water quality was compiled using data from New1, SW2, SW3 and SW5 (Eco Logical Australia 2026) (Figure 2). The baseline datasets span the monitoring period January 2023 to December 2025.

Baseline freshwater has low turbidity and is generally slightly acidic to slightly alkaline (25th to 90th percentile pH 6.0 to 7.5), with negligible to low total and dissolved concentrations of most metals and metalloids. In most cases, metal and metalloid concentrations were less than the limits of analytical reporting. A very small proportion of samples recorded elevated concentrations of sulphate and chloride (maximum 21,800 mg/L and 3,010 mg/L, respectively), consistent with occasional tidal influence at locations that otherwise have fresh water. A very small proportion of samples also recorded elevated total boron and iron (maximums of 4.83 mg/L and 9.98 mg/L, respectively), and elevated dissolved aluminium, boron, cobalt, copper and iron (maximums of 0.07, 4.23, 0.004, 0.004 and 0.98 mg/L, respectively). Slightly elevated total aluminium and iron concentrations were common (median 0.070 mg/L and 1.15 mg/L, respectively), while a smaller proportion of samples recorded slightly elevated total cobalt and copper (90th percentile cobalt value of 0.0020 mg/L and 80th percentile copper value of 0.0018 mg/L).

Baseline tidal water also has low turbidity and is generally slightly acidic to slightly alkaline (25th to 90th percentile pH 6.27 to 7.41), with negligible to low total and dissolved concentrations of most metals and metalloids. Consistent with tidal influence, sulphate and chloride concentrations were typically elevated (75th percentile sulphate 2,460 mg/L; median chloride 6,440 mg/L). A very small proportion of samples recorded elevated total boron, copper and iron (maximums of 5.67, 25.2 and 3.31 mg/L, respectively) and elevated dissolved boron (maximum 5.31 mg/L). Slightly elevated total aluminium, boron and iron (median 0.060, 1.44 and 0.44 mg/L, respectively) and dissolved boron (median 1.56 mg/L) were common. Smaller proportions of samples recorded slightly elevated total copper (90th percentile 0.004 mg/L), while only a very small proportion recorded slightly elevated total cobalt and zinc (maximum 0.149 and 0.076 mg/L, respectively) and slightly elevated dissolved copper, iron and zinc (maximum 0.022, 0.81 and 0.029 mg/L, respectively).

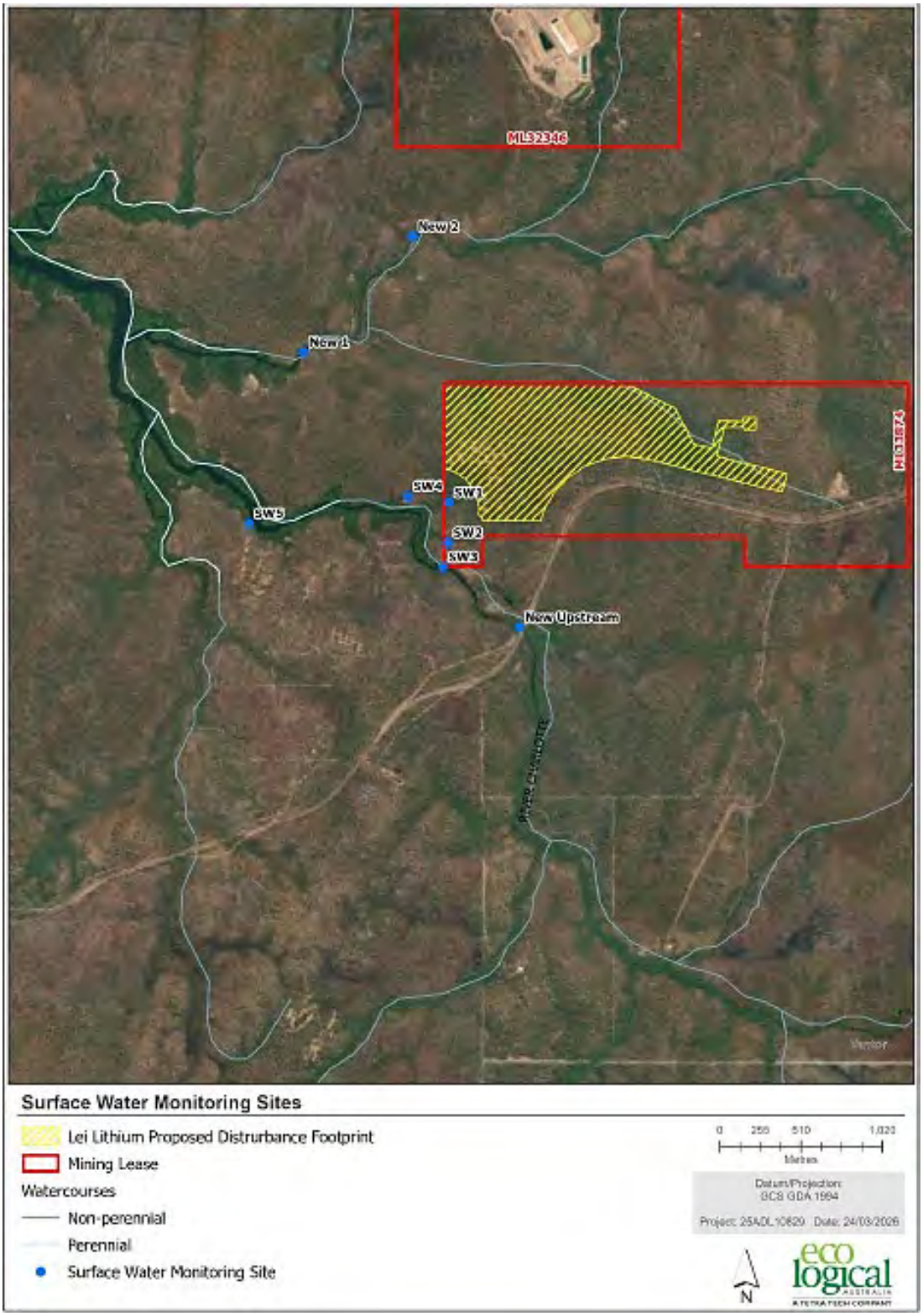


Figure 2: Surface water monitoring sites.

Table 4: Baseline surface water quality - upstream (EcOz 2026).

Parameter	Unit	Count	Min	Max	10th Percentile	25th Percentile	Median	75th Percentile	80th Percentile	90th Percentile
pH	-	67	5.57	8.81	5.82	5.96	6.28	6.94	7.09	7.52
Electrical Conductivity	µS/cm	67	15.8	**56140**	23.4	39.4	74.5	325	507	**1544**
Bicarbonate Alkalinity	mg/L	67	2	135	4	5	8	11	13	16
Ammonia	mg/L	67	0.005	1.85	0.005	0.02	0.04	0.09	0.12	0.24
Nitrate	mg/L	67	0.005	0.07	0.005	0.005	0.005	0.005	0.005	0.01
Total Nitrogen	mg/L	67	0.05	2.3	0.1	0.2	0.3	0.4	0.4	0.5
Sulphate	mg/L	67	0.5	**3010**	0.5	0.5	0.5	2.5	3.0	9.0
Chloride	mg/L	67	2.0	**21800**	3.0	4.0	5.0	12	27	81
Calcium	mg/L	67	0.5	465	0.5	0.5	0.5	0.8	1.0	2.0
Magnesium	mg/L	67	0.5	1320	0.5	0.5	0.5	2.0	2.0	5.4
Sodium	mg/L	67	2.0	11000	2.6	3.0	5.0	11	17	45
Potassium	mg/L	67	0.5	400	0.5	0.5	0.5	1.0	1.0	3.0
Aluminium (total)	mg/L	67	0.005	**0.54**	0.008	0.030	**0.070**	**0.14**	**0.16**	**0.24**
Aluminium (dissolved)	mg/L	67	0.005	**0.07**	0.005	0.005	0.01	0.03	0.03	0.04
Arsenic (total)	mg/L	67	0.0005	0.011	0.0005	0.0005	0.001	0.002	0.002	0.004
Arsenic (dissolved)	mg/L	67	0.0005	0.005	0.0005	0.0005	0.0005	0.001	0.002	0.002
Beryllium (total)	mg/L	57	0.0005	0.004	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Beryllium (dissolved)	mg/L	65	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Barium (total)	mg/L	65	0.004	0.287	0.008	0.012	0.020	0.026	0.031	0.036
Barium (dissolved)	mg/L	65	0.004	0.273	0.008	0.011	0.017	0.022	0.024	0.029
Boron (total)	mg/L	65	0.025	**4.83**	0.025	0.025	0.025	0.060	0.082	0.32
Boron (dissolved)	mg/L	65	0.025	**4.23**	0.025	0.025	0.025	0.025	0.070	0.15
Cadmium (total)	mg/L	67	0.00005	0.0004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Cadmium (dissolved)	mg/L	67	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium (total)	mg/L	67	0.0005	0.004	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Chromium (dissolved)	mg/L	67	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (total)	mg/L	65	0.0005	**0.004**	0.0005	0.0005	0.0005	0.0005	0.0005	**0.0020**
Cobalt (dissolved)	mg/L	65	0.0005	**0.004**	0.0005	0.0005	0.0005	0.0005	0.0006	0.0016
Copper (total)	mg/L	66	0.0005	**0.016**	0.0005	0.0005	0.0005	0.0010	**0.0018**	**0.0020**
Copper (dissolved)	mg/L	67	0.0005	**0.004**	0.0005	0.0005	0.0005	0.0005	0.0005	0.0014
Iron (total)	mg/L	67	0.06	**9.98**	0.15	**0.33**	**1.15**	**1.71**	**1.90**	**2.39**
Iron (dissolved)	mg/L	67	0.025	**0.98**	0.025	0.08	0.18	0.30	**0.32**	**0.50**
Lead (total)	mg/L	67	0.0005	0.003	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lead (dissolved)	mg/L	67	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lithium (total)	mg/L	67	0.0005	0.18	0.001	0.002	0.004	0.006	0.007	0.009
Lithium (dissolved)	mg/L	67	0.0005	0.15	0.002	0.003	0.004	0.006	0.006	0.007
Manganese (total)	mg/L	63	0.004	0.865	0.006	0.012	0.03	0.069	0.077	0.139
Manganese (dissolved)	mg/L	63	0.0005	0.752	0.005	0.009	0.028	0.060	0.068	0.103
Mercury (total)	mg/L	67	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (dissolved)	mg/L	67	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (total)	mg/L	67	0.0005	0.004	0.0005	0.0005	0.0005	0.001	0.001	0.002
Nickel (dissolved)	mg/L	67	0.0005	0.004	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
Selenium (total)	mg/L	65	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Selenium (dissolved)	mg/L	65	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Vanadium (total)	mg/L	65	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Vanadium (dissolved)	mg/L	65	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc (total)	mg/L	67	0.0025	0.029	0.0025	0.0025	0.0025	0.006	0.006	0.007
Zinc (dissolved)	mg/L	67	0.0025	0.016	0.0025	0.0025	0.0025	0.0025	0.006	0.007

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria defined in Table 7, Section 3.1. Black bold and tan shaded values are above the 'elevated' threshold criteria as defined in Table 7, Section 4.1.

Table 5: Baseline surface water quality – tidal influence (EcOz 2026).

Parameter	Unit	Count	Min	Max	10th Percentile	25th Percentile	Median	75th Percentile	80th Percentile	90th Percentile
pH	-	101	5.69	7.92	5.99	6.27	6.79	7.12	7.19	7.41
Electrical Conductivity	µS/cm	101	17.9	**62370**	46.1	496	**19258**	**45558**	**49100**	**56060**
Bicarbonate Alkalinity	mg/L	101	2	136	4.0	7.0	49	115	119	128
Ammonia	mg/L	101	0.005	0.49	0.005	0.02	0.09	0.18	0.19	0.25
Nitrate	mg/L	101	0.005	0.06	0.005	0.005	0.005	0.005	0.005	0.01
Total Nitrogen	mg/L	101	0.05	1.1	0.2	0.2	0.3	0.4	0.5	0.5
Sulphate	mg/L	101	0.5	**3520**	0.5	8.0	**796**	**2460**	**2630**	**2870**
Chloride	mg/L	101	3	**22100**	12	53	**6440**	**16000**	**16700**	**19300**
Calcium	mg/L	101	0.5	520	0.5	2.00	136	402	417	463
Magnesium	mg/L	101	0.5	1540	1.00	4.00	387	1170	1220	1340
Sodium	mg/L	101	2	12600	7.0	34	3260	9500	9990	10900
Potassium	mg/L	101	0.5	456	0.5	2.0	124	352	374	408
Aluminium (total)	mg/L	99	0.005	**3.74**	0.005	0.005	**0.06**	**0.15**	**0.17**	**0.27**
Aluminium (dissolved)	mg/L	99	0.005	0.07	0.005	0.005	0.005	0.01	0.02	0.03
Arsenic (total)	mg/L	101	0.0005	0.003	0.0005	0.0005	0.0005	0.0005	0.001	0.002
Arsenic (dissolved)	mg/L	101	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.005	0.001
Beryllium (total)	mg/L	83	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Beryllium (dissolved)	mg/L	98	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Barium (total)	mg/L	98	0.005	0.109	0.0112	0.014	0.017	0.023	0.025	0.029
Barium (dissolved)	mg/L	98	0.005	0.106	0.010	0.012	0.017	0.022	0.024	0.030
Boron (total)	mg/L	93	0.025	**5.67**	0.025	0.025	**1.44**	**3.91**	**4.13**	**4.68**
Boron (dissolved)	mg/L	98	0.025	**5.31**	0.025	0.025	**1.56**	**3.98**	**4.22**	**4.72**
Cadmium (total)	mg/L	101	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Cadmium (dissolved)	mg/L	101	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium (total)	mg/L	101	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Chromium (dissolved)	mg/L	101	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (total)	mg/L	98	0.0005	**0.149**	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (dissolved)	mg/L	98	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Copper (total)	mg/L	101	0.0005	**25.2**	0.0005	0.0005	0.0005	0.0005	0.001	**0.004**
Copper (dissolved)	mg/L	101	0.0005	**0.022**	0.0005	0.0005	0.0005	0.0005	0.0005	**0.002**
Iron (total)	mg/L	99	0.025	**3.31**	0.025	0.17	**0.44**	**0.95**	**1.12**	**1.57**
Iron (dissolved)	mg/L	99	0.025	**0.81**	0.025	0.025	0.025	0.13	0.17	0.29
Lead (total)	mg/L	101	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lead (dissolved)	mg/L	101	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lithium (total)	mg/L	99	0.0005	0.215	0.002	0.004	0.060	0.154	0.158	0.176
Lithium (dissolved)	mg/L	99	0.0005	0.196	0.002	0.004	0.053	0.151	0.160	0.171
Manganese (total)	mg/L	93	0.005	0.314	0.008	0.015	0.036	0.057	0.065	0.089
Manganese (dissolved)	mg/L	93	0.0005	0.275	0.005	0.012	0.030	0.054	0.058	0.074
Mercury (total)	mg/L	101	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (dissolved)	mg/L	101	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (total)	mg/L	101	0.0005	0.069	0.0005	0.0005	0.0005	0.0005	0.0005	0.001
Nickel (dissolved)	mg/L	101	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Selenium (total)	mg/L	98	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Selenium (dissolved)	mg/L	99	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Vanadium (total)	mg/L	98	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Vanadium (dissolved)	mg/L	98	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc (total)	mg/L	101	0.0025	**0.076**	0.0025	0.0025	0.0025	0.0025	0.0025	0.0060
Zinc (dissolved)	mg/L	101	0.0025	**0.029**	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria defined in Table 7, Section 3.1. Black bold and tan shaded values are above the 'elevated' threshold criteria as defined in Table 7, Section 4.1.

As expected, baseline tidal water exhibits a strong seawater influence, reflected by higher chloride and sulphate concentrations, but otherwise, freshwater and tidal water quality are similar, with negligible to low total and dissolved concentrations of most metals and metalloids. There is no evidence of any adverse effects on water quality associated with acid sulphate soils (i.e., via oxidation of sulphide minerals) at either freshwater or tidal monitoring locations. If present, this would typically result in substantially lower pH than the observed minima (5.57 and 5.69, respectively), together with significant concentrations of dissolved metals such as aluminium and iron, as well as other environmentally important trace elements such arsenic, copper, cadmium, cobalt, manganese, nickel and zinc. Relatively low dissolved iron and manganese concentrations also suggest predominantly oxic conditions rather than anoxic conditions in the sampled water column.

3.3. Hydrogeology and groundwater quality

Groundwater flow within the project area is controlled by shallow alluvial sediments and the deeper Northern Australian Fractured Rock Province Aquifer (NAFRPA) hosted within the Burrell Creek Formation (Eco Logical Australia 2026). The shallow alluvial aquifer occurs within the upper few metres of soils and sandy clay units that overlie weathered and fractured schist and phyllite units of the NAFRPA.

Existing groundwater monitoring bores include LG1, LG2, LG3, LG4 and LG5, all screened within the fractured rock aquifer system. Groundwater levels are generally shallow, up to around 16 m BGL (below ground level), and regional groundwater flow is interpreted to move south-west toward the Charlotte River. Hydraulic conductivity is highly variable, ranging from approximately 0.27 to 2.6 m/day within fractured zones and 0.0003 to 0.08 m/day within fresh, unfractured rock. Limited nested monitoring indicates potential hydraulic connection between weathered and fractured rock units.

Baseline groundwater quality monitoring of the NAFRPA was undertaken from December 2023 to December 2025 and a summary is presented in Table 7.

Baseline groundwater is slightly acidic to slightly alkaline (25th to 90th percentile pH 6.32–8.57) and contains negligible dissolved concentrations of most metals and metalloids. A moderate proportion of samples recorded slightly elevated electrical conductivity (75th percentile 323 µS/cm), reflecting bicarbonate alkalinity (75th percentile 141 mg/L) rather than chloride or sulphate salinity (75th percentiles 1 and 8 mg/L, respectively). A moderate proportion of samples also recorded slightly elevated arsenic and zinc concentrations (75th percentiles 0.100 and 0.011 mg/L, respectively), while a small proportion recorded slightly elevated dissolved copper (90th percentile 0.002 mg/L).

Overall, the NAFRPA dataset suggests groundwater quality is relatively benign. Where some constituents are slightly elevated, they are most likely associated with equilibrium with aquifer rock materials. It is notable that groundwater quality is broadly similar to the water extraction dataset (Section 1.3), particularly the typical occurrence of slightly elevated aluminium and arsenic concentrations. The very low chloride and sulphate concentrations in groundwater indicates an absence of seawater influx.

Table 6: Baseline groundwater quality (EcOz 2026).

Parameter	Unit	Count	Min	Max	10th Percentile	25th Percentile	Median	75th Percentile	80th Percentile	90th Percentile
pH	-	49	5.81	**10.5**	5.99	6.32	6.68	7.06	7.20	8.57
Electrical Conductivity	µS/cm	49	19.6	**930**	121	183	227	**323**	**402**	**562**
Bicarbonate Alkalinity	mg/L	52	36	158	49	63	94	114	126	133
Total Nitrogen	mg/L	52	0.1	1.7	0.1	0.1	0.3	0.5	0.6	0.9
Sulphate	mg/L	52	0.5	11	0.5	0.5	0.5	1.0	2	2.9
Chloride	mg/L	52	4	16	4	4	5	8	9	12
Calcium	mg/L	52	4	30	4	6.75	12	16	17	20.8
Magnesium	mg/L	52	0.5	6	2	2	4	5	5	6
Sodium	mg/L	52	9	69	10.1	12	17.5	29.3	35.8	44.7
Potassium	mg/L	52	3	66	4	4	5	8.25	13	29.8
Aluminium (dissolved)	mg/L	52	0.005	2.60	0.005	0.005	0.005	0.005	0.005	0.028
Arsenic (dissolved)	mg/L	52	0.0050	**0.205**	0.008	0.012	0.031	**0.100**	**0.115**	**0.154**
Beryllium (dissolved)	mg/L	52	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Barium (dissolved)	mg/L	52	0.014	0.146	0.028	0.034	0.047	0.062	0.067	0.089
Boron (dissolved)	mg/L	52	0.025	0.200	0.025	0.025	0.025	0.025	0.025	0.025
Cadmium (dissolved)	mg/L	52	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium (dissolved)	mg/L	52	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (dissolved)	mg/L	52	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001
Copper (dissolved)	mg/L	52	0.0005	**0.012**	0.0005	0.0005	0.0005	0.0005	0.001	**0.002**
Iron (dissolved)	mg/L	52	0.025	5.570	0.025	0.03	0.29	1.17	1.33	1.90
Lead (dissolved)	mg/L	52	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Lithium (dissolved)	mg/L	49	0.029	0.330	0.045	0.082	0.100	0.136	0.143	0.278
Manganese (dissolved)	mg/L	52	0.001	0.418	0.003	0.018	0.084	0.158	0.178	0.210
Mercury (dissolved)	mg/L	52	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (dissolved)	mg/L	52	0.0005	0.009	0.0005	0.0005	0.0005	0.001	0.002	0.003
Selenium (dissolved)	mg/L	52	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Vanadium (dissolved)	mg/L	52	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Zinc (dissolved)	mg/L	52	0.0025	**0.056**	0.0025	0.0025	0.004	**0.011**	**0.019**	**0.034**

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria defined in Table 7, Section 4.1. Black bold and tan shaded values are above the 'elevated' threshold criteria as defined in Table 7, Section 4.1.

3.4. Water management planning

The Groundwater Impact Assessment (Eco Logical Australia 2026) concluded the principal environmental risks are groundwater drawdown, potential impacts to the Charlotte River system, acid sulphate soils, and cumulative interactions with nearby lithium mining projects. Groundwater drawdown is predicted to be largely confined to the underground workings, although measurable drawdown may extend into the Charlotte River alluvial corridor. The most sensitive receptors are the shallow alluvial sediments, the Northern Australian Fractured Rock Province Aquifer (NAFRPA), groundwater-dependent ecosystems, and vegetation potentially reliant on shallow groundwater.

Potential groundwater impacts include groundwater level decline, altered flow paths, saline intrusion into deeper flow systems and mine workings, and oxidation of acid sulphate soils, which could generate acidity and mobilise metals, affecting groundwater and surface water quality. Potential surface water impacts relate to changes in groundwater–surface water interaction, dewatering near the Charlotte River, acid sulphate soil oxidation, and release or seepage of mine-affected water from water management infrastructure, waste rock dumps and ore stockpiles. Receptors include freshwater tributaries, tidally influenced reaches of the Charlotte River, mangroves, aquatic ecosystems, and downstream estuarine environments connected to Bynoe Harbour.

If the Lei Lithium Project operates concurrently with the Grants Lithium Project and the BP33 underground mine, cumulative groundwater drawdown is predicted to increase only slightly. However, cumulative effects may increase the risk of groundwater level decline, saline intrusion, impacts to groundwater-dependent ecosystems, and acid sulphate soil exposure within the Charlotte River alluvial corridor.

Key water management strategies include:

- Surface water will be managed using mine water dams, raw water dams and sediment basins. Mine water dams will capture local runoff, groundwater inflows and mine-affected runoff from the ore stockpile and waste rock dump, with water reused for underground operations. Controlled discharge to the Charlotte River catchment will occur under a water discharge licence. Raw water and sediment basin water will be reused for dust suppression, truck washdown and construction before passive release. Where practicable, tunnel lining will reduce groundwater inflows and drawdown.
- Potential drawdown effects on acid sulphate soils have been identified, although no baseline groundwater impacts have been observed. Proposed management includes development of an acid sulphate soil management plan that incorporates monitoring of potential drawdown and adversely influenced water quality using a Trigger Action Response Plan (TARP) framework.
- Groundwater modelling suggests there will not be significant cumulative impacts from nearby projects. Nevertheless, adaptive management will rely on ongoing groundwater level and water quality monitoring, model refinement, implementation of TARPs, and consideration of additional monitoring bores to validate predictions and improve future assessments.
- Those to which this report relates in the management and monitoring of water quality of dewatered groundwater, drainage lines associated with waste rock and ore storage areas and the mine water dam (refer to Section 4.3 for further detail).

4. PRELIMINARY ASSESSMENT OF DISCHARGE AND SEEPAGE WATER QUALITY ISSUES

The NT EPA assessment of the project SER identified elevated aluminium, arsenic and zinc in groundwater, and arsenic enrichment in waste rock and process residues, including elevated arsenic in water and peroxide extracts as concerns. The assessment also suggested seepage and runoff from waste rock and ore stockpiles, and groundwater discharge from dewatering operations, have the potential to directly and cumulatively impact surface water quality through the mobilisation of metals, metalloids (particularly arsenic) and nutrients present in groundwater and the local geology. They also have the potential to impact groundwater quality through the mobilisation of metals and metalloids from waste rock and ore stockpiles, and the ecological health of the Charlotte River through migration of mine-impacted water within the shallow alluvial aquifer.

The following sections are intended to address the additional information required by the NT EPA in relation to potential impacts to surface and groundwater quality as summarised in Table 1. The specific items are as follows:

Item 12 - Describe the baseline chemical and physical characteristics of surface water and groundwater within the predicted zone of influence and identify the water quality standards and guidelines used to assess the ecological values and health of surface water environments.

Item 13 - Identify the quantity, quality (including anions, cations, pH, EC, metals, arsenic and nutrients) and location of all potential surface water and groundwater discharges from the proposal, including both point sources (such as controlled discharges from regulated dams) and diffuse sources (such as seepage from waste rock dumps, ore stockpiles or wastewater irrigation).

Item 14 - Demonstrate how water would be managed and treated to protect aquatic ecosystems before discharge. Provide a table comparing predicted water quality with the standards and guidelines identified in Item 12.

Item 15 - Identify, describe and assess the potential impacts of proposed discharges on the quality and quantity of receiving waters, including cumulative impacts from other proposals, and the measures that would be used to avoid or minimise those impacts.

Item 16 - Describe the avoidance and mitigation measures to manage the impacts and risks of water discharges identified in Item 15. Provide details of the proposed monitoring program, including trigger thresholds and corrective actions.

4.1. Baseline chemical and physical characteristics of surface water and groundwater (response to Item 12)

Baseline surface water and groundwater conditions reflect a low-relief catchment draining westward to the Charlotte River, with ephemeral tributaries flowing to the river and ultimately Bynoe Harbour. The upper Charlotte River is non-perennial, becoming tidally influenced downstream near the mining lease. Baseline monitoring was undertaken between January 2023 and December 2025 for freshwater, tidal water and groundwater. Detailed reviews of baseline surface and groundwater quality are provided in Sections 2.2 and 2.3.

Table 7 provides the water quality screening criteria used to assess the ecological values and health of surface water environments. The screening criteria provide perspective for evaluation of constituents in baseline surface water and groundwater. They also provide perspective for interpretation of results of water extraction test work (Section 1.3) and modelled predictions of surface water discharge composition in the absence of water treatment (Section 3.2). The following should be noted in relation to the criteria used:

- 'Slightly Elevated' screening criteria - These relate to fresh-water ecosystem protection values, consistent with the 95% level of protection values (ANZG 2018) or a suitably conservative alternate freshwater ecosystem / beneficial water use protection value. Although these criteria have been referenced from ecological or human health protection-based guideline values, they have used merely to convey order of magnitude.
- 'Elevated' screening criteria - These relate to threshold values where water quality may be adversely influenced.
- Both sets of criteria are intended to convey a sense of the order of magnitude of the reported value and do not necessarily infer potential risk to human health and or the environment[3].

The results of baseline monitoring indicate freshwater is typically characterised by low turbidity and circum-neutral pH (i.e., slightly acidic to slightly alkaline). Total and dissolved concentrations of most metals and metalloids are negligible to low. A small proportion of test samples had elevated concentrations of sulphate and chloride, consistent with local tidal influence, together with occasional elevated dissolved boron, iron, aluminium, cobalt and copper. Slightly elevated total aluminium and iron were relatively common. Baseline tidal water also has low turbidity and is circum-neutral, and the water quality is broadly similar to freshwater, with negligible to low concentrations of most metals and metalloids, apart from higher chloride and sulphate concentrations reflecting seawater influence. Monitoring data indicate slightly elevated aluminium, boron and iron concentrations commonly occur, and on occasions boron, copper and iron are elevated. There is no evidence of any adverse effects on baseline freshwater quality or tidal water quality associated with acid sulphate soils.

Monitored baseline groundwater is representative of a fractured rock aquifer, with water levels generally less than 16 m below ground level and regional flow toward the Charlotte River. Hydraulic conductivity is highly variable, and limited monitoring indicates potential hydraulic connection between weathered and fractured fresh rock. Groundwater quality is slightly acidic to slightly alkaline and contains negligible dissolved concentrations of most metals and metalloids. A slightly elevated electrical conductivity reflects bicarbonate alkalinity rather than chloride or sulphate salinity. Slightly elevated concentrations of arsenic and zinc commonly occur, and slightly elevated copper occurs occasionally. Overall, groundwater monitoring data suggest groundwater quality is relatively benign and shows no evidence of seawater intrusion.

[3]An assessment of potential environmental risk would need to be based upon probable water quality in the receiving environment as well as detailed consideration of the nature of environmental reception e.g. both toxicity of the contaminant and dosage to the receptor.

Table 7: *Screening criteria applied to dissolved phase constituents in baseline surface water and groundwater, water extractions and modelled composition of surface water discharge water quality.*

Parameter	Units	Screening Criteria	
		Slightly Elevated	Elevated[4]
pH	-	4.0 – 5.0 and 8.5 – 9.5[5]	< 4.0 and > 9.5[6]
EC	dS/m	0.25[7]	2.5[7]
Total Nitrogen	mg/L	0.25[8]	2.5
Sulphate	mg/L	429[9]	1000[10]
Chloride	mg/L	175[11]	700[11]
Aluminium	mg/L	0.055	5[10]
Antimony	mg/L	0.009	0.09
Arsenic	mg/L	0.013	0.5[10]
Beryllium	mg/L	0.00013	0.013[12]
Boron	mg/L	0.94	4.7[13]
Cadmium	mg/L	0.0002	0.01[10]
Cobalt	mg/L	0.0014	1[10]
Chromium	mg/L	0.001	1[10]
Copper	mg/L	0.0014	1[10]
Fluoride	mg/L	1.7	8.5[13]
Iron	mg/L	0.3[14]	3
Lead	mg/L	0.0034	0.1[10]
Lithium	mg/L	0.25[15]	2.5
Mercury	mg/L	0.0006	0.002[10]
Manganese	mg/L	1.9	9.5[13]
Molybdenum	mg/L	0.034	0.34
Nickel	mg/L	0.011	1[10]
Selenium	mg/L	0.011	0.11
Silver	mg/L	0.00005	0.005[12]
Thallium	mg/L	0.00003	0.003[12]
Uranium	mg/L	0.0005	0.2[10]
Zinc	mg/L	0.008	0.8[12]

[4] Slightly elevated metal and metalloid concentrations times a factor of 10 unless otherwise stated was considered appropriate in terms of possible water quality influence.

[5] Nominal lower pH value indicative of moderate residual acidity, upper value-based default trigger values for estuaries in tropical Australia (ANZG 2018).

[6] Order of magnitude greater than slightly elevated pH screening criteria.

[7] Slightly elevated salinity threshold based on default trigger for lowland river in tropical Australia (ANZG 2018). Elevated salinity threshold, slightly elevated threshold x 10.

[8] Default trigger for estuaries in Tropical Australian for total N (ANZG 2018). Elevated total N threshold, slightly elevated threshold x 10.

[9] Use of a Canadian based freshwater ecological protection guideline (BC WQG 2021) in the absence of local screening criteria.

[10] Generic threshold for non-adverse health effects to livestock (ANZG 2018) and in the case of sulphate, arsenic, cadmium, cobalt, chromium, copper, lead, mercury, nickel and uranium the threshold for no adverse effects to cattle.

[11] Default chloride concentrations causing foliar injury in crops, lower value for chloride sensitive, upper value for chloride tolerant (ANZG 2018).

[12] Two orders of magnitude (100 times) the slightly elevated screening criteria were considered appropriate in terms of possible water quality influence.

[13] Five times the slightly elevated screening criteria was considered sufficient in terms of possible water quality influence.

[14] Australian Drinking Water Guideline value (NHMRC 2022).

[15] Crop irrigation water quality guideline (CCME 2024) divided by a factor of 10.

4.2. Assessment of point and diffuse discharge sources (response to Items 13, 14 and 15)

A conceptualisation of controlled release of excess water from the mine to the Charlotte River is shown in Figure 3, and a quarterly life-of-mine (LOM) water balance for expected rainfall conditions is presented in Table 8[16]. The LOM water balance includes groundwater, waste rock and ore contact drainage, controlled releases, and catchment drainage to the Charlotte River. In addition, LOM water balances for dry and wet rainfall conditions are presented in Appendix 1.

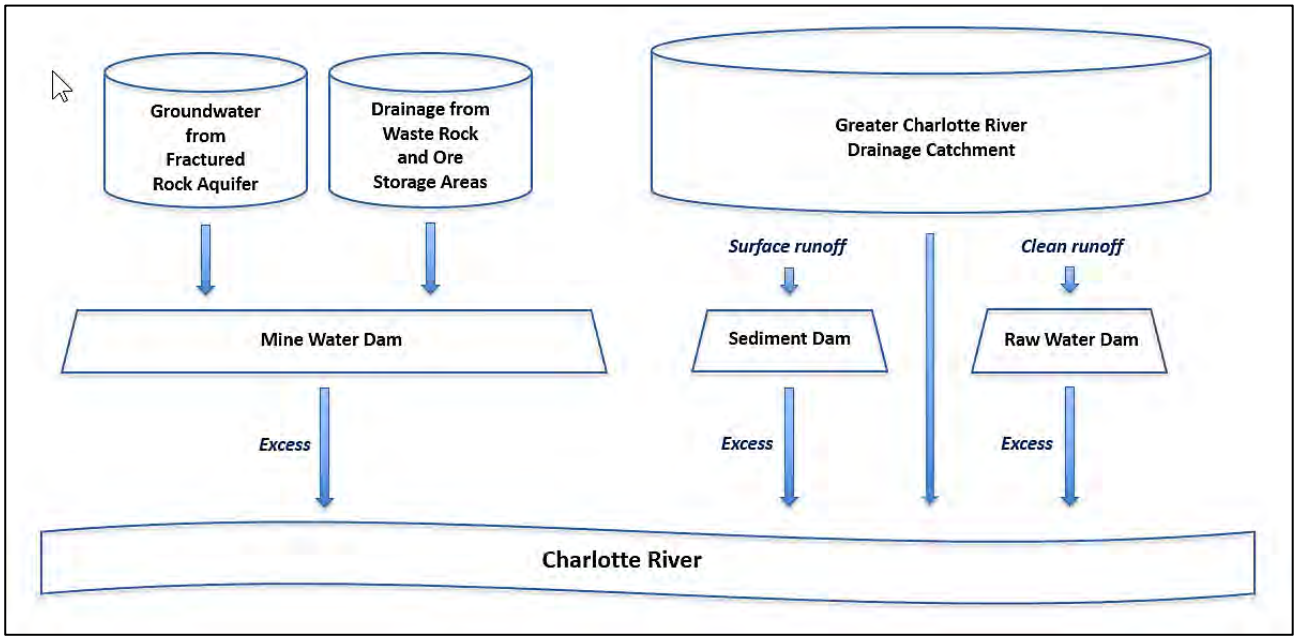


Figure 3: Schematic of controlled release of excess water from the mine to the Charlotte River.

Preliminary modelling of Charlotte River water quality downstream of controlled releases of excess mine water was undertaken using the PHREEQC geochemical equilibrium modelling program (Parkhurst & Appelo, 2013). Simulations were based on expected, dry and wet water balance scenarios and conservatively assumed no removal of dissolved constituents by mineral precipitation except when examining iron oxide / hydroxide effects. Input source term chemistries were based on[17]: Groundwater - 75th percentile baseline quality; Freshwater - median baseline quality; and Mine rock - 1:2 de-ionised water extraction results.

A literature-derived nitrate concentration of 44.3 mg/L (Gemson et al., 2022) was included to assess the potential influence of blast residues in ore and waste rock contact water, as water extraction testing was undertaken on representative drill core. The potential removal of metals and metalloids by adsorption onto iron oxide/hydroxide phases formed through oxidation of dissolved groundwater iron was also evaluated. The input source terms and the most adverse predicted Charlotte River water quality[18] are presented in Table 9.

[16] Provided by Kah Ong, Senior Engineer, WRM Water & Environment, 22 June 2026 but was not intended to duplicate water balance information presented in other WRM reports submitted to the NT EPA.

[17] It should be noted that the modelled water quality is a mixing model prior to reception by Charlotte River to provide a means of comparing probable discharge water quality with surface water quality, not a detailed model of Charlotte River water quality.

[18] Most adverse water quality in terms of arsenic concentration. Most other metals and metalloids also had greatest concentration.

Table 8: LOM water balance for expected rainfall conditions that accounts for excess water discharge.

Quarter	GW Inflow to MWD1 (ML)	Waste rock and ore contact drainage to MWD1 (44% of catchment) (ML	Drainage with no contact with ore or waste rock to MWD1 (56% of catchment)	Combined Catchment runoff to MWD1 (ML)	Controlled released from MWD1 (ML)	Raw Water Dam Discharge (ML)	Sediment Dam Discharge (ML)	Charlotte river catchment (ML)
Q2_2027	23.1	1.4	1.7	3.1	0.0	0.0	0.0	0.0
Q3_2027	23.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2027	24.5	13.0	16.5	29.5	0.0	0.0	0.0	369.4
Q1_2028	24.2	58.2	74.0	132.2	0.0	272.4	0.0	26670
Q2_2028	51.8	0.8	1.0	1.8	0.0	0.0	0.0	0.0
Q3_2028	31.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2028	44.4	11.5	14.6	26.1	0.0	0.0	0.0	447.5
Q1_2029	64	59.0	75.0	134.0	286.9	360.1	0.0	26819
Q2_2029	69.1	0.9	1.2	2.1	0.0	0.0	0.0	0.0
Q3_2029	64.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2029	82.6	11.7	14.9	26.6	49.9	0.0	0.0	447.5
Q1_2030	93.5	59.5	75.8	135.3	251.1	364.7	0.0	28170
Q2_2030	92.1	0.9	1.2	2.1	0.0	0.0	0.0	0.0
Q3_2030	91.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2030	93.6	11.4	14.4	25.8	47.0	0.0	0.0	447.5
Q1_2031	104.6	59.4	75.6	135.0	300.7	363.5	9.0	28173
Q2_2031	107.2	1.1	1.3	2.4	0.0	78.9	0.0	0.0
Q3_2031	103.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2031	104.5	11.4	14.4	25.8	43.2	0.0	0.0	447.5
Q1_2032	119.7	60.3	76.8	137.1	337.2	374.3	14.0	28197
Q2_2032	118.2	0.8	1.1	1.9	0.0	0.0	0.0	0.0
Q3_2032	111	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2032	98.3	11.4	14.5	25.9	43.4	0.0	0.0	471.3
Q1_2033	132	59.2	75.4	134.6	358.7	371.1	14.0	28170
Q2_2033	120.5	0.8	1.1	1.9	0.0	0.0	0.0	0.0
Q3_2033	113.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2033	114.4	11.4	14.4	25.8	45.2	0.0	0.0	471.3
Q1_2034	111.9	59.2	75.4	134.6	366.0	371.1	14.0	28168

Table 9: Source term chemistries and modelled outputs for the Charlotte River.

Parameter	Source Term Chemistries			Predicted Charlotte River Chemistry[19]			
	Groundwater (75th percentile)	Waste Rock and Ore Contact Water (75th percentile)	Undisturbed Catchment Surface Run-off (median)[20]	Most adverse WQ in terms of As for Dry Conditions	Most adverse WQ in terms of As for Expected Conditions	Most adverse WQ in terms of As for Expected Conditions (including iron oxide/hydroxide adsorption)	Most adverse WQ in terms of As for Wet Conditions
pH	7.06	8.8	6.28	6.50	6.54	6.56	6.31
Bicarb alk (mg/L)	114	31	8	24	26	26	18
Nitrate (mg/L)	**2.2**	**44.3**	**1.3**	**1.7**	**1.8**	**1.8**	**1.4**
Sulphate (mg/L)	1	5	0.5	0.6	0.6	0.3	0.5
Chloride (mg/L)	8	5	5	5	5	5	5
Calcium (mg/L)	16	2	0.5	1.5	1.7	1.7	0.7
Magnesium (mg/L)	5	0.5	0.5	0.8	0.8	0.8	0.5
Sodium (mg/L)	29.3	10	5	8	8	8	7
Potassium (mg/L)	8.25	7	0.5	1.0	1.2	1.2	0.6
Aluminium (mg/L)	0.005	**0.53**	0.01	0.013	0.015	0.015	0.011
Arsenic (mg/L)	**0.1**	**0.074**	0.0005	0.0071	0.0088	0.00000002	0.0016
Beryllium (mg/L)	0.0005	0.0005	0.0005	0.0005	0.0005	0.00000003	0.0005
Barium (mg/L)	0.062	0.443	0.017	0.02	0.02	0.02	0.02
Boron (mg/L)	0.025	0.12	0.025	0.026	0.026	0.026	0.025
Cadmium (mg/L)	0.00005	0.0001	0.00005	0.00005	0.00005	0.00002	0.00005
Chromium (mg/L)	0.0005	0.0006	0.0005	0.0005	0.0005	0.00000001	0.0005
Cobalt (mg/L)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0004	0.0005
Copper (mg/L)	0.0005	0.001	0.0005	0.00050	0.00051	0.0000018	0.00050
Iron (mg/L)	**1.17**	0.23	0.18	0.24	0.26	0.00065	0.19
Lead (mg/L)	0.0005	0.0005	0.0005	0.0005	0.0005	0.00000004	0.0005
Lithium (mg/L)	0.136	0.208	0.004	0.013	0.016	0.016	0.006
Manganese (mg/L)	0.158	0.015	0.028	0.036	0.038	0.038	0.029
Mercury (mg/L)	0.00005	0.00005	0.00005	0.00005	0.00005	0.000010	0.00005
Nickel (mg/L)	0.001	0.0013	0.0005	0.00054	0.00055	0.00028	0.00051
Selenium (mg/L)	0.005	0.005	0.002	0.0022	0.0023	0.000043	0.0020
Zinc (mg/L)	**0.011**	0.005	0.0025	0.0030	0.0032	0.00062	0.0026

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria Black bold and tan shaded values are above the 'elevated' threshold criteria.

[19] Includes all contact and non-contact volumetric estimates in Table 8.

[20] Raw Water Dam and Sediment Dam assumed to have same source term chemistry.

The results of preliminary modelling of water quality resulting from seepage from waste rock and ore storage areas to shallow groundwater prior to reception by the Charlotte River are presented in Table 10. The source term chemistries used were the same as those used for river water modelling, with the mix ratio corresponding to the ratio of waste rock and ore storage areas (13.23 ha) to the Charlotte River catchment (6,137 ha) i.e., equivalent to 0.0022:1. To account for reduced infiltration across the wider catchment, a scenario with a mixing ratio of 0.022:1 was also assessed.

The model predicts controlled releases from operational water storages, including the mine water dam, are not likely to generate adverse drainage water under expected, dry or wet rainfall scenarios. The water quality of discharge water prior to mixing with the Charlotte River is predicted to remain slightly acidic, with negligible to low concentrations of metals and metalloids. Nitrate associated with blast residues is the only constituent that might occur at slightly elevated concentrations but is predicted to remain of a similar order of magnitude to concentrations in the Charlotte River.

The diffuse seepage from waste rock and ore storage areas to shallow groundwater is predicted to produce similar water quality to that in the Charlotte River.

Although runoff from ore and waste rock storage areas is likely to contain slightly elevated aluminium and arsenic, a comparison of source term chemistries and quarterly water volumes indicates that dewatered groundwater is the dominant life-of-mine source of arsenic, iron and zinc to the mine water dam. The influence of groundwater on mine water dam quality increases over the life of mine as dewatering volumes increase.

Modelling indicates that under expected rainfall conditions, the greatest effect of discharge on river water quality occurs in Q4 of each year, immediately before the wet season. At this time, controlled releases are approximately 20% of wet season (Q1) volumes, while combined catchment runoff to the MWD1 is only around 2% of wet season volumes, thereby reducing the potential for mixing with groundwater before discharge to the Charlotte River.

Modelling also suggests any iron oxide / hydroxide phases formed through oxidation of dissolved groundwater iron are likely to be very effective in reducing the dissolved concentration of arsenic, beryllium, cadmium, chromium, lead, nickel, selenium and zinc.

Under the dry rainfall scenario, controlled releases are limited to the wet season. The model predicts the greatest effect on river water quality will occur during the 2033 wet season when groundwater dewatering volumes are expected to peak. Under the wet rainfall scenario, the greatest effect on water quality occurs in Q2 each year, immediately after the wet season, when catchment runoff volumes are comparatively low.

Overall, preliminary modelling indicates that, despite seasonal and life-of-mine variations in groundwater and ore and waste storage area contact water inputs, discharge water quality prior to entering the Charlotte River will be similar to baseline water quality in non-tidal reaches. Thus, although cumulative impacts from existing upstream mining and this project were not assessed, project discharges are unlikely to have a significant adverse effect on Charlotte River water quality.

Additionally, the results of preliminary modelling indicate controlled release of water from the mine water dam during the wet season, combined with water retention and/or reuse before and after the wet season and mine water treatment contingency as described in Section 4.3 should effectively minimise accumulative water quality impacts on the Charlotte River associated with this project and surrounding mining operations. Notwithstanding this assessment, contingencies for mine water treatment will be implemented as described in Section 4.3.

The modelling is subject to several limitations, including use of quarterly water balance volumes, a hypothetical nitrate concentration for waste rock and ore contact water, Charlotte River freshwater quality to represent contact water chemistry for the broader catchment, and uncertainty in the chemistry of the shallow groundwater system and the potential effects of groundwater drawdown on acid sulphate soils.

Table 10: Modelled outputs for seepage top shallow groundwater from waste rock and ore storage areas.

Parameter	Reception of Infiltrated Waste Rock and Ore Contact Water Mixed (75th Percentile) with Undisturbed Catchment	Reception of Infiltrated Waste Rock and Ore Contact Water Mixed (75th Percentile) with 10% of Undisturbed Catchment
pH	6.26	6.30
Bicarbonate alkalinity (mg/L)	17	17
Nitrate (mg/L)	**1.4**	**2.2**
Sulphate (mg/L)	0.5	0.6
Chloride (mg/L)	5	5
Calcium (mg/L)	0.5	0.5
Magnesium (mg/L)	0.5	0.5
Sodium (mg/L)	7	8
Potassium (mg/L)	0.5	0.6
Aluminium (mg/L)	0.011	0.021
Arsenic (mg/L)	0.0007	0.0021
Beryllium (mg/L)	0.0005	0.0005
Barium (mg/L)	0.018	0.026
Boron (mg/L)	0.025	0.027
Cadmium (mg/L)	0.00005	0.00005
Chromium (mg/L)	0.0005	0.0005
Cobalt (mg/L)	0.0005	0.0005
Copper (mg/L)	0.00050	0.00051
Iron (mg/L)	0.18	0.18
Lead (mg/L)	0.0005	0.0005
Lithium (mg/L)	0.004	0.008
Manganese (mg/L)	0.028	0.028
Mercury (mg/L)	0.00005	0.00005
Nickel (mg/L)	0.00050	0.00052
Selenium (mg/L)	0.0020	0.0021
Zinc (mg/L)	0.0025	0.0026

Note: Underlined values represent below the reportable limit (half of that value for statistical evaluation). Blue bold values are above the 'slightly elevated' threshold criteria Black bold and tan shaded values are above the 'elevated' threshold criteria.

4.3. Avoidance and mitigation measures (response to Item 16)

Avoidance and mitigation measures will comprise:

- As far as practicable, restriction of release of water from the mine water dam to high intensity rainfall events and the wet season as per a discharge license.
- Increased re-use of mine water during periods leading up to and after the wet season, including increased redirection to the underground; and return to plant crushing and screening.
- Implementation of a Trigger action response plan (TARP) as detailed below.
- Contingency water treatment of dewatered groundwater and/or mine water dam water, probably based on processes that promote adsorption onto iron oxide/hydroxide phases, such as groundwater aeration, ferric salt addition (ferric sulphate or ferric chloride), and lime dosing. If required, more advanced treatment methods, including activated carbon filtration and reverse osmosis, will be considered.

A preliminary TARP has been developed for water quality monitoring of dewatered groundwater, drainage lines associated with waste rock and ore storage areas and the mine water dam (Appendix 2). This is currently conceptual and will be refined once relevant operational monitoring requirements and integration with other monitoring plans are confirmed. The TARP follows a four-level trigger structure that escalates responses from normal operations (Level 1) to emergency actions (Level 4). Level 1 represents routine monitoring and compliance with baseline and guideline conditions. Level 2 identifies early deviations or low-risk conditions, prompting increased inspection and confirmatory sampling. High/Extreme risks (Level 3–4) typically requires cessation of activities, immediate notification to the mine area manager and rectification measures that may be extensive and require the advice of external specialists.

5. CONCLUSIONS

The NT EPA assessment of the Lei Lithium Project, proposed by Lithium Plus Minerals, identified elevated aluminium, arsenic and zinc in groundwater, and arsenic enrichment in waste rock and process residues, including elevated arsenic in water and peroxide extracts. It also identified potential impacts from seepage and runoff from waste rock and ore stockpiles, and groundwater discharge from dewatering operations, including mobilisation of metals, metalloids (particularly arsenic) and nutrients to surface water and groundwater, and migration of mine-impacted water through the shallow alluvial aquifer to the Charlotte River.

This report addresses the additional information requirements as specified by the NT EPA for surface and groundwater quality (Inland Water Environmental Quality, Items 12–16). In summary, the information is as follows:

- Baseline monitoring (January 2023 to December 2025) indicates the project area drains westward via ephemeral tributaries to the Charlotte River and Bynoe Harbour. Freshwater and tidal surface waters are characterised by low turbidity, slightly acidic to slightly alkaline pH, and negligible to low concentrations of most metals and metalloids. Occasional elevated concentrations of some constituents reflect tidal influence, but there is no evidence of adverse effects from acid sulphate soils.
- Groundwater is representative of a fractured rock aquifer with regional flow toward the Charlotte River. Water quality is slightly acidic to slightly alkaline, with negligible dissolved concentrations of most metals and metalloids. Slightly elevated electrical conductivity reflects bicarbonate alkalinity rather than salinity. Slightly elevated arsenic and zinc are common, with no evidence of seawater intrusion. Screening criteria used to evaluate these data sets are specified in Table 7, Section 4.1.
- The results of preliminary water quality modelling indicate releases from operational water storages and diffuse seepage from waste rock and ore storage areas should not generate adverse water quality under expected, dry or wet rainfall scenarios. Predicted water quality prior to reception will be similar to current baseline in the non-tidal reaches of the Charlotte River, slightly acidic with negligible to low concentrations of metals and metalloids. Nitrate associated with blast residues is the only constituent that might occur at slightly elevated concentrations but is predicted to remain of a similar order of magnitude to concentrations in the Charlotte River. Dewatered groundwater was identified to be the principal life-of-mine source of arsenic, iron and zinc to the mine water dam, with its influence increasing as dewatering volumes rise. Modelling remains subject to uncertainty regarding, water balance volumes, nitrate concentrations, shallow groundwater chemistry and potential groundwater drawdown effects on acid sulphate soils.
- Mitigation measures include restricting mine water releases to the wet season and high-intensity rainfall events where practicable, increasing mine water reuse, implementing a four-level Trigger Action Response Plan (TARP), and contingency treatment using groundwater aeration, ferric salt addition and lime dosing, with activated carbon filtration or reverse osmosis considered if required.

6. REFERENCES

AMIRA (EGi & IWRI). 2002. ARD Test Handbook. Project P387A Prediction & Kinetic Control of Acid mine Drainage. AMIRA International Limited. May 2002. Authored by Environmental Geochemistry International (EGi) and Ian Wark Research Institute (IWRI).

ANZECC. 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

ANZG. 2018. Australian & New Zealand Guidelines for Fresh & Marine Water Quality. https://www.waterquality.gov.au/guidelines/anz-fresh-marine

BC WQG. 2021. British Columbia Ministry of Environment and Climate Change Strategy (2021). British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.

CCME. 2024. Canadian Council of Ministers of the Environment. https://ccme.ca/en/summary-table

Eco Logical Australia. 2026. Lei Lithium Groundwater Impact Assessment and Model Report. Version 3. 9 July 2026. Eco Logical Australia Pty Ltd.

EcOZ. 2026. Background surface and groundwater quality data sets. Excel file: Lithium Plus – Water Quality Database MASTER (ID 234176). Provided to EGi on 25 June 2026.

EGi. 2024. Geochemical Characterisation of Proposed Waste and Ore Materials. Lei Lithium Project. J000870 / R1689. Rev 2. 18 November 2024.

Gemson et al., 2022. Nitrate Dynamics at Mine Sites – Broader Context, Source and Management Considerations. IMWA 2022 – "Reconnect". Wijnand Gemson, Terry Harck, and Ryan Burgess. Hydro Geochem Group. Perth, Australia.

INAP. 2014. Global Acid Rock Drainage Guide (GARD Guide), International Network for Acid Prevention (http://www.gardguide.com/).

INAP. 2014. Global Acid Rock Drainage Guide (GARD Guide), International Network for Acid Prevention. http://www.gardguide.com/

INAP & ICMM (2025). Tool for Acid Rock Drainage and Metal Leaching Prevention and Management. International Network for Acid Prevention (INAP) and International Council on Mining and Metals (ICMM).

LPSDP. 2016. Preventing Acid and Metalliferous Drainage. Leading Practice Sustainable Development Program (LPSDP) for the Mining Industry. September 2016. Department of Foreign Affairs and Trade. Canberra, ACT 2600.

Lithium Plus. 2024. Lei Lithium Project Referral Form. Northern Territory Environment Protection Authority. Lithium Plus Minerals Ltd (2024).

Lithium Plus. 2026. Investor Presentation – April 2026. Available at: https://lithiumplus.com.au. Lithium Plus Minerals Ltd (2026).

Lithium Plus. 2026a. Project background, geology and resource definition information: https://lithiumplus.com.au/bynoe-lithium-project/

MEND. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. Report 1.20.1. Mining Environment Neutral Drainage (MEND) Program, Natural Resources Canada. December 2009.

NHMRC. 2022. National Water Quality Management Strategy. Australian Drinking Water Guidelines 6 2011. Version 3.8 Updated September 2022. Australian Government. National Health and Medical Research Council. Natural Resource Management Ministerial Council.

NT EPA. 2024. Public comment is sought on new referral – Lei Lithium Project. Available at: https://ntepa.nt.gov.au/news/2024/public-comment-is-sought-on-new-referral-lei-lithium-project

NT EPA. 2025. *Lei Lithium Project – Assessments in Progress Register*. Available at: https://ntepa.nt.gov.au/your-business/public-registers/environmental-impact-assessments-register/assessments-in-progress-register/lei-lithium-project. Northern Territory Environment Protection Authority (2025).

NT Gov. 2026. Northern Territory Government. Resourcing the Territory – Lithium. https://resourcingtheterritory.nt.gov.au/minerals/mineral-commodities/lithium Accessed 12 June 2026. Environment Centre NT. 2025. Submission on Lei Lithium Project Referral to NT EPA. 7 January 2025.

Parkhurst & Appelo. 2013. Description of input and examples for PHREEQC version 3—A computer program for speciation, batch-reaction, one-dimensional transport, and inverse geochemical calculations. Parkhurst, D. L., & Appelo, C. A. J. U.S. Geological Survey Techniques and Methods, Book 6, Chapter A43, 497 p.

Projectick. 2026. Mine layout with Box Cut and Cover Tunnel. 10 June 2026.

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APPENDIX 1

LOM water balance for dry and wet conditions

Table A1: LOM water balance for dry rainfall conditions that accounts for excess water discharge.

Quarter	GW Inflow to MWD1 (ML)	Waste rock and ore contact drainage to MWD1 (44% of catchment) (ML	Drainage with no contact with ore or waste rock to MWD1 (56% of catchment)	Catchment runoff to MWD1 (ML)	Controlled released from MWD1 (ML)	Raw Water Dam Discharge (ML)	Sediment Dam Discharge (ML)	Charlotte river catchment (ML)
Q2_2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2027	1.8	2.3	4.1	0.0	0.0	0.0	0.0	1.8
Q1_2028	15.6	19.8	35.4	0.0	0.0	0.0	1477.9	15.6
Q2_2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2028	1.4	1.7	3.1	0.0	0.0	0.0	0.0	1.4
Q1_2029	15.4	19.7	35.1	97.0	14.0	0.0	1478.0	15.4
Q2_2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2029	1.4	1.7	3.1	0.0	0.0	0.0	0.0	1.4
Q1_2030	15.5	19.8	35.3	104.4	14.0	0.0	1477.9	15.5
Q2_2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2030	1.3	1.7	3.0	0.0	0.0	0.0	0.0	1.3
Q1_2031	15.4	19.7	35.1	115.8	14.0	0.0	1477.0	15.4
Q2_2031	0.0	0.0	0.0	0.0	69.3	0.0	0.0	0.0
Q3_2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2031	1.3	1.7	3.0	0.0	0.0	0.0	0.0	1.3
Q1_2032	15.5	19.7	35.2	122.6	42.3	0.0	1478.1	15.5
Q2_2032	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2032	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2032	1.3	1.7	3.0	0.0	0.0	0.0	0.0	1.3
Q1_2033	15.4	19.7	35.1	125.9	41.3	0.0	1477.3	15.4
Q2_2033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q3_2033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q4_2033	1.3	1.7	3.0	0.0	0.0	0.0	0.0	1.3
Q1_2034	15.4	19.7	35.1	122.2	41.3	0.0	1478.0	15.4

Table A1: LOM water balance for wet rainfall conditions that accounts for excess water discharge.

Quarter	GW Inflow to MWD1 (ML)	Waste rock and ore contact drainage to MWD1 (44% of catchment) (ML	Drainage with no contact with ore or waste rock to MWD1 (56% of catchment)	Catchment runoff to MWD1 (ML)	Controlled released from MWD1 (ML)	Raw Water Dam Discharge (ML)	Sediment Dam Discharge (ML)	Charlotte river catchment (ML)
Q2_2027	23.1	36.3	46.1	82.4	0.0	97.7	0.0	18909.8
Q3_2027	23.4	3.2	4.0	7.2	0.0	0.0	0.0	0.0
Q4_2027	24.5	51.3	65.2	116.5	0.0	118.8	0.0	19485.8
Q1_2028	24.2	117.6	149.6	267.2	161.6	857.2	149.8	69875.5
Q2_2028	51.8	34.4	43.7	78.1	34.2	258.5	34.9	18864.0
Q3_2028	31.6	2.5	3.1	5.6	0.0	0.0	0.0	0.0
Q4_2028	44.4	48.5	61.7	110.2	67.9	210.1	0.0	19596.1
Q1_2029	64.0	121.1	154.1	275.2	534.3	941.5	240.4	69888.3
Q2_2029	69.1	35.7	45.4	81.1	108.5	258.7	34.9	18879.6
Q3_2029	64.4	2.5	3.2	5.7	0.0	0.0	0.0	0.0
Q4_2029	82.6	49.9	63.5	113.4	181.6	210.1	0.0	19600.4
Q1_2030	93.5	121.3	154.4	275.7	423.9	940.0	298.7	69797.1
Q2_2030	92.1	30.7	39.0	69.7	122.6	142.1	47.3	9345.4
Q3_2030	91.4	2.5	3.1	5.6	0.0	0.0	0.0	0.0
Q4_2030	93.6	49.1	62.6	111.7	247.2	210.1	0.0	19601.9
Q1_2031	104.6	121.1	154.2	275.3	483.9	940.1	298.7	69799.4
Q2_2031	107.2	30.6	39.0	69.6	133.8	237.4	47.3	9339.9
Q3_2031	103.6	2.5	3.1	5.6	0.0	0.0	0.0	0.0
Q4_2031	104.5	49.0	62.4	111.4	269.6	234.7	0.0	19559.3
Q1_2032	119.7	121.2	154.3	275.5	551.4	905.6	299.5	69886.3
Q2_2032	118.2	30.4	38.6	69.0	136.9	140.9	41.4	9340.2
Q3_2032	111.0	2.5	3.1	5.6	0.0	0.0	0.0	0.0
Q4_2032	98.3	48.9	62.2	111.1	284.3	231.2	0.0	19590.5
Q1_2033	132.0	121.2	154.2	275.4	574.7	905.5	299.5	69884.4
Q2_2033	120.5	30.4	38.8	69.2	144.9	140.9	41.4	9340.1
Q3_2033	113.1	2.5	3.1	5.6	0.0	0.0	0.0	0.0
Q4_2033	114.4	48.8	62.2	111.0	287.6	231.2	0.0	19590.5
Q1_2034	111.9	121.0	153.9	274.9	577.8	904.3	309.3	69799.1

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APPENDIX 2
Preliminary TARP

MINE SITE-WIDE AMD SURFACE AND GROUNDWATER QUALITY TARP (CONCEPTUAL)

Introduction

This Trigger Action Response Plan (TARP) applies to water quality monitoring of dewatered groundwater, drainage lines associated with waste rock and ore storage areas, and the mine water dam. It provides structured triggers and proportional responses for managing acid rock drainage (AMD) and associated water-quality risks. Triggers are based on both visual indicators and water-quality results from surface water and groundwater monitoring.

Monitoring covers pH, EC, acidity, alkalinity, total suspended solids, total nitrate as N, total and free cyanide, sulphate, major ions, and dissolved metals and metalloids (Al, Fe, As, Cd, Cr, Co, Cu, Pb, Hg, Mn, Ni, Se, U, Zn).

Trigger Levels

Table A1: Triggers defining risk escalation.

Trigger Level	Definition	Intent
Level 1 – Routine (Low Risk)	Within 0.5x guideline value or no greater than baseline; no abnormal conditions.	Routine operations and monitoring.
Level 2 – Moderate Risk	Early deviation from baseline or from 0.5x to 1.0x guideline value.	Increase monitoring; investigate causes.
Level 3 – High Risk	Material deviation from baseline or up to 5 x exceedance of guideline value; AMD indicators evident.	Mitigation/containment. Notify Manager, Environment and Sustainability. Rectification based on detailed investigation.
Level 4 – Extreme Risk	Severe AMD or acute guideline breach (often order-of-magnitude).	Cease operation in mine area. Notify the Manager, Environment and Sustainability. Activate emergency plan which may include active AMD treatment strategies such as water treatment.

AMD Indicators and Triggers

Indicators include orange-brown precipitates, white-yellow salts, and salt crusting at seepage points. Evidence of such indicators should be document with photos.

Table A2: Visual Indicators and risk-based responses.

Trigger Level	Trigger Event	Risk Level	Response
Level 1	No visible oxidation or staining.	Low	Continue routine inspection and logging.
Level 2	Minor oxidation and/or faint staining with iron hydroxide and/or iron/aluminium sulphate salts.	Moderate	Increase inspections; collect additional water quality samples for testing.
Level 3	Acidic seepage or persistent iron/aluminium sulphate salts from AMD point source but extent localised within onsite drainage lines.	High	Assess extent and source; Notify Manager, Environment and Sustainability. Rectification based on detailed investigation.
Level 4	Extensive AMD generation with iron/aluminium sulphate salts entrained within drainage lines well beyond AMD point source, including off site.	Extreme	Cease operation and isolate area. Notify Manager, Environment and Sustainability. Where material removal is not possible, activate emergency plan which may include active AMD treatment strategies.

Water-Quality Triggers (Surface & Groundwater)

The table below defines absolute Level 1–4 thresholds. All should be used in conjunction with relative to baseline triggers (table A4) to establish whether there is an emerging adverse water quality issue.

Table A3: Absolute Level 1–4 thresholds (all metals and metalloids dissolved).

Parameter	Level 1 (Low)[1]	Level 2 (Moderate)	Level 3 (High)	Level 4 (Extreme)
pH (units)	6.0 – 9.0	5.0 – 9.5	4.0 – 10.5	< 4.0, > 10.5
EC (µS/cm)	< 250	250 – 1,500	1,500 – 7,500	> 7,500
Acidity (mg/L as CaCO3)	< 10	10 – 50	50 – 250	> 250
Nitrate as Total N (mg/L)	< 0.25	0.25 – 5	5 – 100	< 100
Sulphate (mg/L)	< 429	429 – 1000	1000 – 5,000	> 5,000
Al (mg/L)	< 0.05	0.05 – 1	1 – 25	>25
Fe (mg/L)	< 0.3	0.3 – 5	5 – 25	> 25
As (µg/L)	< 13	13 – 100	100 – 500	>500
Cd (µg/L)	< 0.2	0.2 – 20	20 – 500	>500
Cr (µg/L)	< 1	1 – 50	50 – 2,500	>2,500
Co (µg/L)	< 1.4	1.4 – 50	50 – 2,500	>2,500
Cu (µg/L)	< 1.4	1.4 – 50	50 – 2,500	>2,500
Pb (µg/L)	< 3.4	3.4 – 10	10 – 500	>500
Hg (µg/L)	< 0.6	0.6 – 5.0	5.0 – 25	>25
Mn (µg/L)	< 2	2 – 20	20 – 200	>200
Ni (µg/L)	< 11	11 – 70	70 – 350	>350
Se (µg/L)	< 11	11 – 40	40 – 200	>200
U (µg/L)	< 0.5	0.5 – 30	30 – 150	>150
Zn (µg/L)	< 8	8 – 500	500 – 2,500	>2,500

[1] Generally 'slightly elevated' threshold as defined by Table 7, Section 4.1 of the report.

Relative-to-Baseline Triggers by Parameter (All Monitoring Points)

The table below requires application of multiplicative or delta-based triggers relative to each location's established baseline (median over ≥12 months). Use of the relative to baseline triggers below to confirm level of risk.

Table A4: Relative to Baseline Level 1–4 thresholds.

Parameter	Baseline Definition	Level 2 (Moderate)	Level 3 (High)	Level 4 (Extreme)
pH (units)	Median pH at point	↓ ≥1.0 units from baseline	↓ ≥2.0 units from baseline	↓ ≥3.0 units from baseline or pH<4.0
EC (µS/cm)	Median EC	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Acidity (mg/L as CaCO3)	Median acidity	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Nitrate as Total N (mg/L)	Median nitrate	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Sulphate (mg/L)	Median sulphate	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Al (mg/L)	Median Al (diss.)	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Fe (mg/L)	Median Fe (diss.)	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
As (µg/L)	Median As	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Cd (µg/L)	Median Cd	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Cr (µg/L)	Median Cr	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Co (µg/L)	Median Co	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Cu (µg/L)	Median Cu	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Pb (µg/L)	Median Pb	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Hg (µg/L)	Median Hg	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Mn (µg/L)	Median Mn	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Ni (µg/L)	Median Ni	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Se (µg/L)	Median Se	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
U (µg/L)	Median U	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Zn (µg/L)	Median Zn	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline

Monitoring Program

Table A5: Monitoring Program Summary.

Medium	Location	Frequency	Parameters
WRDs/OSPs	Toe drains, runoff areas	Monthly.	pH, EC, acidity, alkalinity, total suspended solids, total nitrate as N, total and free cyanide, sulphate, major ions, and dissolved metals and metalloids (Al, Fe, As, Cd, Cr, Co, Cu, Pb, Hg, Mn, Ni, Se, U, Zn).
Groundwater	Up-/down-gradient bores	Quarterly (L2: monthly)	
Surface water	Upstream/downstream sites	Monthly (L2: weekly)	

Trigger–Action–Response

Surface Water and Groundwater Quality

Table A6: Trigger-Response Summary.

Level	Trigger	Action
2	Parameters > Level 1	Investigate source; increase sampling. Collect additional water quality samples for testing.
3	Parameters > Level 2	Increase monitoring frequency and investigate. Assess extent and source; Notify Manager, Environment and Sustainability. Rectification based on detailed investigation.
4	Parameters > Level 3	Cease operation and isolate area. Notify Manager, Environment and Sustainability. Where material removal is not possible, activate emergency plan which may include active AMD treatment strategies.

Governance and Reporting

Responsibility: Mine Environmental Superintendent leads TARP activation.

Communication: All Level 3–4 events reported to mine management within 24 hours.

Termination: Event downgraded when parameters return to Level 1 for ≥2 consecutive sampling rounds.

Review: Annual review of triggers, thresholds, and field indicators against updated data and guidelines.

References

AMIRA (EGi & IWRI). 2002. ARD Test Handbook. Project P387A Prediction & Kinetic Control of Acid mine Drainage. AMIRA International Limited. May 2002. Authored by Environmental Geochemistry International (EGi) and Ian Wark Research Institute (IWRI).

INAP. 2014. Global Acid Rock Drainage Guide (GARD Guide), International Network for Acid Prevention (http://www.gardguide.com/).



Environmental Geochemistry International

ENVIRONMENTAL GEOCHEMISTRY
INTERNATIONAL PTY LTD

ABN 48 600 298 271

9/44 CARRINGTON ROAD
CASTLE HILL, NSW 2154 AUSTRALIA

T +61 2 9810 8100
E EGI@GEOCHEMISTRY.COM.AU
W WWW.GEOCHEMISTRY.COM.AU