Appendix A Water Management Plan (WRM 2026b)

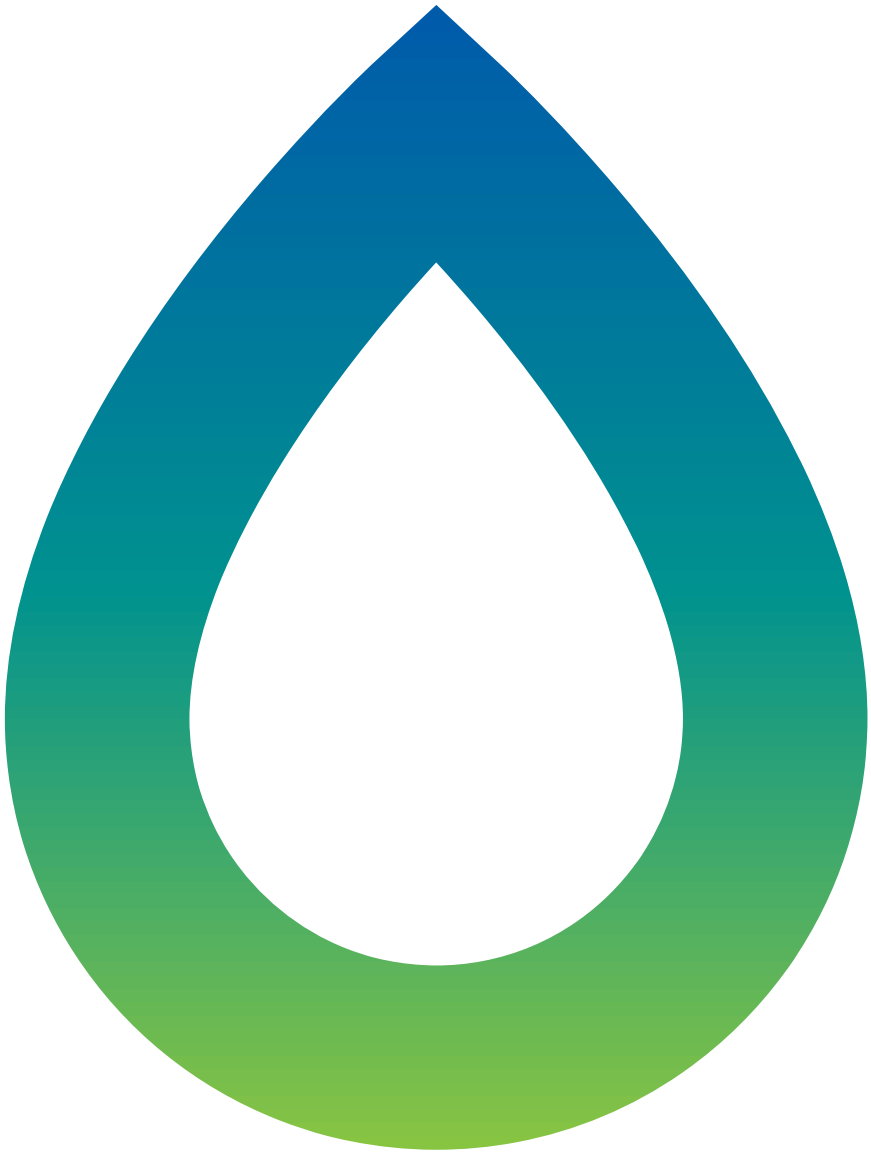
LEI LITHIUM PROJECT

Water Management Plan

Lithium Plus Minerals Ltd

25 September 2026

2255-02-B3



DETAILS

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1 INTRODUCTION

1.1 BACKGROUND

The Lei Lithium Project (the Project) is a proposed underground lithium mine located on the Cox Peninsula in the Northern Territory, approximately 30 km south of Darwin within ML(A) 33874, accessed via Fog Bay Road. The Project is managed by Lithium Plus Minerals Ltd. The life of mine is estimated to be 7 years, with a total resource recovery of approximately 3.09 million tonnes of spodumene, as direct shipping ore from the Darwin Port to overseas. Final Investment Decision (FID) is planned for July 2027.

A locality plan of the Project area is shown in Figure 1.1.

1.2 PURPOSE AND SCOPE

The purpose of the Lei Lithium Water Management Plan (WMP) is to:

- Maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected; and
- Maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.

The scope of the Lei Lithium WMP includes water management aspects for two phases of the Lei Lithium project:

- Phase 1 (Construction): Construction of the cut-and-cover tunnel and decline and associated surface infrastructure to support construction.
- Phase 2 (Operational): Operation of the mine and ore transport to Port.

The WMP also considers:

- Water inventory management of site infrastructure across the two phases, including indicative operational Trigger Action Response Plans (TARPs) for site inventory and water quality; and
- Surface and groundwater systems influenced by mining operations, including those upstream and downstream of the mine area.

1.3 REPORT STRUCTURE

This report is structured as follows:

- Section 2: A description of the existing environment at Lei Lithium.
- Section 3: A description of the potential contaminant sources produced by Lei Lithium activities.
- Section 4: A detailed description on the Lei Lithium water management system.
- Section 5: A water balance assessment of the Lei Lithium water management system over the next seven years of operations.
- Section 6: A description of the adopted water monitoring plan at Lei Lithium.
- Section 7: A description of the contingency actions for environmental triggers.
- Section 8: A description of the WMP review and the roles and responsibilities required.
- Section 9: A description of known gaps in information and knowledge.
- Section 10: A list of references.

- Appendix A: Processed water quality results for monitoring stations for baseline and operations (where applicable).
- Appendix B: Operational Trigger Action Response Plans (TARPs) for site water management across the two phases.

1.4 SITE CONFIGURATION AND SCHEDULE

The locations of the Project are shown in Figure 1.2. Key stages across the Life of Mine (LOM) are outlined in Table 1.1.

Table 1.1 Key site and water infrastructure completion dates

Phase	Key infrastructure	Estimated completion (project months)	Project month period
Phase 1 (Construction Phase)	Construction of infrastructure, cut and cover tunnel and decline	12[a]	1 – 12
Phase 2 (Operational Phase)	Underground, mining and ore transport to Port	68	13 – 80
Closure and rehabilitation	Backfilling, removal of infrastructure and revegetation	6	81 – 86
Post-closure	Monitoring of the mine site until rehabilitation completion criteria are achieved and the site is relinquished	Ongoing	

Note a: the raw water and sedimentation dam will be prioritized in the construction schedule and used to supply construction water.

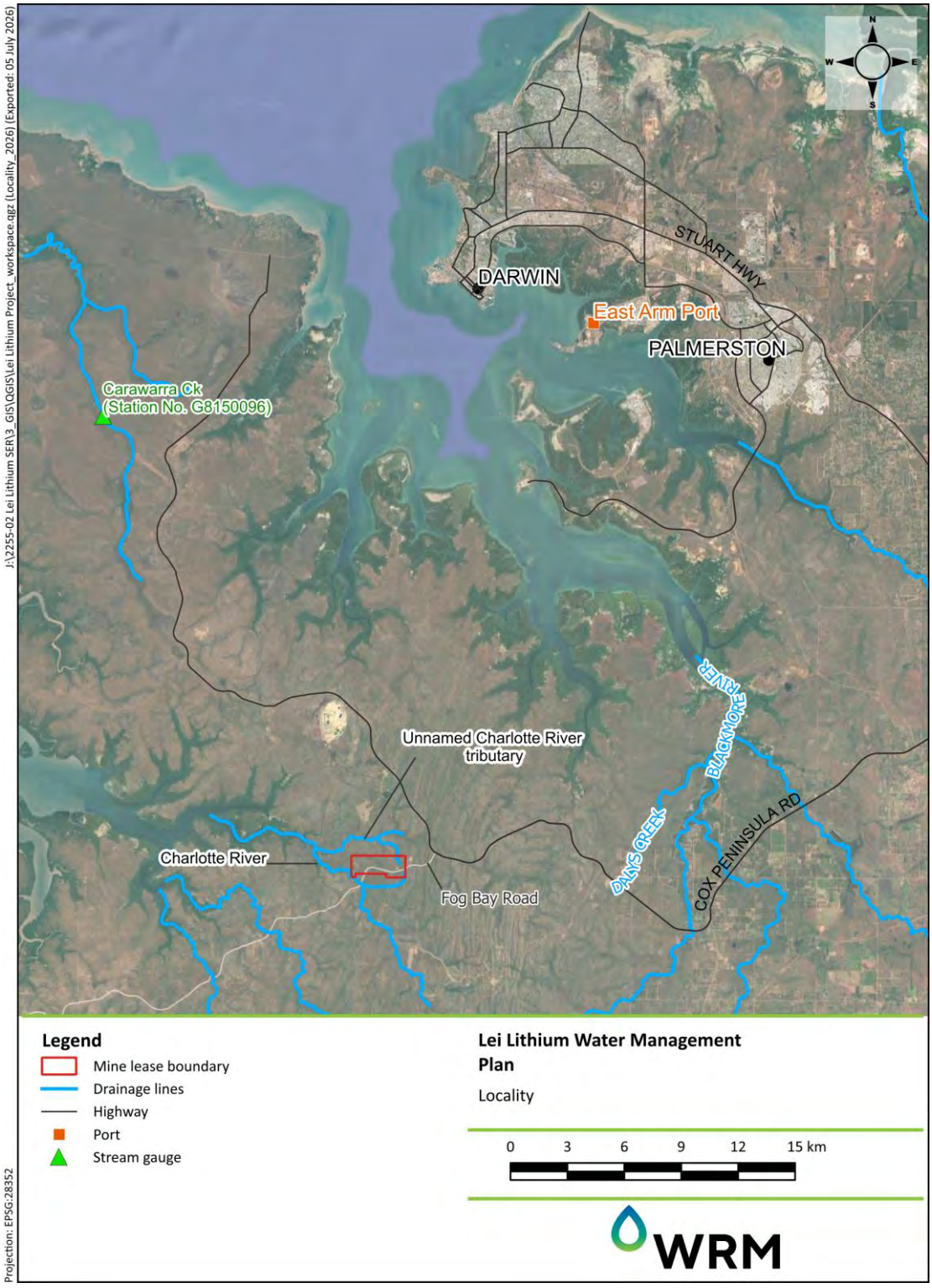


Figure 1.1 Locality plan

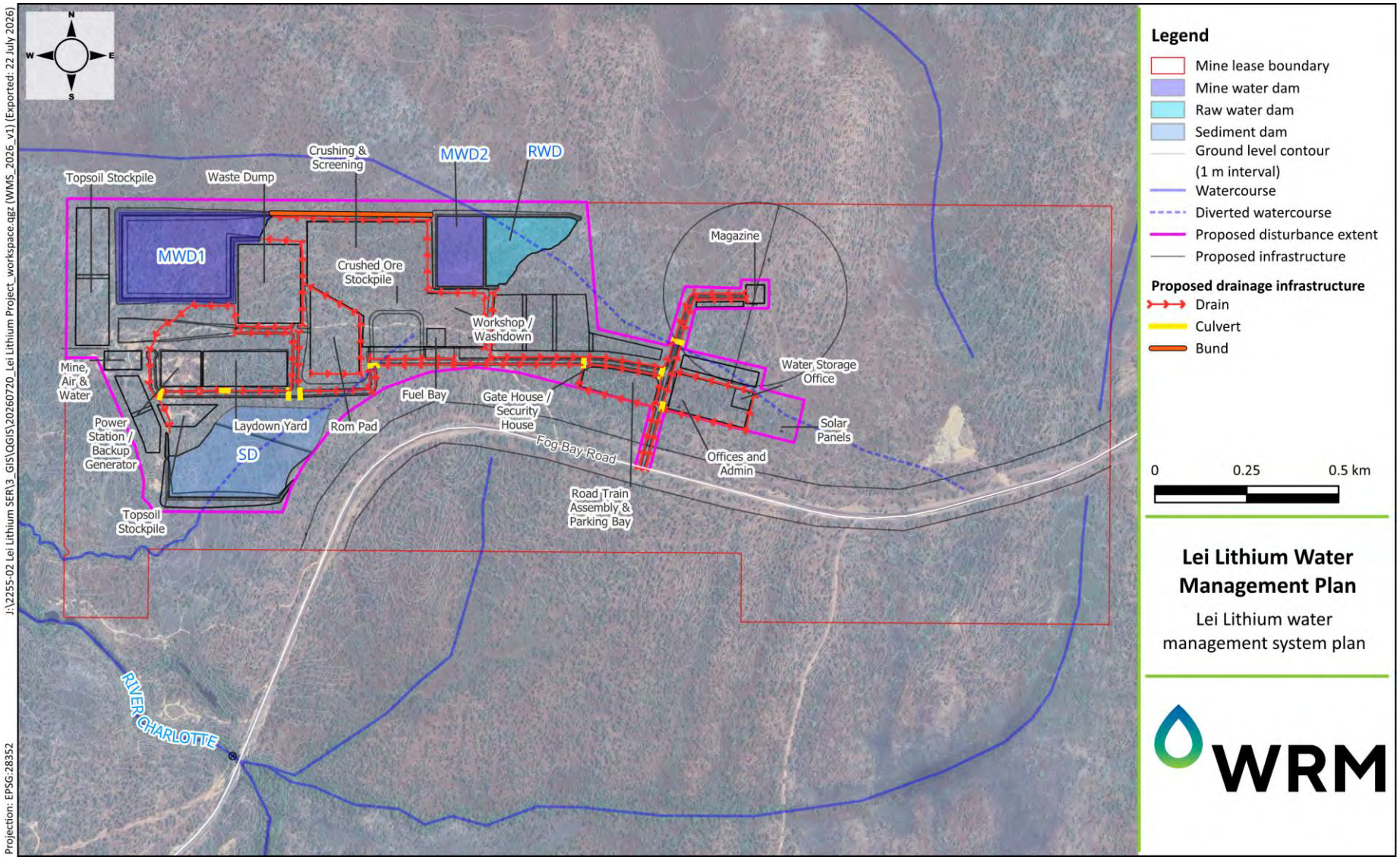


Figure 1.2 **Lei Lithium water management system plan**

2 ENVIRONMENTAL SETTING

2.1 GENERAL

This section of the water management plan describes the regional and local drainage characteristics in the vicinity of Lei Lithium. Environmental values as defined by the ANZECC (2000) guidelines and NT government regulations of these waterways are also described.

2.2 ENVIRONMENTAL VALUES

2.2.1 Land use and surface water use

The project area is largely undeveloped vacant crown land with only minor disturbances including the sealed Fog Bay Road, unsealed access tracks, mineral exploration activities as well as historic mining pits and dams (Frater, 2005).

There are no national parks, conservation areas or any residences, farms or industry within the catchment areas upstream or immediately downstream of the mine.

2.2.2 Biodiversity values and beneficial uses

Waterways in the project area are largely intact and are considered under ANZECC (2000a) protection level classification as 'slightly disturbed'. They are not considered an example of rare, highly diverse, or significant habitat in the region.

The project area also lies within the Bynoe Harbour Region declaration of surface water beneficial uses under the NT Water Act.

As part of the ecological assessment undertaken for the Project (EcOz, 2024a), three significant vegetation types of relevance were identified in the vicinity of the Project area and within key waterways. These include:

- **Riparian Vegetation:**
  - Riparian vegetation is classified as any native vegetation within, and immediately surrounding, a water way, and is not restricted to a distinct vegetation community immediately adjacent to waterways.
  - Riparian vegetation that is distinct from the surrounding vegetation often has additional values, which include supporting unique biodiversity and providing refuge habitat and habitat corridors.
  - Riparian vegetation edges the river and creek lines that cross the Project area, specifically the Charlotte River and its tributaries.
- **Mangroves:**
  - Mangroves are located along sheltered coastlines, growing in tidal areas frequently inundated by salt water.
  - Mangroves contain many unique and highly specialised animals and plants, including many species restricted to these environments.
  - A mangrove community occurs adjacent to the disturbance footprint within the landward zone, where tidal inundation is irregular and infrequent.
- **Old-growth forest:**
  - Hollow-bearing trees occur in a wide range of vegetation, however, they are more likely to occur within older Eucalyptus forest and woodlands with a lower fire frequency. As the development of tree hollows is associated with the age of vegetation, a forest with many tree hollows is referred to as an old-growth forest.

- Some hollow-bearing trees were noted between the Charlotte River and the western side of the Project area. However, densities observed did not quality for as old-growth forest.

2.2.3 Groundwater environmental and social values

Groundwater environmental and social values been assessed by CloudGMS (2026a) and characterised by EcoLogical (2026a). Key groundwater environmental and social values are outlined below:

- The mine area is part of the Darwin Rural Adelaide River Water Control District, which includes beneficial uses for groundwater such as agriculture, aquaculture, public water supply, cultural, industry, rural stock and domestic, mining activity and petroleum activity. However, the aquifer underlaying the area Burrell Creek Formation (BCF) has a poor water supply potential. The aquifer is described as fractured and weathered rocks. therefore, the aquifer has limited use for domestic, stock or agricultural water supply. The Grants and BP33 mines are the only surrounding mining groundwater users in the area. The closest registered bore currently in use to provide domestic water supply is located approximately 1.9 km south of Lei Lithium.
- The aquifer beneath the Lei Lithium mine site and surrounding areas is a poor groundwater resource.
- Charlotte River is mapped as a moderate-potential aquatic Groundwater Dependent Ecosystem (GDE) within 5 km of the Project, with the disturbance area approximately 300 m from the moderate-status mapping. At its closest point, the Project area site transects the river along the southwest corner. However, the Eco Logical Australia (EcoLogical, 2026a) report indicate uncertainty around actual groundwater dependence, noting that upstream surface water sites are frequently dry or not flowing during the dry season and that mapping suggests little to no dry-season baseflow from groundwater.
- Areas mapped as moderate-potential terrestrial GDEs, primarily eucalypt woodland communities, occur across the majority of the Project area and the disturbance area and may use groundwater during extended dry periods. There is also a low-potential terrestrial GDE in the south-western corner of the Project and disturbance areas, associated with drainage open woodland, which is also present within the northern section of the 2 km site radius. However, the GDE assessment conducted by EcOz (2026) demonstrated that, despite elevated Normalised Difference Moisture Index (NDMI) responses, ground-truthing did not identify evidence of groundwater dependence in the areas assessed. Instead, the elevated NDMI responses were considered more likely to reflect surface water accumulation and prolonged soil moisture.
- Groundwater discharges to the Charlotte River are evident from groundwater levels recorded in monitoring bores located adjacent to the river. However, mapping of the upper reaches of the drainage lines indicates that these are not permanent watercourses. As such, groundwater is unlikely to provide substantial baseflow to the Charlotte River, particularly during the dry season.
- Mangroves are mapped along the river up to the western boundary of ML33874 (approximately 200 m west of the mine area). While groundwater flows from the aquifer to the river may supply nutrients to aquatic vegetation it is unlikely that the mangroves would be considered groundwater dependent (EcoLogical, 2026a).

2.3 REGIONAL DRAINAGE CHARACTERISTICS

Lei Lithium is located within the Finniss River sub-basin of the greater Timor Sea Basin. The Finniss River sub-basin consists of several major streams that discharge into the Timor Sea, as shown in Figure 2.1.

Figure 2.2 also shows the surrounding catchments of the Project area. The Project area is located within the Charlotte River sub-catchment to the south, and an un-named tributary of the Charlotte River to the north.

The catchments surrounding Lei Lithium are predominately undisturbed, with road infrastructure. Mangroves cover much of the coastal shoreline in the vicinity of Lei Lithium.

2.4 LOCAL DRAINAGE NETWORK

Figure 2.2 shows the local pre-mining drainage features within the vicinity of Lei Lithium. Drainage features that cross the Lei Lithium area eventually drain to the Timor Sea.

2.4.1 Local site drainage catchments

Local site drainage catchments include localised overland flow catchments located within the Project mine lease boundary. The topography within the mine lease boundary is generally wide and flat (between 1% - 2% slopes) on the northern side which drains to an unnamed tributary of the Charlotte River, with steeper gradients (between 3% - 5% slopes) towards the ridge line and the existing road (Fog Bay Road) that passes through the centre of the mine lease boundary. The catchment is generally vegetated with grasses, shrubs and small trees.

2.4.2 Charlotte River

The Charlotte River has a total catchment area of approximately 5,916 ha to the New Upstream monitoring location, approximately 5,992 ha to the SW3 monitoring location, and 6,200 ha to the SW5 monitoring location.

The downstream reaches of the Charlotte River (at SW5) is tidally influenced by Bynoe Harbour. Vegetation at the downstream reaches include mangroves and riparian vegetation around the edges of the river and creek lines. The upstream reaches of the Charlotte River (at New Upstream) are generally not tidally influenced by the Bynoe Harbour, however can show signs of sea water on very high tides.

There are also several local overland flow catchments located on the southern and western side of the Project mine lease boundary, which drain into the Charlotte River.

2.4.3 Unnamed Northern Tributary of the Charlotte River

The Unnamed Northern Tributary of the Charlotte River has a total catchment area of approximately 2,871 ha to the New 2 monitoring location and approximately 3,052 ha to the New 1 monitoring location. The catchment area includes several local overland flow paths/drainage features on the northern side of the site, as well as an active mine site (BP33 underground) further north of the Project.

The downstream reaches of the Unnamed Northern Tributary (at New 1) are generally tidally influenced during periods of high tide, however do exhibit freshwater characteristics during low tides. The upstream reaches of the Unnamed Northern Tributary (at New 2) are generally freshwater.

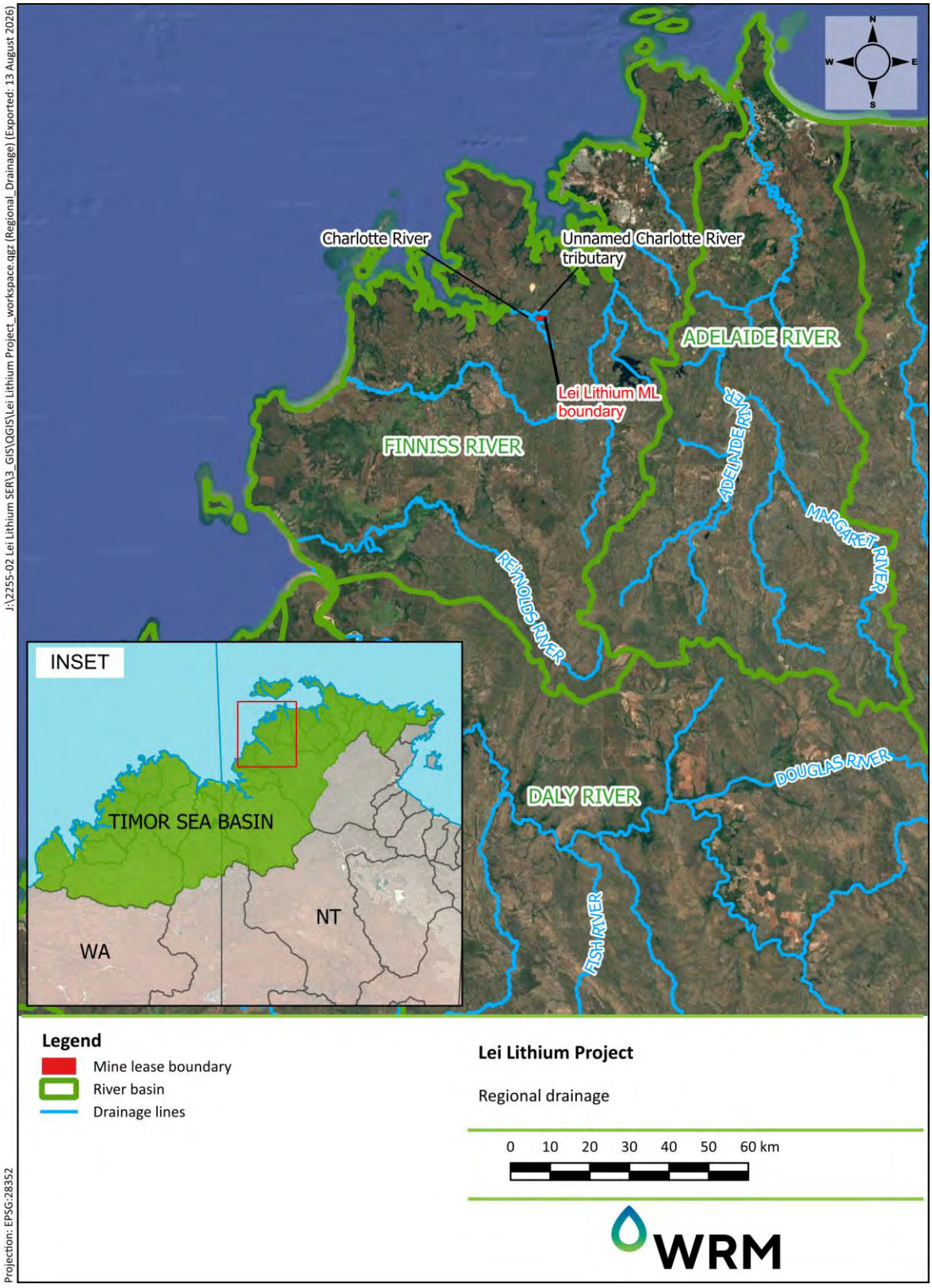


Figure 2.1 Regional drainage

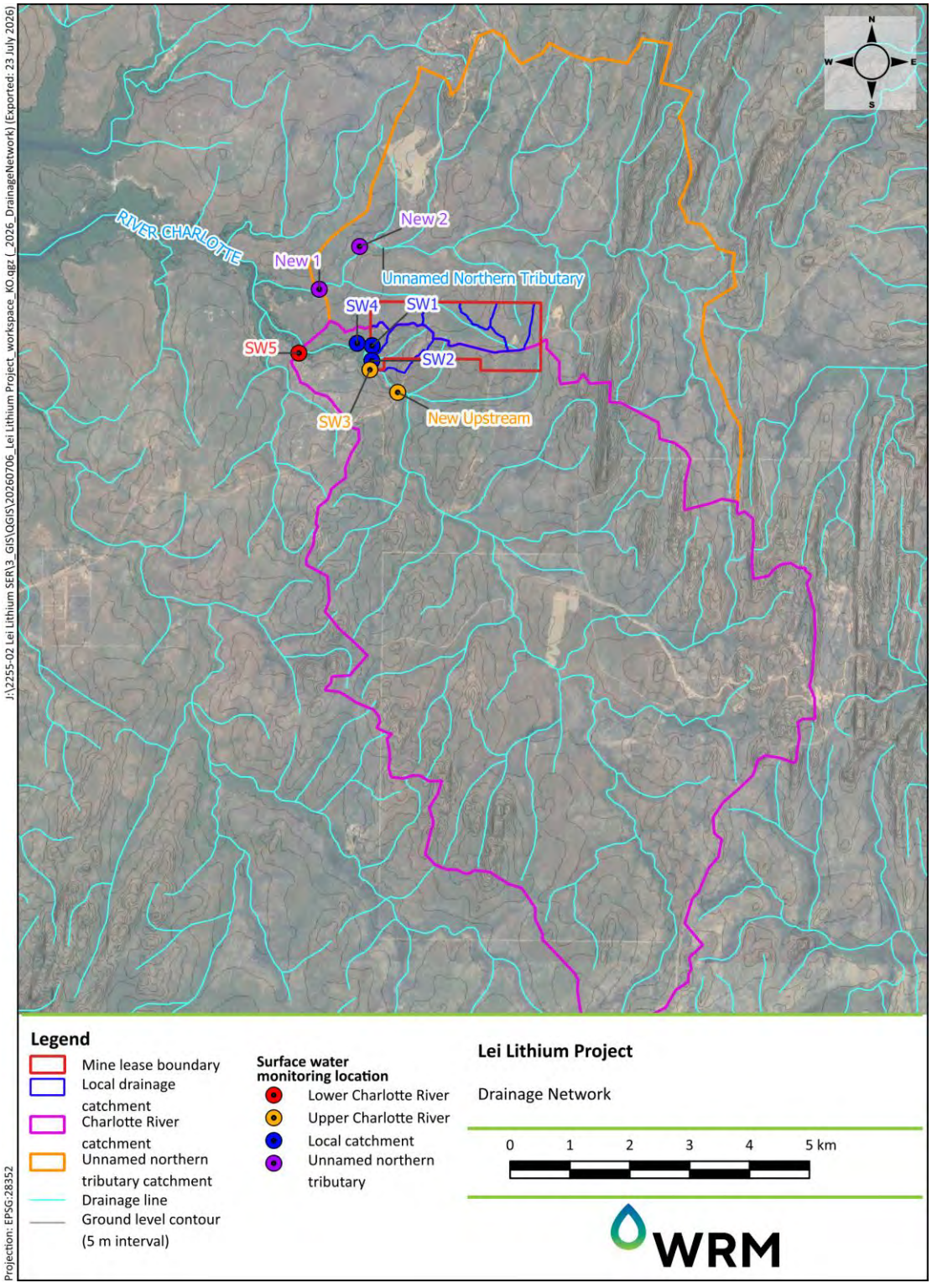


Figure 2.2 Local drainage network

2.5 CLIMATE

Rainfall and evaporation data was obtained for the Mine site from the Department of Environment and Science (DES) SILO Data Drill Service. The SILO Data Drill data provides a continuous daily data set between 1889 and 2025. Derived daily pan evaporation, lake evaporation and actual evapotranspiration rates were also available for Lei Lithium from the SILO Data Drill Service.

2.5.1 Rainfall

The average monthly rainfalls at Lei Lithium exhibit distinct wet (November to April) and dry (May to October) seasons during the year, with a dry season low of 1.2 mm in August to a wet season high of 379.9 mm in January. The wet season average monthly rainfalls (81.2 mm to 379.9 mm) are significantly higher than the equivalent dry season monthly rainfalls (1.2 mm to 58.6 mm). The recorded mean annual rainfall at the Project over the period 1889 to 2025 is approximately 1,525 mm.

Table 2.1 shows the mean monthly and annual SILO Data Drill rainfall, evaporation and Morton's lake evaporation at Lei Lithium based on the available 137 years of data. Figure 2.3 shows the statistical variation of monthly rainfall at Lei Lithium.

2.5.2 Evaporation

Table 2.1 shows the mean monthly and annual SILO Data Drill pan evaporation values at Lei Lithium based on the available 137 years of data. Figure 2.4 shows the mean monthly evaporation and evapotranspiration at Lei Lithium.

The average annual pan evaporation at the Project is estimated to be approximately 2,286 mm, which is approximately 1.5 times the average annual rainfall.

Table 2.1 SILO Data Drill mean monthly rainfall, pan evaporation and lake evaporation at Lei Lithium

Month	Mean Monthly Rainfall (mm)	Mean Monthly Pan Evaporation (mm)	Mean Morton's Lake Evaporation (mm)
January	379.9	171.5	166.0
February	314.8	147.6	152.0
March	272.1	162.4	179.6
April	81.2	175.5	179.2
May	9.7	184.6	162.8
June	2.2	177.2	141.3
July	1.4	192.7	151.9
August	1.2	211.6	176.4
September	14.1	223.8	197.5
October	58.6	237.7	218.0
November	140.8	209.5	203.4
December	249.0	191.9	187.3
Annual	**1,525.1**	**2,285.9**	**2,115.5**

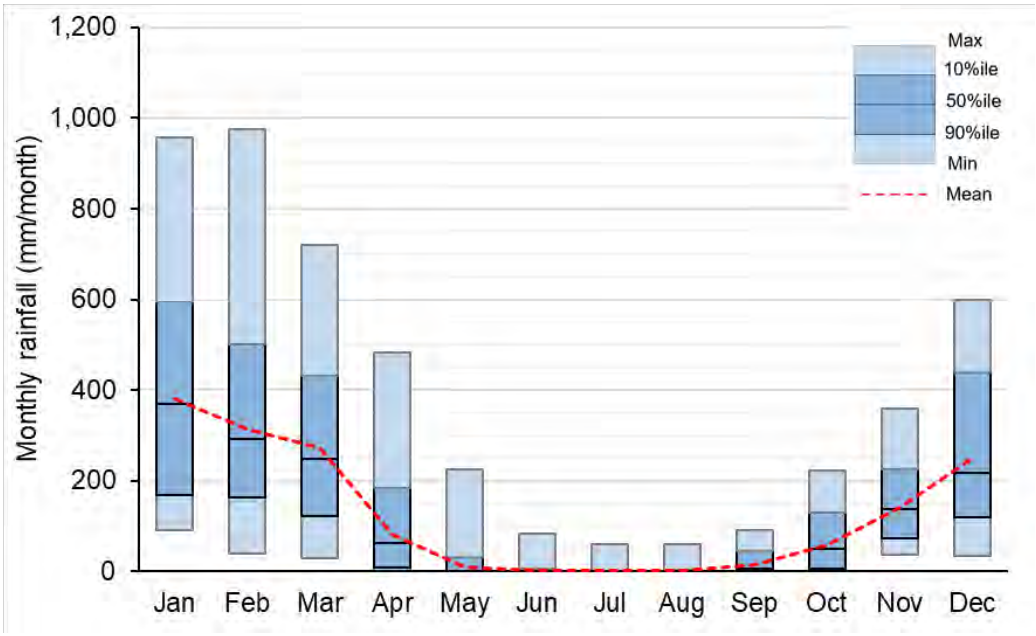


Figure 2.3 **Monthly rainfall at Lei Lithium from 137 years of SILO Data Drill rainfall data**

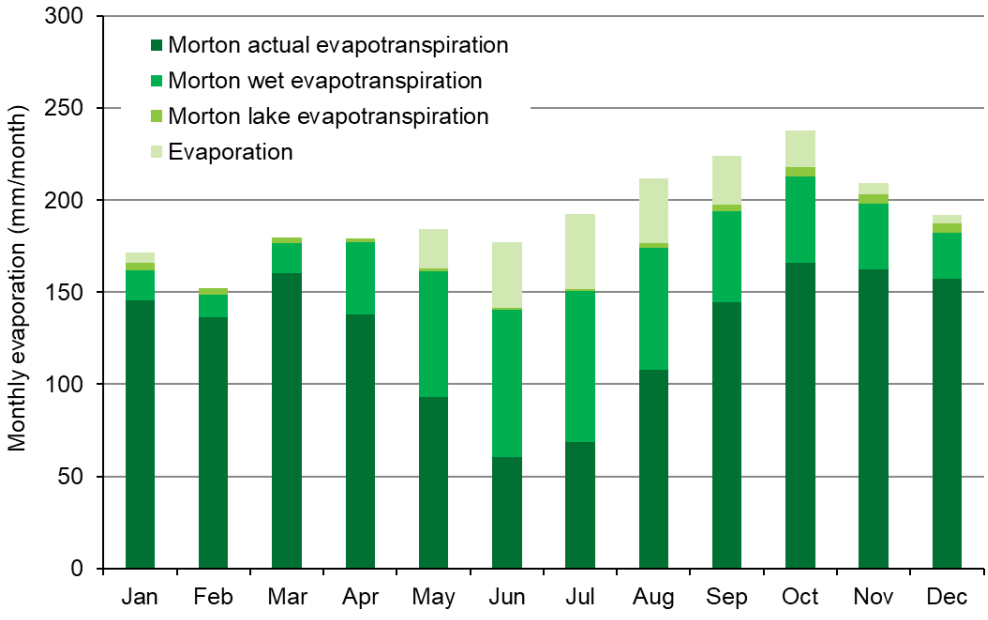


Figure 2.4 **Mean monthly evaporation and evapotranspiration at Lei Lithium from 137 years of SILO Data Drill rainfall data**

2.6 GEOLOGY AND SOILS

Land units present within the ML boundary were based on mapped land units available on NR Maps (DLPE, 2026) and described in the Land Resources of the Elizabeth, Darwin and Blackmore Rivers - Greater Darwin Area.

2.6.1 Soil management units

Landform class, land units and associated landform and soil descriptions for the project area, are shown in Table 2.2. The distribution of the land units in the vicinity of the Lei Lithium area is shown in Figure 2.5. Much of the disturbance area comprises rudosol soils associated with land unit 2a1, with small areas of hydrosols associated with land units 5b1 (drainage systems), 3e/4c (plains) and 5a (alluvial plains).

Land unit mapping shows the project area has a Nil (Class 1) risk of Acid Sulfate Soils (ASS) which correlates with the Land Systems of the Northern Part of the Northern Territory. There are no potential acid sulfate soils within the project area, however, it is noted that the Charlotte River alluvial corridor intersects with the potential acid sulphate soils (PASS) areas.

Table 2.2 Land units and soils within the mineral lease boundary (Fogarty et al.,1984)

Landform Class	Land Unit	Landform	Soil Description
Rises	2a1	Low rises and associated upper slopes. Gradient 0.5-4 %. Extensive surface gravels.	• Rudosols. • Gravelly lithosols, usually shallow with some moderately deep occurrences. • Loamy sand or sandy loam surface to sandy clay loam subsoil. • 20-40 % gravels in surface, 30-60 % gravels in subsoil. • Well drained.
Side slopes	2b2	Gentle side slopes to low hills. Gradient 2-5 %. Common rock outcrop (mostly laterite) extensive surface gravels	• Kandosol. • Shallow gravelly massive earths and minor lithosols. • Gradational; loamy sand surface over a sandy loam to light sandy clay loam subsoil. • 30-60% gravel throughout. • Moderately well drained.
Plains & drainage systems	6b/5b1/ 3e/4c	Broad drainage floors and creek margins. Gradient < 1.5 %.	• Hydrosols • Shallow to moderately deep siliceous and earthy sands, minor sandy massive earths. • Coarse textured sands to sandy loams. • 0-10 % gravel in surface, 5-40 % gravel in subsoil. • Well drained.
Alluvial plains	5a	Narrow alluvial plains within upland terrain. Gradient < 1.0 %.	• Hydrosols. • Hardsetting apedal mottled yellow duplex soils. • Fine sandy loam or loam overlaying light clay to medium clay subsoil. • Minor subsoil ferruginous gravels. • Imperfectly drained.

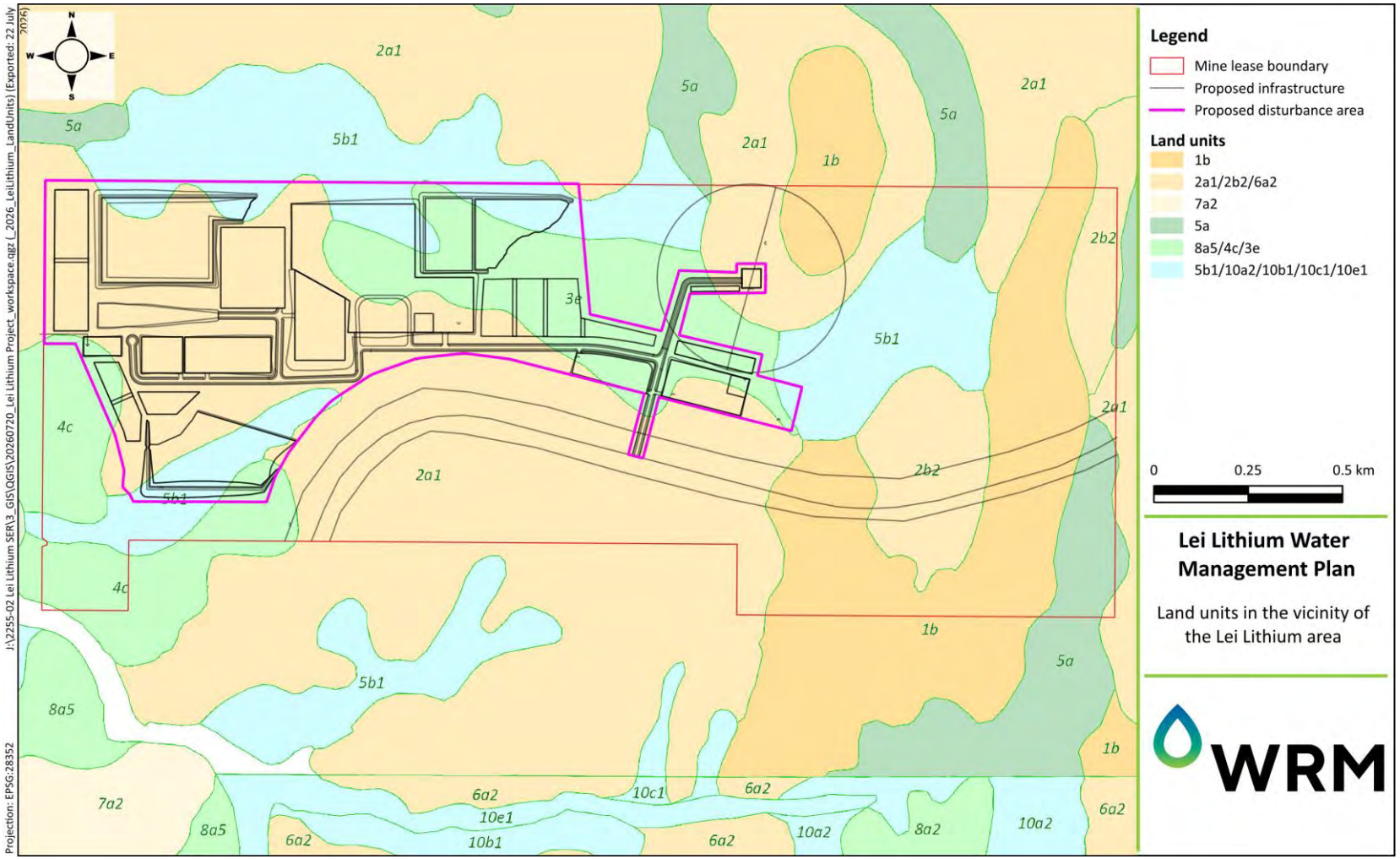


Figure 2.5 Distribution of identified land units

2.7 GROUNDWATER CHARACTERISTICS

Information below is adapted from EcoLogical (2026a) report and supplemented with data obtained from groundwater monitoring bores across the mine site.

2.7.1 Aquifer geology

The substrate and underlying geology of the area around the proposed mine footprint comprises a thin surface layer (less than 5 m thick) of laterite gravel, sand and clay, underlain by the Burrell Creek Formation (BCF) comprising shales, siltstones, and strongly foliated phyllite. The weathering profile extends to depths of 30 to 50 m before reaching fresh, un-weathered BCF.

Key aspects of the BCF aquifer are provided below:

- The aquifer is described as fractured and weathered rocks, where the rock is mostly weakly fractured so is a comparatively poor aquifer. There is limited use of this aquifer for domestic, stock or agricultural water supply (CloudGMS, 2026a).
- Groundwater around the Lei deposit is hosted in the BCF, which underlies the area surrounding the deposit apart from shallow alluvial deposits around the Charlotte River. Shallow alluvial aquifers are limited in extent and generally thin and discontinuous where present along drainage lines. Notably, no shallow alluvial aquifer was encountered during the drilling works conducted in the Project area by CDM Smith in 2023 (CDM Smith, 2024).
- The BCF forms a marginal fractured rock aquifer with typical bore yields less than 0.5 L/s. The limited groundwater potential is largely due to the lack of primary porosity and limited open fracturing within the formation. High yields are recorded where drilling intersects fracture zones or bands of quartz veining. Groundwater is typically intersected at the base of the weathering zone/transition into fresh BCF (CloudGMS, 2026a).
- The BCF is largely fine grained and characteristically weathers to clay. Where heavily weathered, the formation is often less permeable relative to fresh rock due to the lower likelihood of fractures staying open in the clayey, weathered phyllite (Groundwater Enterprises, 2023).

A conceptual geological model of the mine site is presented in Figure 2.6. The model was developed based on bore records within the area, including the lithology description of the monitoring bores located within ML33874.

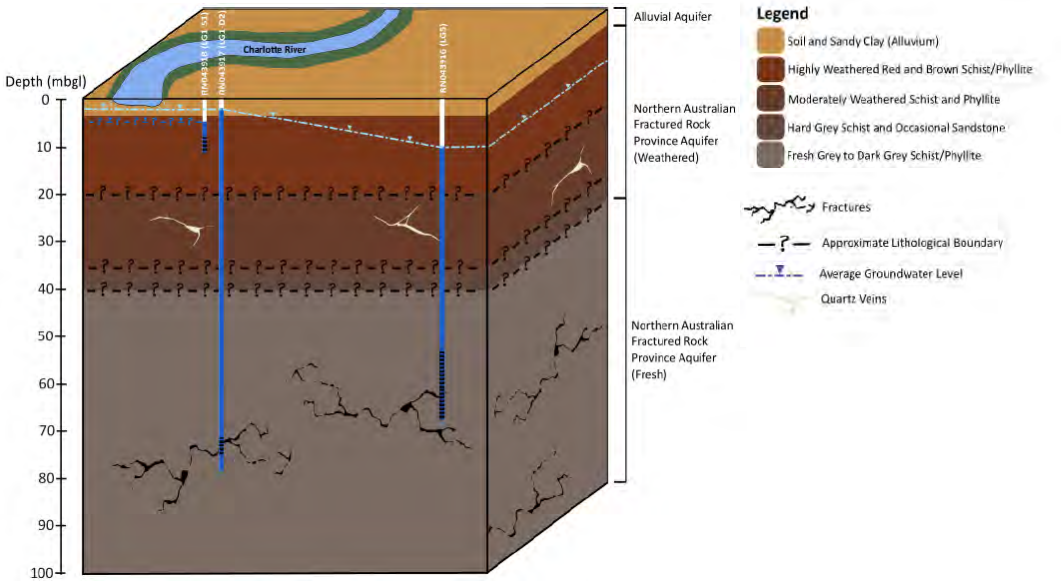


Figure 2.6 Conceptual geological model of the project area (EcoLogical, 2026a)

Hydrogeologically, the mine site is situated within the Northern Australian Fractured Rock Province (NAFRP) aquifer system. Groundwater occurs primarily within fractures and quartz veins of the BCF, with overall low primary porosity.

The hydrostratigraphic profile comprises:

- A thin, discontinuous alluvial aquifer within Quaternary sediments (0-4 m below);
- A weathered BCF unit with low permeability, forming a shallow fractured rock aquifer (approximately 4-40 m); and
- A deeper fractured rock aquifer within fresh BCF (approximately 40-75 m+), where groundwater flow is controlled by discrete fractures and structural features.

2.7.2 Hydraulic conductivity

Slug tests undertaken by CDM Smith (CDM Smith, 2024) identified the hydraulic properties of the aquifer in the immediate vicinity of the monitoring bores installed at the site. The tests identified:

- Weathered rock fractures had hydraulic conductivity values of about 6.8 m/day; and
- Weathered rock where fractures were not documented had hydraulic conductivity values of about 0.05 to 3.8 m/day.

Adjacent studies at BP33 to the north (CLoudGMS, 2021) had also characterised the BCF as follows:

- The predominant aquifer within the region is the BCF with overall low yields (<0.5 L/s) with the resource being limited potential due to low primary porosity and minimal open fractures. There are however higher yields within fracture zones and quartz veins with groundwater levels typically seen at the base of the weathering zone of the BCF.
- Fresh and weathered BCF with negligible fracturing displayed hydraulic conductivity values of about 0.003 to 0.08 m/day.
- Fractured fresh and weather BCF displayed hydraulic conductivity values with a range from 0.27 to 6.8 m/day.
- Alluvial sediments displayed values in the order of 0.4 m/day.

2.7.3 Groundwater levels

Groundwater levels in the mine site were monitored quarterly between December 2023 and December 2025. The levels recorded in the six monitoring bores, all intercepting the BCF, evidence relatively shallow aquifer with levels ranging from surface (overflowing) up to 16 m below ground level (mBGL), as shown in Figure 2.7.

Figure 2.7 shows a clear seasonal pattern in groundwater levels. Levels typically peak at the end of the wet season (March) and are lowest during the late dry season (September) or early wet season (December).

The magnitude of groundwater level fluctuations varies spatially, with bores located in lower-lying areas, such as the nested LG1 bores, exhibiting smaller annual changes (approximately <3 m) compared to those in more elevated areas (LG2 to LG5; approximately 7 to 11 m) (CloudGMS, 2026a). Groundwater levels also appear to be influenced by proximity to Charlotte River, suggesting groundwater discharge to the river, as indicated by the shallower groundwater levels recorded at the nested LG1 bores.

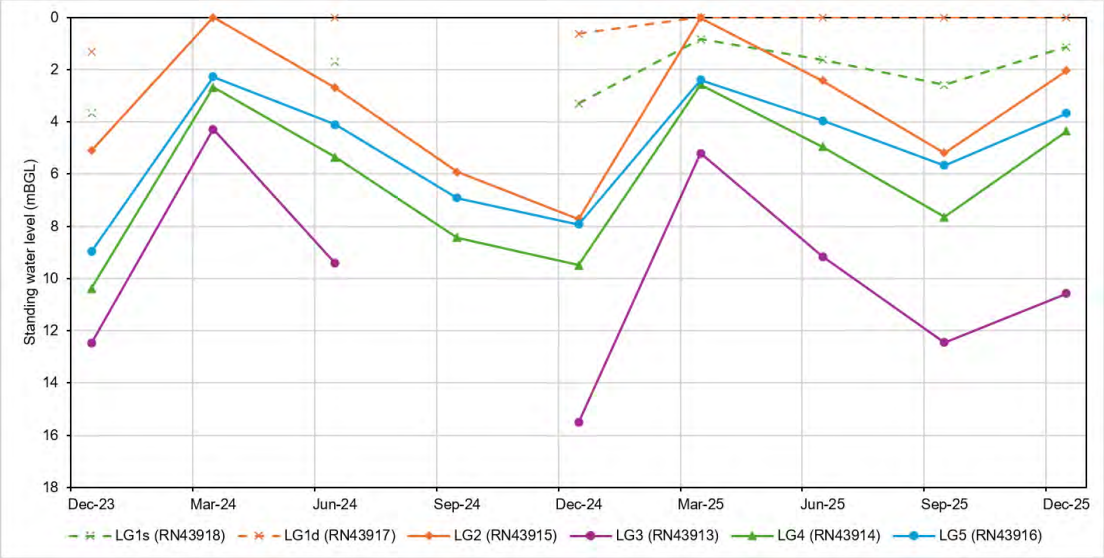


Figure 2.7 Standing water levels (SWLs) in monitoring bores

2.7.4 Groundwater flows and recharge

Groundwater flow within the project area is dominated by topography, moving from elevated areas toward Charlotte River, with no significant change driven by wet season recharge (CloudGMS, 2026a). The influence of surface topography on groundwater flows was also observed during investigations conducted at BP33 and Grants (Groundwater Enterprises, 2023).

Recharge of the BCF occurs predominantly via diffuse infiltration during the wet season, with estimated recharge rates ranging from approximately 80–200 mm/year in elevated areas and 30–120 mm/year in lower-lying areas (CloudGMS, 2026b). Recharge is highly seasonal, with the majority occurring during the monsoonal period when rainfall exceeds evapotranspiration.

The observed response of groundwater levels to rainfall variability within the mine site supports this conceptual model of recharge processes. Recharge is influenced by factors such as soil permeability, evapotranspiration losses, and the presence of fracture pathways within the weathered profile, which can enhance infiltration to the underlying fractured rock aquifer.

3 CONTAMINANT SOURCE STUDY

3.1 OVERVIEW

This section of the water management plan describes the activities at Lei Lithium that could potentially generate contaminants that may impact on Environmental Values of the receiving waters, if not managed.

3.2 SITE CONFIGURATION AND SCHEDULE

The planned site configuration is shown in Figure 1.2, which will be developed over the construction and operational phases of the Lei Lithium project. Phases include:

- Phase 1: Construction phase comprising excavation of the box cut, development of the cut and cover tunnel, waste rock stockpile from the underground (WRD), contractor laydowns, access roads, office buildings / workshops, sediment basin, raw water dam, required drainage infrastructure, mine water dam, construction of underground portal and decline;
- Phase 2: Operational phase which includes ongoing mine development, underground exploration activities, extraction of ore and ore transport to port.

3.3 SITE WATER TYPES

Lei Lithium monitors water quality in dams that capture surface runoff. The water quality results are all stored in the sites' water quality database. A summary of water quality in dams with catchments of different water types is provided below.

For water management system purposes, the water generated at Lei Lithium is divided into three types:

- **Raw water / Diverted water:** surface runoff from areas where water quality is generally unaffected by mining operations. Diverted water includes runoff from undisturbed areas and any fully rehabilitated areas (i.e. rehabilitated areas with established vegetation and stable landforms). It also includes runoff from the surrounding natural catchment that is diverted around the mine site with no direct impact on the water quality from the mining operations.
- **Sediment water:**
  - Means the following types of water:
    - Rainfall runoff from catchments which can discharge through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an ESCP to manage such runoff, provided that this water has not been mixed with mine-affected water.
- **Mine affected water (or mine water):**
  - Means the following types of water:
    - Groundwater from underground operation dewatering activities during Phase 2;
    - Catchment runoff and/or seepage from the crusher and/or ore stockpiles; and
    - A mix of mine affected water and other water.
  - Mine affected water does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by mining activities that have not yet been completely rehabilitated, and has only been in contact with:
    - Land that has been rehabilitated to a stable landform and either capped or revegetated but only still awaiting maintenance and monitoring of the rehabilitation over a specified period of time to demonstrate rehabilitation success; or

- Land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the water has been in contact does not cause environmental harm to waters or groundwater; or
- both.

3.4 SITE WATER TYPE CHARACTERISTICS

3.4.1 Raw water

Raw water is captured from the natural undisturbed catchment area which is generally located in the eastern side of the site. It is likely that the runoff from the natural catchments would produce runoff with similar characteristics to the baseline water quality conditions (pre-operational monitoring sites). Raw water would be stored in the RWD and made available for use for surface water operational demands at Lei Lithium. A total of 47 samples measuring pH, EC and various metals were collected from the local site monitoring locations (SW1, SW2 and SW4) between 2023 and 2025. These are summarised in Table A.1, Table A.2 and Table A.4.

3.4.2 Sediment water

Sediment water includes runoff from topsoil stockpiles and general mine services areas. Sediment water is expected to be elevated in total suspended sediments and turbidity but generally low in salinity and dissolved metal concentrations. Sediment water will drain to a sediment dam for sediment removal before discharging to the receiving environment. Sediment water may also be used for makeup water for operational demands if required.

The water quality in the sediment dam will be monitored in accordance with the surface water quality monitoring program detailed in Section 6.3.

3.4.3 Mine affected water

Mine affected water includes groundwater inflows into the underground mine during underground operations (Phase 2). It also includes runoff from areas disturbed by mining which are not rehabilitated, except for areas managed under the site's ESCP. This includes runoff and/or seepage from the crushing and/or ore stockpiles.

There is currently no available water quality data of the mine affected storages as operations have not commenced. It is proposed to monitor the water quality in the Mine Water Dams (MWDs) in accordance with the surface water quality monitoring program detailed in Section 6.3 during operations.

Mine affected water from MWDs will be recycled and reused to meet underground site demands. Mine water can also be released from MWD under the conditions of a WDL if water is diluted to meet water quality trigger levels. It is also proposed to investigate the water quality to determine if mine-affected water can be reused for surface water demands (such as haul road dust suppression).

Should mine-affected water not meet the sufficient water quality for discharging, alternative measures will be investigated to manage excess water on site. This will include:

- Additional water quality treatment measures to manage excess traces of contaminants;
- Water quality treatment plants (Reverse Osmosis);
- Evaporator fans (as an alternative method of reducing excess water on site); or
- Additional mine water storages.

3.5 SITE BACKGROUND SURFACE WATER QUALITY CHARACTERISTICS

Baseline water quality monitoring has been undertaken at various locations for the project between January 2023 and December 2025 during periods of flow. The monitoring record length and sample density vary between sites due to differences in hydrological conditions, flow persistence and opportunities for sampling. Consequently, the number of available samples at each location differs across the monitoring network. The results of the monitoring are presented below. The available dataset was considered sufficient to characterise baseline water quality conditions and support the development of preliminary site-specific operational trigger values for water management purposes. These trigger values should be reviewed and refined as additional monitoring data become available. An analysis of baseline water quality has been undertaken for each individual water monitoring location.

Table 3.1 summarises the key water quality parameters for the key natural catchments in the vicinity of the mine. Appendix A shows the water quality statistics for each surface water monitoring location. Water quality concentrations recorded below the limit of reporting (LOR) were assumed to be half of the LOR value.

3.5.1 Charlotte River

The Charlotte River stream is located immediately south of the mine site. The site water quality monitoring locations in the Charlotte River include SW5, SW3 and New Upstream. The salinity of the waters at the sampling locations in the Charlotte River generally shows brackish waters towards the lower reaches of the Charlotte River (at SW5), and freshwater towards the upper reaches of the river (at New Upstream). The water quality show:

- The Charlotte River is generally elevated compared against the Australian and New Zealand Guidelines for fresh and marine water quality (ANZG) default guideline values (DGVs)for the following parameters:
  - Field Parameters:
    - Electrical Conductivity for freshwater;
    - Dissolved oxygen for the lower 20th percentile for freshwater; and
    - Total Suspended Solids for freshwater and marine water.
  - Nutrients:
    - Ammonia for marine water;
    - Total Nitrogen for freshwater and marine water;
    - Total Phosphorus for freshwater and marine water; and
    - Chlorophyll a for freshwater.
  - Dissolved metals:
    - Aluminium and Copper for marine water; and
    - Iron for fresh water.
- For other dissolved metals, there are elevated traces of:
  - Boron and Strontium, which are elements which are naturally found in marine water; and
  - Lithium, which may be due to the lithium deposit in this area.
- All key dissolved metal levels, with exception of aluminium, copper and iron, are lower than the ANZG (2018) 95% limit of protection for either marine species and freshwater species.
- At SW5:
  - The pH for the catchment is generally slightly acidic to neutral, which correlates to the acidity of fresh rainwater in tropical regions.

- Electrical conductivity, Salinity, Alkalinity, Sulfate and Chloride levels are elevated compared to other monitoring stations in the site catchment. This indicates that the monitoring locations in the Charlotte River are influenced by sea water with intermittent fresh to brackish flows during runoff events.
- Dissolved major cations which include Calcium, Magnesium, Sodium and Potassium are generally highly associated with salt water.

- At SW3:
  - Electrical conductivity, Salinity, Alkalinity, Sulfate and Chloride levels are generally lower in comparison to the downstream reaches of the Charlotte River (SW5). For water quality samples above the median, the electrical conductivity generally indicates brackish waters. Water quality samples below the median generally indicates freshwater.
  - The water quality at SW3 tends to vary between freshwater and brackish waters depending on when the sample has been undertaken. This indicates waters at SW3 transition between fresh water and brackish water depending on tide.

- At New Upstream:
  - Electrical conductivity, salinity, alkalinity, sulfate and chloride levels are significantly lower in comparison to the downstream reaches of the Charlotte River (SW5 and in SW3 to an extent). Water quality samples at the New Upstream monitoring location generally exhibit surface water quality results closer to freshwater ecosystems.
  - The water quality at New Upstream generally indicate freshwater and has little influence from the tidal characteristics of the Charlotte River and may be treated as a freshwater stream.

3.5.2 Local sites/creeks

The local creeks are located immediately south of the mine site. The salinity of the waters at the sampling locations in the local creeks generally shows freshwater quality with some chance of brackish waters when there is a high tide. The water quality show:

- The water quality generally exhibits freshwater characteristics, however, can be influence by seawater during periods of high tide. In particular, at locations closer to the Charlotte River (at SW1 and SW2).
- The local sites/creeks are generally elevated compared to the default guideline values (for both freshwater and marine water systems) for the following parameters:
  - Field Parameters:
    - The pH range is slightly more acidic (lower pH) compared to the Charlotte River locations, when compared to the lower end of freshwater guideline values.
    - Electrical Conductivity for freshwater;
    - Dissolved oxygen for the lower 20th percentile for freshwater; and
    - Total Suspended Solids for freshwater.
  - Nutrients:
    - Ammonia for marine water;
    - Total Nitrogen for freshwater and marine water; and
    - Total Phosphorus for freshwater and marine water.
  - Nutrients (both Total Nitrogen and Total Phosphorus) are slightly lower when compared to the Charlotte River catchment.
  - Dissolved metals:
    - Copper and Zinc for freshwater and marine water; and
    - Iron for fresh water.

- The remaining dissolved metals are either similar or lower than the Charlotte River catchment.

- At SW1:
  - The electrical conductivity at SW1 is significantly lower across the 20th - 80th percentile range (between 30.1 µS/cm and 260.5 µS/cm) when compared to the Charlotte River locations. The salinity range indicates that SW1 is generally freshwater.
  - Parameters associated with marine waters (Anions and Cations, Boron and Strontium) are significantly lower compared to SW5 and can generally be classified as freshwater.

- At SW2:
  - The electrical conductivity at SW2 is significantly lower across the 20th - 80th percentile range (between 55.9 µS/cm and 18,181 µS/cm) when compared to the Charlotte River locations. The salinity range indicates that SW2 transitions between freshwater and brackish/sea water depending on the tide level.
  - Parameters associated with marine waters (Anions and Cations, Boron, Strontium, and Barium) are generally elevated towards the upper end (80% percentile) of the water quality samples undertaken, and on par with freshwater for lower end (20th to 50th percentile).

- At SW4:
  - The electrical conductivity at SW4 is significantly lower across the 20th - 80th percentile range (between 62 µS/cm and 474 µS/cm) when compared against the downstream stations (SW5 and SW3). The salinity range indicates that SW4 is generally freshwater.
  - Parameters associated with marine waters (Anions and Cations, Boron, Strontium, and Barium) are significantly lower compared to SW5 and can generally be classified as freshwater.

3.5.3 Northern unnamed tributary

The northern unnamed tributary (of the Charlotte River) is located north of the mine site. The salinity of the waters at the sampling locations in the tributary generally shows marine water influence at the downstream end (New 1) and freshwater on the upstream side (New 2). The water quality show:

- The downstream location (New 1) generally transitions between freshwater and brackish water depending on the tide, however is generally more brackish than fresh. The upstream location (New 2) is generally fresh water.

- The northern unnamed tributary is generally elevated compared to the default guideline values (for both freshwater and marine water systems) for the following parameters:
  - Field Parameters:
    - Electrical Conductivity for freshwater;
    - Dissolved oxygen for the lower 20th percentile for freshwater; and
    - Total Suspended Solids for both freshwater and marine water.
  - Nutrients:
    - Ammonia for marine water;
    - Total Nitrogen for freshwater and marine water; and
    - Total Phosphorus for freshwater and marine water.
  - Nutrients (both Total Nitrogen and Total Phosphorus) are generally similar when compared to the Charlotte River catchment.
  - Dissolved metals:
    - Aluminium for marine water;
    - Copper for both freshwater and marine water; and
    - Iron for fresh water.

- The remaining dissolved metals are either similar or lower than the Charlotte River catchment.

- The pH range is slightly more acidic compared to the Charlotte River locations.

- At New 1:
  - The electrical conductivity at New 1 is generally lower across the 20th percentile (647 µS/cm) and generally similar for the 50th to 80th percentile range (23,838 µS/cm and 55,648 µS/cm) when compared against the downstream Charlotte River station (SW5). The salinity range indicates that New 1 transitions between freshwater and brackish/sea water depending on the tide level (albeit more brackish water than freshwater).
  - Nutrients (both Total Nitrogen and Total Phosphorus) are generally very similar compared to the downstream Charlotte River monitoring location.

- At New 2:
  - The electrical conductivity at New 2 is significantly lower across the 20th - 80th percentile range (between 27.8 µS/cm and 868.8 µS/cm) when compared to the Charlotte River locations. The salinity range indicates that New 2 is generally freshwater.
  - Nutrients (both Total Nitrogen and Total Phosphorus) are generally very similar compared to the downstream Charlotte River monitoring location.

Table 3.1 Default guideline values compared to 80%ile water quality at each monitoring location

Parameter	Default guideline value		Units	Charlotte River			Local / Site			Northern Tributary	
	Fresh[e]	Marine[f]		SW5	SW3	New Upstream	SW1	SW2	SW4	New 1	New 2
Field parameters[a]											
pH	6.0 – 7.5	6.0 – 8.5	-	6.86 – 7.35	6.15 – 7.19	6.06 – 7.80	5.87 – 6.41	5.95 – 7.04	5.83 – 6.07	6.16 – 7.15	6.07 – 6.70
EC	200	-	µS/cm	15,502 – 52,115	56.6 – 44,010	36.0 – 399.7	30 – 261	56 – 18,181	62 - 474	647 – 55,648	28 – 869
Dissolved Oxygen	80 – 100	50 - 100	%	69 – 91	63 – 93	59 – 83	62 – 91	55 – 85	61 – 87	79 – 93	62 – 82
Turbidity	20	-		8.7	11.0	11.3	8.3	5.1	5.0	7.6	10.0
Total Suspended Solids	5	10	mg/L	24	28	7.2	8.2	7.6	2.5	13	5.0
Nutrients[a]											
Ammonia	900[b]	20	µg/L	198	190	80	188	202	230	158	108
Nitrite and Nitrate	8	20	µg/L	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]
Total Nitrogen	230	300	µg/L	500	500	400	360	400	400	500	500
Total Phosphorus	10	30	µg/L	54	50	50	48	40	20	56	50
Reactive Phosphorus	5	10	µg/L	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]	5 [c]
Chlorophyll a	2	4	µg/L	4.6	3.6	3	1	2	0.5	3	1.8
Dissolved metals[b]											
Aluminium	55 when pH >6.5; and 0.8 when pH <6.5	37	µg/L	50	50	34	30	20	30	50	50
Arsenic	13	13	µg/L	5 [c]	5 [c]	1	1	3.8	2	5 [c]	4
Barium	-	-	µg/L	16	24	31	24	34	9.4	22	35

Parameter	Default guideline value		Units	Charlotte River			Local / Site			Northern Tributary	
	Fresh[e]	Marine[f]		SW5	SW3	New Upstream	SW1	SW2	SW4	New 1	New 2
Boron	940	-	µg/L	4,756	3,764	90	25	1,778	30	4,226	93
Cadmium	0.2	5.5	µg/L	0.5[c]	0.5[c]	0.05[c]	0.05[c]	0.5[c]	0.05[c]	0.5[c]	0.05[c]
Chromium	1	4.4	µg/L	5[c]	5[c]	0.5[c]	0.5[c]	0.5[c]	0.5[c]	5[c]	0.5[c]
Cobalt	1.4	1	µg/L	5[c]	5[c]	1	1	5[c]	0.5[c]	5[c]	1.7[c]
Copper	1.4	0.6	µg/L	5[c]	5[c]	0.7	0.5[c]	4.6	0.5[c]	5[c]	2.5
Iron	280	540	µg/L	50	136	320	212	418	80	88	362
Lead	3.4	4.4	µg/L	5[c]	5[c]	0.5[c]	0.5[c]	5[c]	0.5[c]	5[c]	0.5[c]
Lithium	-	-	µg/L	164	146.6	6	6.6	70	5	162.4	4.8
Mercury	0.6	0.4	µg/L	0.05[c]	0.05[c]	0.05[c]	0.05[c]	0.05[c]	0.05[c]	0.05[c]	0.05[c]
Nickel	11	5.9	µg/L	5[c]	5[c]	1	0.5[c]	5[c]	0.5[c]	5[c]	1
Silver	0.05	1.4	µg/L	0.5[c]	0.5[c]	-	0.5[c]	0.5[c]	0.5[c]	-	-
Strontium	-	-	µg/L	2,458	25	-	3	18	12	-	-
Zinc	8	8	µg/L	25[c]	25[c]	7	4.6	18.6	2.5[c]	25[c]	6.8

Note:
a – Darwin Harbour Water Quality Objectives (NT, 2010).
b – Australian and New Zealand Water Quality Guideline Values (ANZG, 2018) based on 95% species protection.
c - Limit of Reporting – Half of the limit of reporting has been adopted for this assessment.
d – Yellow shaded cells represent elevated above freshwater, orange shaded cells represent elevated above marine water, red shaded cells represent elevated above both.
e - Freshwater ecosystems trigger values.
f – Marine water (Upper estuary for DHWQO) ecosystems trigger values.

3.6 SITE BACKGROUND GROUNDWATER QUALITY CHARACTERISTICS

Table 3.2 summarises the key water quality parameters from groundwater monitoring bores. Table A.9 to Table A.11 summaries the groundwater quality parameters for the full range of toxicants for the combined dataset, shallow bores and deep bores. Baseline groundwater quality sampling was undertaken at six monitoring bores: LG3 (RN43913), LG4 (RN43914), LG2 (RN43915), LG5 (RN43916), LG1d (RN43917) and LG1s (RN43918), from December 2023 to December 2025. The background groundwater quality data for collected during the monitoring period shows:

- Baseline monitoring indicates that groundwater quality is naturally variable across the site, with differences in pH, salinity, nutrients and some metals observed between bores. Elevated concentrations of some metals, particularly arsenic, appear to be associated with natural background conditions. Overall, the results support the use of site-specific trigger values to account for natural groundwater quality variability across the monitoring network.
- Compared to the background surface water quality monitoring in Section 3.5, the toxicants which are elevated include:
  - Nutrients:
    - Nitrite and Nitrates;
    - Total Nitrogen;
    - Total Phosphorus; and
    - Reactive Phosphorus.
  - Dissolved metals:
    - Arsenic, Barium, Copper, Iron, Lithium and Zinc.
- The groundwater quality samples show the electrical conductivity/salinity levels are generally lower than the baseline water quality in the Charlotte River seawater and the local creek freshwater during natural rainfall runoff event. In addition, the parameters associated with major cations are generally much lower. The groundwater quality sampling undertaken indicates that there is limited evidence of interaction between the seawater identified in the Charlotte River and the groundwater aquifers; however, groundwater-surface water interaction cannot be discounted, particularly closer to the Charlotte River. Although the shallow alluvial aquifer was not encountered during drilling activities, such an aquifer is likely to be present along the Charlotte River, which is likely to receive some groundwater discharge, although this contribution is not considered sufficient to maintain dry-season flow. Electrical conductivity and major cations should continue to be monitored to detect any changes that may indicate interaction between the sea water and the groundwater aquifer.
- It is planned to include monitoring around the elevated toxicants found in groundwater in comparison to the background surface water quality. The key contaminants are included in the site-specific guideline values in Table 6.4.

Table 3.2 Groundwater quality assessment – dissolved metals and hydrocarbons

Parameter	Units	Freshwater default guidelines values	Marine water default guideline values	No. of data points	20th percentile	Median	80th percentile	Discussion
Physical parameters[a]								
Electrical conductivity	µS/cm	200	NA	49	137.5	226.6	402.4	Lower than surface water quality background data.
pH	-	6.0 – 7.5	6.0 – 8.5	49	6.19	6.68	7.20	Similar to surface water quality.
Dissolved Oxygen	%	80 - 100	50 - 100	49	0.40	1.13	2.60	Significantly lower than surface water quality.
Turbidity	NTU	20	NA	49	1.93	10.48	114.52	Elevated compared to the baseline surface water quality.
Total suspended solids	mg/L	5	10	49	124.2	172	214	Elevated compared to baseline surface water quality.
Nutrients[a]								
Ammonia	mg/L	0.9[b]	0.020	-	-	-	-	No samples.
Nitrite and Nitrate (NO_X)	mg/L	0.008	0.020	49	0.005 [c]	0.01	0.04	Slightly elevated compared to baseline surface water quality.
Total Nitrogen	mg/L	0.23	0.30	52	0.10	0.30	0.58	Slightly elevated above the baseline surface water quality.
Total Phosphorus	mg/L	0.01	0.03	52	0.172	0.25	0.458	Significantly elevated above the baseline surface water quality.
Filterable Reactive Phosphorus	mg/L	0.005	0.010	52	0.102	0.195	0.366	Significantly elevated above the baseline surface water quality.
Chlorophyll	mg/L	0.002	0.004	-	-	-	-	No samples.
Dissolved metals[b]								
Aluminium	mg/L	0.0550 when pH >6.5, 0.0008 when pH< 6.5	0.0370	52	0.005 [c]	0.005 [c]	0.005 [c]	Generally below baseline surface water quality.

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Parameter	Units	Freshwater default guidelines values	Marine water default guideline values	No. of data points	20th percentile	Median	80th percentile	Discussion
Arsenic	mg/L	0.013	NA	52	0.012	0.0305	0.1146	Significantly elevated above the baseline surface water quality.
Barium	mg/L	NA	NA	52	0.0322	0.0465	0.0668	Slightly elevated above the baseline surface water quality.
Beryllium	mg/L	NA	NA	52	0.0005 [c]	0.0005 [c]	0.0005 [c]	Same as baseline surface water quality.
Boron	mg/L	0.94	NA	52	0.025 [c]	0.025 [c]	0.025 [c]	Generally below baseline surface water quality.
Cadmium	mg/L	0.0002	0.0055	52	0.00005 [c]	0.00005 [c]	0.00005 [c]	Same as baseline surface water quality.
Caesium	mg/L	NA	NA	-	-	-	-	No samples.
Chromium	mg/L	0.001	0.0044	52	0.0005 [c]	0.0005 [c]	0.0005 [c]	Same as baseline surface water quality.
Cobalt	mg/L	0.0014	0.0010	52	0.0005 [c]	0.0005 [c]	0.0005 [c]	Same as baseline surface water quality.
Copper	mg/L	0.0014	0.0006	52	0.0005 [c]	0.0005 [c]	0.0009	Same as baseline surface water quality.
Iron	mg/L	0.28	0.54	52	0.025	0.285	1.326	Significantly elevated above the baseline surface water quality.
Lead	mg/L	0.0034	0.0044	52	0.0005 [c]	0.0005 [c]	0.0005 [c]	Same as baseline surface water quality.
Lithium	mg/L	NA	NA	49	0.0786	0.10	0.1426	Slightly elevated compared to baseline surface water quality.
Mercury	mg/L	0.0006	0.0004	52	0.00005 [c]	0.00005 [c]	0.00005 [c]	Same as baseline surface water quality.
Nickel	mg/L	0.011	0.0059	52	0.0005 [c]	0.0005 [c]	0.0020	Same as baseline surface water quality.
Selenium	mg/L	0.011	NA	52	0.005 [c]	0.005 [c]	0.005 [c]	Same as baseline surface water quality.
Silver	mg/L	0.00005	0.0014	-	-	-	-	No samples.
Strontium	mg/L	NA	NA	-	-	-	-	No samples.
Thorium	mg/L	NA	NA	-	-	-	-	No samples.
Tin	mg/L	NA	NA	-	-	-	-	No samples.
Titanium	mg/L	NA	NA	-	-	-	-	No samples.
Uranium	mg/L	0.0005	0.1	-	-	-	-	No samples.

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Parameter	Units	Freshwater default guidelines values	Marine water default guideline values	No. of data points	20th percentile	Median	80th percentile	Discussion
Vanadium	mg/L	0.006	0.1	52	0.005 [c]	0.005 [c]	0.005 [c]	Same as baseline surface water quality.
Zinc	mg/L	0.008	0.008	52	0.0025 [c]	0.00375	0.0192	Same as baseline surface water quality.
Hydrocarbons								Same as baseline surface water quality.
TRH C6-C10	mg/L	NA	NA	52	0.0100 [c]	0.0100 [c]	0.0100 [c]	Same as baseline surface water quality.
>C10-C16	mg/L	NA	NA	52	0.0500 [c]	0.0500 [c]	0.0500 [c]	Same as baseline surface water quality.
>C16-C34	mg/L	NA	NA	52	0.0500 [c]	0.0500 [c]	0.0500 [c]	Same as baseline surface water quality.
>C34-C40	mg/L	NA	NA	52	0.0500 [c]	0.0500 [c]	0.0500 [c]	Same as baseline surface water quality.
Benzene	mg/L	0.95	0.7	52	0.0005 [c]	0.0005 [c]	0.0005 [c]	Same as baseline surface water quality.
Toluene	mg/L	0.18	0.18	52	0.0010 [c]	0.0010 [c]	0.0010 [c]	Same as baseline surface water quality.
Ethylbenzene	mg/L	0.08	0.08	52	0.0010 [c]	0.0010 [c]	0.0010 [c]	Same as baseline surface water quality.
Meta & para xylene	mg/L	0.075	0.075	52	0.0010 [c]	0.0010 [c]	0.0010 [c]	Same as baseline surface water quality.
Ortho-xylene	mg/L	0.350	NA	52	0.0010 [c]	0.0010 [c]	0.0010 [c]	Same as baseline surface water quality.
Naphthalene	mg/L	0.016	0.07	52	0.0025 [c]	0.0025 [c]	0.0025[c]	Same as baseline surface water quality.

Note:
a – Limit of Reporting
b – Darwin Harbour Water Quality Objectives (NT, 2010)
c – Australian and New Zealand Water Quality Guideline Values (ANZG, 2018)
d – Yellow shaded cells represent elevated above freshwater, orange shaded cells represent elevated above marine water, red shaded cells represent elevated above both.

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3.7 CHEMICAL AND FUEL STORAGE

Primary chemical storage areas are located within the mine services area. These storage facilities will be constructed and bunded generally in accordance with the relevant specifications of AS1940 – Storage and Handling of Flammable and Combustible Liquids (AS1940).

Incident reporting and the management of spills are undertaken in accordance with the site operational incident reporting forms and procedures. Incidental spills, fuel storage / use and equipment failures are a potential source of hydrocarbons in surface and groundwater.

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4 SITE WATER MANAGEMENT

4.1 OVERVIEW

This section of the water management plan describes the objectives and principles of the water management system for the proposed mining operations at Lei Lithium, including a description of the infrastructure and systems that will be put in place to achieve the objectives and principles.

4.2 MANAGEMENT OBJECTIVES

Overarching objectives of the WMS is to:

- All mine water storages are to be sized and operated to provide minimal risk of uncontrolled off-site spills. Mine water storages have been sized to 1% AEP spill risk;
- Ensure the site has sufficient water available for construction and operation during dry periods;
- Ensure the water management system can be operated in compliance with a Waste Discharge License (WDL);
- Manage and monitor ground and surface waters to ensure risk of environmental harm is minimised and social and environmental objectives are maintained; and
- Successfully engage with external stakeholders to be seen as a good custodian of society's water resources. The priority areas are the sites impact on surface water and groundwater.

Specific objectives for each water type are as follows:

- **Raw water / Diverted water:** Separate from the mine affected and sediment water systems as much as practicable and allow it to pass uninterrupted through the catchment. Ensure that associated infrastructure is sufficient to meet site demands particularly under low rainfall conditions.
- **Sediment water:**
  - Maintain the quality of water discharging from Erosion and Sediment Control (ESC) structures to as close to background levels as reasonably possible.
- **Mine-affected water:**
  - Ensure any controlled releases of mine affected water prevents environmental harm and undertaken in accordance with the conditions of a WDL.
  - Manage controlled releases in wet periods to ensure adequate water supplies are maintained for site demand during dry periods.
  - Manage water inventories in wet periods to prevent accidental release of mine affected water offsite and maintain the integrity of mine water storages.

Changes to the water management system during the operational period will continue to be managed in accordance with these objectives.

4.3 SITE WATER MANAGEMENT PRINCIPLES

The general principles to manage site water are as follows:

- The fullest separation of raw water, sediment water and mine affected water runoff as best as reasonably practicable.
- Reduce the area of surface disturbance, thus minimising the volume of sediment or mine-affected runoff.

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- Collect and contain all potential mine affected water into dedicated mine water storages. The mine water storages will be used as the primary water source for underground operational demands.
- Divert up-catchment water runoff from upstream catchments around the disturbance area, where practicable;
- Manage sediment from disturbed catchment areas (e.g. topsoil stockpiles, cleared/pre strip areas) by using erosion and sediment control (ESC) measures prior to release offsite;
- Release on site sediment water in a controlled manner in compliance with IECA (2025) guidelines.
- Reuse onsite water (e.g. mine affected water) where possible to support mine operational water demands (and therefore limit mine affected inventories under normal operating conditions);
- Prioritise the use of poor-quality water before better quality water, where practicable.
- Operational demands will use the following water (in order of priority):

1. mine-affected water (first priority);
2. sediment water;
3. raw water; and
4. external water sources, if required.

- Manage mine affected water discharges to the receiving environment in accordance with a WDL.

4.4 WATER MANAGEMENT SYSTEM

4.4.1 Lei Lithium water management system

The Lei Lithium water management system consists of the following storages:

- Mine Water Dam 1 (MWD1);
- Mine Water Dam 2 (MWD2);
- Raw Water Dam (RWD); and
- Sediment Dam (SD).

A summary of the mine water storages, their proposed capacities and surface areas are provided in Table 4.1. The locations of the above storages are presented in Figure 1.2. Table 4.2 shows the proposed operating rules for the Lei Lithium WMS. A schematic of the Lei Lithium WMS is given in Figure 4.1.

The management of each water type within the Lei Lithium WMS is discussed in the following sections.

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Table 4.1 Lei Lithium water storages

Dam	Catchment area (ha)	Dam surface area (ha)	Maximum capacity (ML)	Maximum operating volume (ML)
Year 1 - 4				
MWD1	29.8	7.5	250	Project Year 2 Q3 = 175; Project Year 2 Q4 = 25.
RWD	82.6	5.7	160	-
SD	36.5	8.7	265	-
Year 5 onwards				
MWD1	29.8	7.5	250	Project Year 2 Q3 = 175; Project Year 2 Q4 = 25.
MWD2	3.7	2.6	80	70.4
RWD	78.9	2.9	80	-
SD	36.5	8.7	265	-

Table 4.2 Proposed Lei Lithium WMS operating rules

Item	Node Name	Strategy/purpose	Operating rules
1.0	**External water supply**		
1.1	External water supply	• Water required to meet any deficits in site operational demands.	• External supply.
2.0	**Supply to demands**		
2.1	Construction demand	• Water associated with the initial construction and development of the mine and mine infrastructure.	• Supplied by SD. • Supplied by RWD.
2.2	Crusher (Dust suppression demand)	• Water associated with crusher dust suppression.	• Supplied by SD. • Supplied by RWD.
2.3	Truck washdown demand	• Water associated with truck washdown.	• Supplied by SD. • Supplied by RWD.
2.4	Mine and access roads demand	• Water associated with dust suppression for mine and access roads on the surface.	• Supplied by SD. • Supplied by RWD.
2.5	Underground water demand	• Water associated with underground water usage. Mine-affected water will be utilised underground and would generally be recirculated back into the water management system. It is assumed that there would also be a loss in the underground water due to factors such as in-situ	• Supplied by MWD1.

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Item	Node Name	Strategy/purpose	Operating rules
		moisture in waste material and air vent losses.	
3.0	**Mine-water discharge**		
3.1	Controlled releases	Water dewatered under the WDL	• Supplied by MWD1.
4.0	**Operation of mining areas**		
4.1	Underground mine	• The underground would be kept as empty as possible by continuously dewatering to prevent any interruptions to mining operations. Mine-affected water would be collected within sumps at each level of the underground mine and be dewatered back to MWD1 at the surface.	• Receives groundwater inflows; • Receives mine-affected from MWD1 for underground operational use. • Dewaters to MWD1.
5.0	**Operation of water storages**		
5.1	MWD1	• Storage for the underground, as well as the main mine water dam for Lei Lithium. MWD1 will discharge mine-affected water under the WDL via MWD1.	• Receives catchment runoff from the WRD, workshop area, and the crusher and ore stockpile areas. • Receives dewatered mine-affected from the underground (which includes groundwater and mine-affected water from underground demands). • Supplies underground water demands. • Dewaters to MWD2 from Year 5, when MWD2 has been constructed. • Discharge mine-affected water under a WDL.
5.2	MWD2	• Supplementary storage for the underground during the latter half of the mine life. • The RWD will be modified into a two cell dam, where one cell (constructed as a turkey's nest) will provide extra storage capacity for mine-affected water from the mine	• Receives mine-affected water from MWD1, when MWD2 has been constructed. • Supplies mine-affected water to MWD1, where controlled releases are occurring.
5.3	SD	• Collects sediment runoff.	• Receives catchment runoff from disturbed areas. • Supplies construction demand. • Supplies crusher (dust suppression) demand.

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Item	Node Name	Strategy/purpose	Operating rules
			• Supplies truck washdown demand. • Supplies mine and access road (dust suppression) demand. • Dewaters to MWD1, if required.
5.4	RWD	• Collects generally undisturbed runoff. • Modified in Year 5 into a multiple cell dam where one cell (turkey's nest) will operate as a mine-affected water storage, and the other cell will continue to operated as a raw water dam.	• Receives catchment runoff from undisturbed areas. • Supplies construction demand. • Supplies crusher (dust suppression) demand. • Supplies truck washdown demand. • Supplies mine and access road (dust suppression) demand • From Y5 water would be discharged from the RWD to construct MWD2

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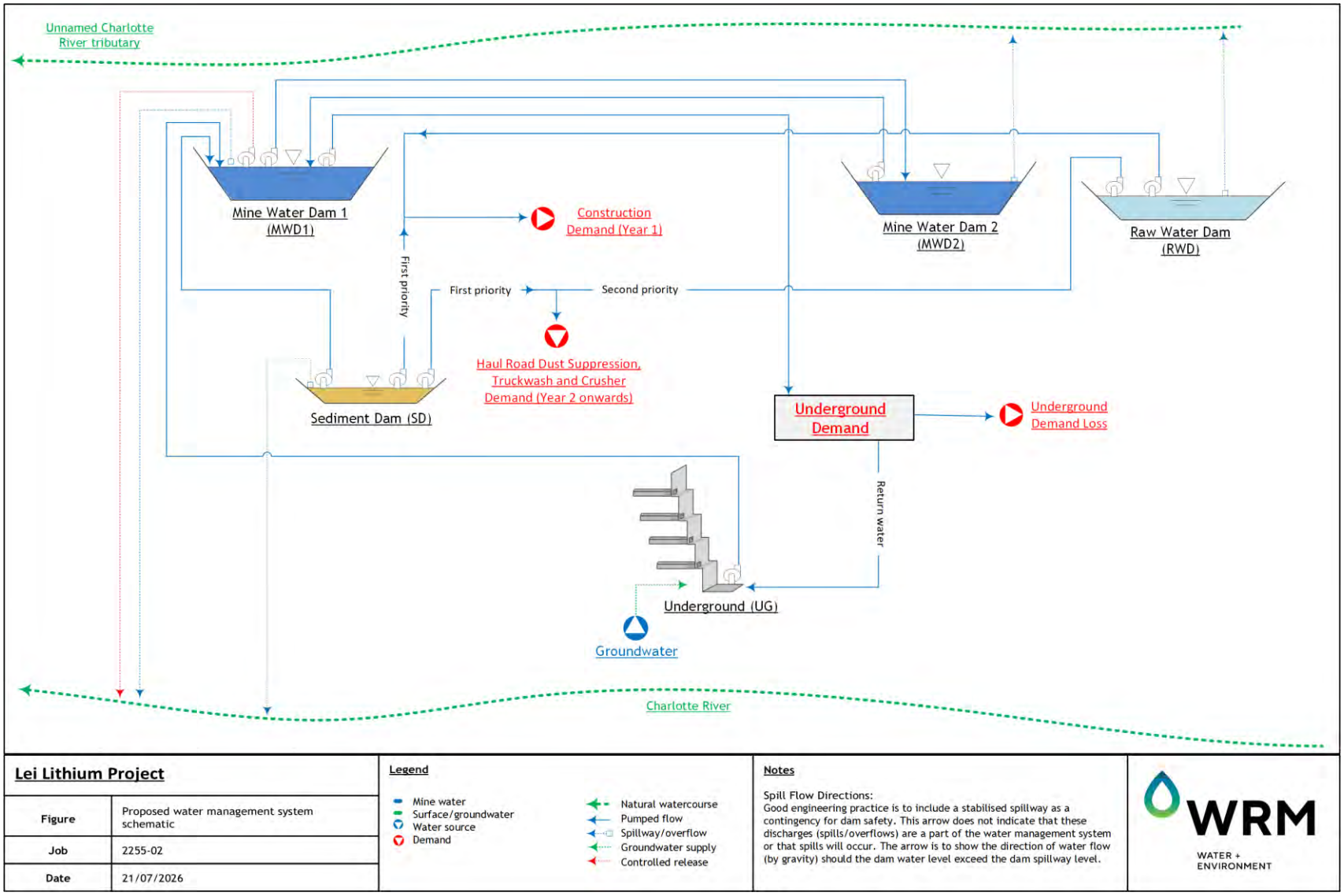


Figure 4.1 Lei Lithium WMS schematic

4.4.2 Raw water management

The water management system has been designed to capture local undisturbed catchments around mining operations in RWD for water security on site. Water in RWD will be used for surface water operational demands such as haul road dust suppression, crusher dust suppression and truck wash down.

In Year 5, the RWD will be converted into a two-cell storage, where one cell (turkey's nest) will be used to manage excess mine-affected water on site. The RWD would have a 50% reduced capacity.

4.4.3 Sediment water management

Surface water and catchment runoff from the disturbance footprint will be managed in accordance with an ESCP. The sediment basin will be managed in accordance with the IECA (IECA, 2025).

Several internal surface water drains are proposed to be constructed to capture surface water from the site and divert runoff to the sediment basin. The sediment basin would then passively discharge into Charlotte River. Figure 1.2 shows the location of the surface water drains.

The adopted design standard does not provide 100% containment for runoff from disturbed areas. Hence, overflows are expected to occur from sediment basin several times during a wet season.

A summary of the design sediment basin capacities and surface areas are provided in Table 4.1. The locations of the sediment basin are shown in Figure 1.2.

4.4.4 Mine water management

Mine affected water containment will be provided in MWD1 and MWD2. MWD1 will receive inflows from the underground mine and catchment runoff from the Waste Rock Dump, workshop pad and crusher and ore stockpile areas. The RWD will be converted into a two-cell storage in Year 5, where one cell (a turkey's nest) will be dedicated to managing mine-affected water on site (MWD2). MWD2 will generally be operated as an additional mine-water storage to manage excess groundwater from the underground mine, where groundwater volumes are predicted to peak.

Mine affected water stored in the MWDs will be used to supply underground demands. Controlled releases into Charlotte River may also be undertaken from MWD1 per the WDL, when there is excess mine-affected water stored onsite.

A series of sumps will be located in each level of the underground mine and underground decline to capture mine affected water and groundwater. A series of pump stations will also be located at approximately 200 m intervals, where several mono pumps will be banked together to pump mine-affected water vertically. The mine-affected water will be staged out through the pump stations to the surface, where mine-affected water between the pump stations will be delivered to the closest pump station by using a flygt pump or via a drain hole.

4.4.5 Groundwater management

Groundwater inflows into the cut and cover tunnel and the underground mine will be dewatered to the Lei Lithium mine water management system. Groundwater inflows entering the underground mine would preferentially be dewatered to MWD1 to supplement underground site demands, or be released via the authorised discharge point per a WDL.

4.4.6 Water management Trigger Action Response Plan

Trigger Action Response Plans (TARPs) have been developed for the management of water inventory for all onsite water storages including sediment dams during two site phases. The TARPs have been developed in consideration of updated water balance modelling and details the conditions under which water will be managed and transferred within, and release offsite. Appendix B shows recommended operational water management TARPs. The Trigger Action Response Plans presented

in Appendix B are conceptual and will be refined once the operational monitoring requirements and their integration with the other monitoring plans for the Project are confirmed, consistent with EGi (2026).

The operational TARPs cover:

- Surface water quality monitoring at monitoring locations;
- Groundwater bore quality monitoring;
- Raw water and sediment water quality in sediment basins and raw water dams;
- Excess mine water inventory in the water management system; and
- Deficits in site storage inventory in the water management system.

The trigger values applied in the Trigger Action Response Plans in Appendix B are the operational trigger values set in the Waste Discharge Licence, derived in accordance with Section 6.3.5.1. Until those values are derived and the licence is issued, the values in Table 6.4 apply as interim criteria.

4.5 WASTE DISCHARGE LICENCE

It is expected that releases of mine-affected water from MWD1 to the Charlotte River would occur, where the Charlotte River is flowing. Discharge from MWD1 will be managed and monitored in accordance with a Waste Discharge Licence to be applied for and issued under the NT Water Act.

5 MINE SITE WATER BALANCE

5.1 OVERVIEW

This section of the WMP describes the water balance model that has been used to assess the performance of the mine site water management system in meeting the WMS objectives. The outcomes of the site water balance model are summarised in this section.

5.2 WATER BALANCE MODEL METHODOLOGY

A computer-based operational simulation model (GoldSim) was used to assess the dynamics of the mine water management system under conditions of varying rainfall and water quality for the next seven years over two phases of the project:

- Phase 1: Construction of infrastructure, cut and cover tunnel, underground decline and associated surface infrastructure.
- Phase 2: Operation of the underground mine.

Long-term daily rainfall and evaporation data for the area was extracted from the SILO DataDrill service. The site water balance was simulated using multiple climate sequences extracted from the historical climate data to assess the performance of the site water management system under the full range of historical climatic conditions.

The GoldSim model dynamically simulates the operation of the water management system (WMS) and keeps complete account of all site water volumes and contaminant loads on a daily time step. For the purpose of this assessment, two contaminants, which have been identified as limiting the ability to discharge mine affected water, were tracked through the Lei Lithium WMS. These included:

- Dissolved Aluminium; and
- Dissolved Arsenic.

Tracking these contaminants informs key operations, including maximum allowable controlled release rates.

The model has been configured to simulate the operations of all major components of the mine water management system. The simulated inflows and outflows included in the model are given in Table 5.1.

Table 5.1 Simulated inflows and outflows to the mine water management system

Inflows	Outflows
Direct rainfall on water storage surfaces	Evaporation from water surface of storages
Catchment runoff	Underground mine demand
Groundwater inflows	Dust suppression demand
Groundwater bore inflows	Truck wash demand
External water supply	Crusher demand
	Offsite spills from storages
	Controlled Releases

The model incorporates the Australian Water Balance Model (AWBM) rainfall runoff model (Boughton, 2003) to determine the runoff characteristics of the various catchment types on the mine site. The water and solute balance model was used to determine the behaviour of the mine water management system over time.

5.3 ASSESSMENT CRITERIA

The models are used to predict the performance of the following:

- Site wide mine affected water inventory against the combined full supply capacity;
- The ability to dewater the underground mine (i.e. if the surface storages are too full to enable the underground mine to be dewatered); and
- Compliance with indicative WDL conditions with respect to the frequency and volumes of controlled releases and the risk of uncontrolled discharge.

The adopted performance criteria for the Lei Lithium water balance are as follows:

- All releases from the mine water dams comply with the indicative WDL conditions; and
- Less than 1% risk that the underground mine will be inundated over the model period.

5.4 SITE WATER BALANCE MODEL CONFIGURATION

The water balance simulated the period from April 2027 to April 2034 on a daily timestep. The adopted site storage characteristics are shown in Table 5.2. The adopted catchments and land use reporting to each of the water storages at Lei Lithium is shown in Table 5.3 and Figure 5.1.

Table 5.2 Storage characteristics for Lei Lithium WMS

Dam	Catchment area (ha)	Dam surface area (ha)	Maximum capacity (ML)	Maximum operating volume (ML)
Year 1 - 4				
MWD1	29.8	7.5	250	Project Year 2 Q3 = 175; Project Year 2 Q4 = 25.
RWD	82.6	5.7	160	-
SD	36.5	8.7	265	-
Year 5 onwards				
MWD1	29.8	7.5	250	Project Year 2 Q3 = 175; Project Year 2 Q4 = 25.
MWD2	3.7	2.6	80	70.4
RWD	78.9	2.9	80	-
SD	36.5	8.7	265	-

Table 5.3 Lei Lithium catchment areas

Storage	Catchment area (ha)				
	Natural	Hardstand	Waste rock dumps	Cleared	Total
Year 1 - 4					
MWD1	2.12	23.99	3.73	-	**29.85**
MWD2	-	-	-	-	**-**
SD	19.92	15.99	-	0.60	**36.51**
RWD	63.18	13.71	-	5.67	**82.55**
Total	**85.22**	**53.69**	**3.73**	**6.27**	**148.91**
Year 5 - 7					
MWD1	2.12	23.99	3.73	-	**29.85**
MWD2	-	3.66	-	-	**3.66**
SD	19.92	15.99	-	0.60	**36.51**
RWD	63.17	10.05	-	5.67	**78.89**
Total	**85.21**	**53.69**	**3.73**	**6.27**	**148.91**

Note a: Catchment and land-use areas represent the total catchment (direct rainfall and catchment runoff) reporting to each storage.

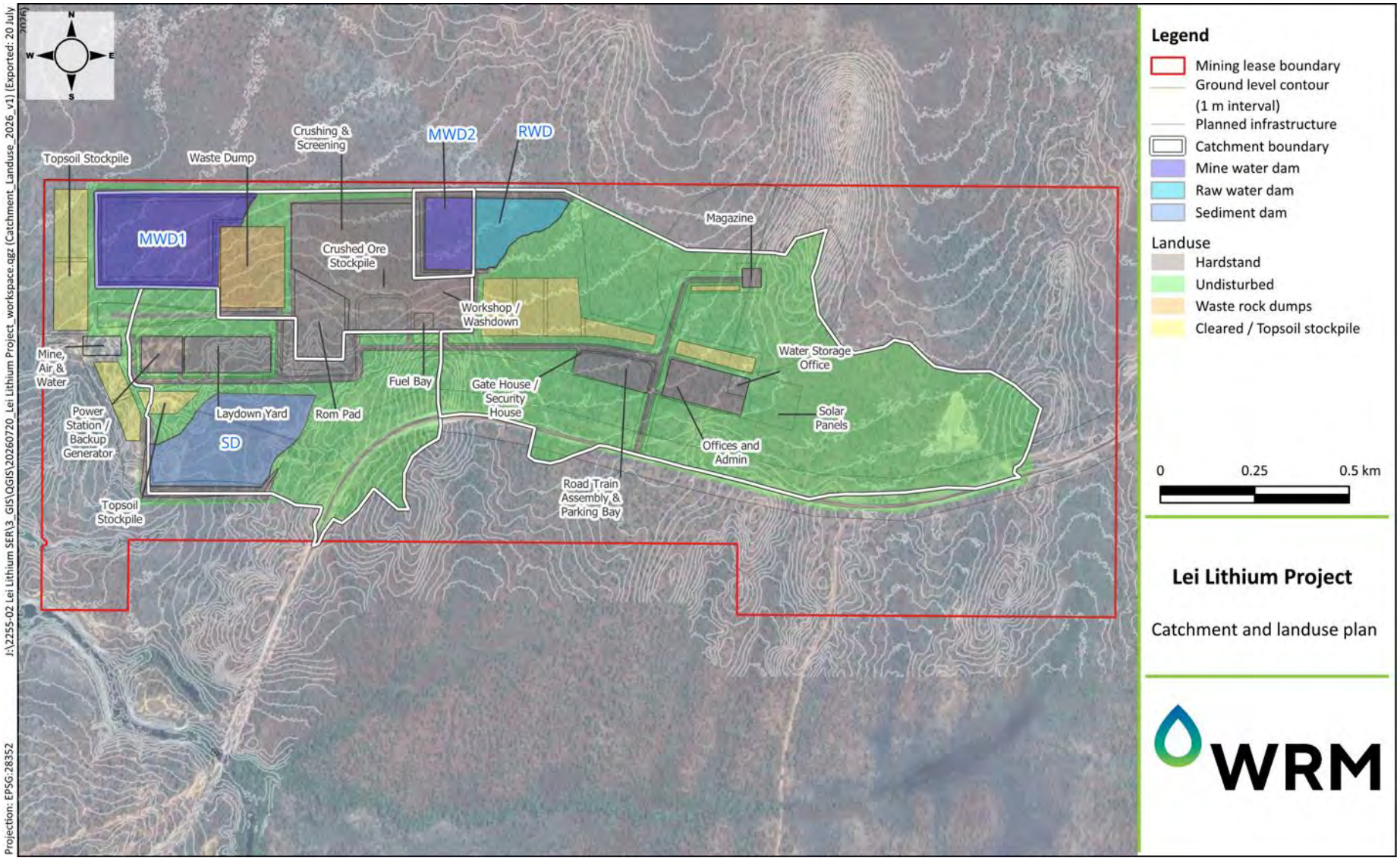


Figure 5.1 Proposed Lei Lithium catchment areas and land use

5.5 MODEL OUTCOMES

The key outcomes from the water balance modelling assessment for next seven years are:

- Figure 5.2 shows the total storage inventory for the life of mine. The results show:
  - The lower inventory levels observed during the Construction Phase (Year 1) are primarily attributed to construction water demands, which result in increased drawdown from the available water storages.
  - Once construction activities are completed and the Operational Phase (Year 2) commences, storage recovery occurs, with inventory levels showing a sustained increasing trend. Therefore, the initial low inventory represents a short-term construction phase impact and does not indicate an ongoing storage limitation.
  - From Project Year 5, it was assumed that water would be discharged from the RWD to construct MWD2, which lowers the volume of water on site.
  - There would generally be sufficient water in the Operational Phase (Year 2 onwards) to supply site operational demands.
  - Under the median climate conditions (50%ile), the maximum water inventory is predicted to occur in Project Year 2, with storage reaching approximately 508 ML. After reaching this peak, inventory levels gradually decrease throughout the mine life, reaching approximately 370 ML by the end of the LOM.
- Figure 5.3 shows the total mine-affected water storage inventory for the life of mine. The results show:
  - As construction activities are completed, the inventory recovers and reaches a maximum of approximately 185 ML by the end of the Construction Phase (Year 1) for wetter climatic conditions.
  - Following the commencement of underground (UG) water demands, the inventory initially declines. However, as the predicted groundwater into mine steadily increases from mine progression, there is a gradual recovery in mine water inventory levels. To provide additional storage capacity for and minimise the risk of uncontrolled discharges from dewatering of the underground, the maximum operating volume (MOV) is reduced from 175 ML to 25 ML by 2029.
  - Following this operational change, inventory levels continue to exhibit a sustained increasing trend during the dry season where discharges are limited. The lower volume allows the site to manage the predicted groundwater inflows during the dry season limiting the risk of uncontrolled spills from the site (from groundwater in the underground mine).
  - The addition of MWD2 at the beginning of Project Year 5 allows the site to manage more groundwater inflows during the dry season, where groundwater inflows are predicted to be at its peak.
  - The maximum mine water inventory predicted over the mine life is approximately 323 ML for very wet climatic conditions (1%ile), occurring in Project Year 7.
- Figure 5.4 shows the predicted quarterly releases from MWD1 to the Charlotte River. The results show:
  - For dry (10%ile) climatic conditions, controlled releases would be undertaken by April 2029. Quarterly discharges from MWD1 comprise only 1.8% - 3.3% of the total flows at the downstream location when controlled releases are undertaken.
  - For median (50%ile) climatic conditions, controlled releases would be undertaken by April 2029. Quarterly discharges from MWD1 comprise only 1.0% - 5.5% of the total flows at the downstream location when controlled releases are undertaken.

- For wet (90%ile) climatic conditions, controlled releases would be undertaken by April 2029. MWD1 comprise only 0.2% - 2.3% of the total flows at the downstream location when controlled releases are undertaken.

- Figure 5.5 shows the predicted external water required to meet shortfalls in site operational demands. The results show:
  - External water supply would generally be required for Construction Phase (Year 1), where water is required for the initial development of the cut and cover tunnel and mine water infrastructure, and in the Operational Phase (Year 2 only) for very dry climatic conditions.
  - The predicted additional volumes required to meet site demands for very dry climatic conditions (99%ile), include:
    - Site construction demands: up to 146 ML; and
    - Operational demands: up to 6 ML.
  - To meet site demands in the first year, the following measures will be investigated:
    - Construction of temporary water handling infrastructure in the wet season;
    - External water supply; and/or
    - Water extraction from groundwater bores, subject to applying for and being granted a groundwater extraction licence.
  - For the remainder of the LOM, there would be sufficient water storage on site to meet all site operational demands.
- Table 5.4 shows the summary of inflows and outflows of the water management system for average climatic conditions.

Table 5.4 Site water balance average annual summary

Category	Parameter	Construction Phase	Operational Phase					
		Year 1 (ML)	Year 2 (ML)	Year 3 (ML)	Year 4 (ML)	Year 5 (ML)	Year 6 (ML)	Year 7 (ML)
Inflows	Groundwater inflow	96	194	313	386	440	465	465
	Rainfall runoff	817	793	791	791	798	795	799
	Direct rainfall on dams	194	276	282	287	285	286	287
	Return water from Underground[a]	0	92	92	92	92	92	92
	Total	**1,108**	**1,354**	**1,478**	**1,556**	**1,615**	**1,636**	**1,643**
Outflows	Evaporation	119	376	387	396	392	394	395
	Mine water dam overflows	0	0	0	0	0	0	0
	Sediment dam overflows	14	43	49	52	54	55	56
	Raw water dam overflows	293	396	401	403	491	411	414
	Underground demand	0	221	221	221	221	221	221
	Construction demand	197	0	0	0	0	0	0
	Surface water demand[b]	0	85	85	85	85	85	85
	Controlled release	26	298	320	392	439	466	472
	Total	**649**	**1,418**	**1,463**	**1,549**	**1,684**	**1,632**	**1,644**
Site water balance		**458**	**-64**	**15**	**7**	**-69**	**5**	**-1**
Shortfall	Shortfall in demands which are required to be sourced externally.	103	0	0	0	0	0	0

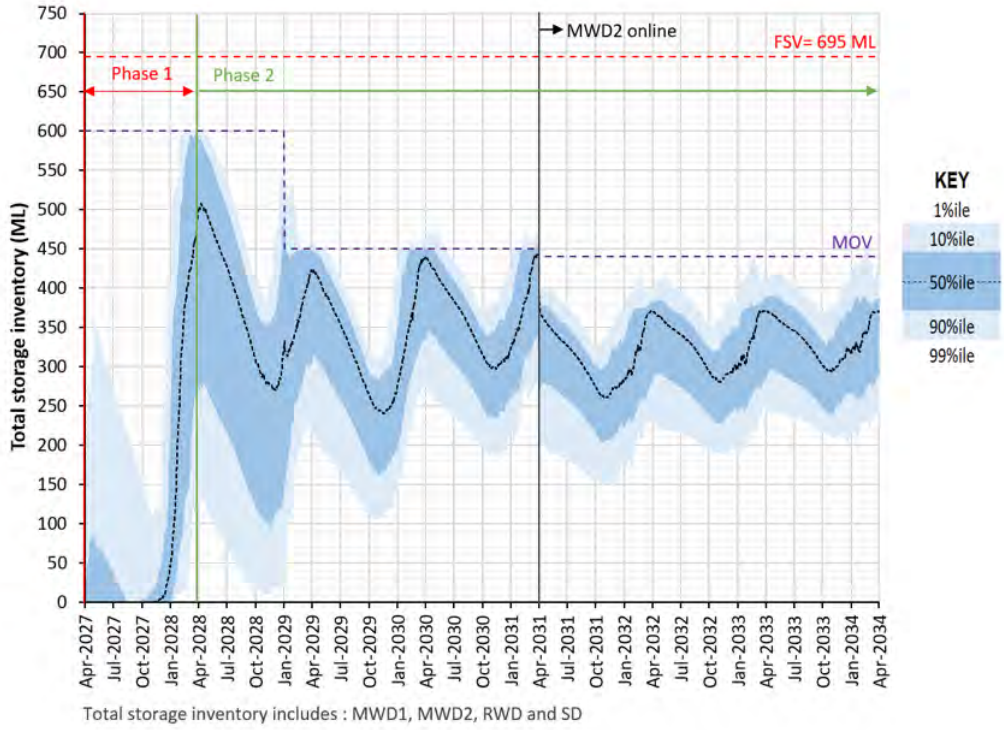


Figure 5.2 Total storage inventory in the WMS

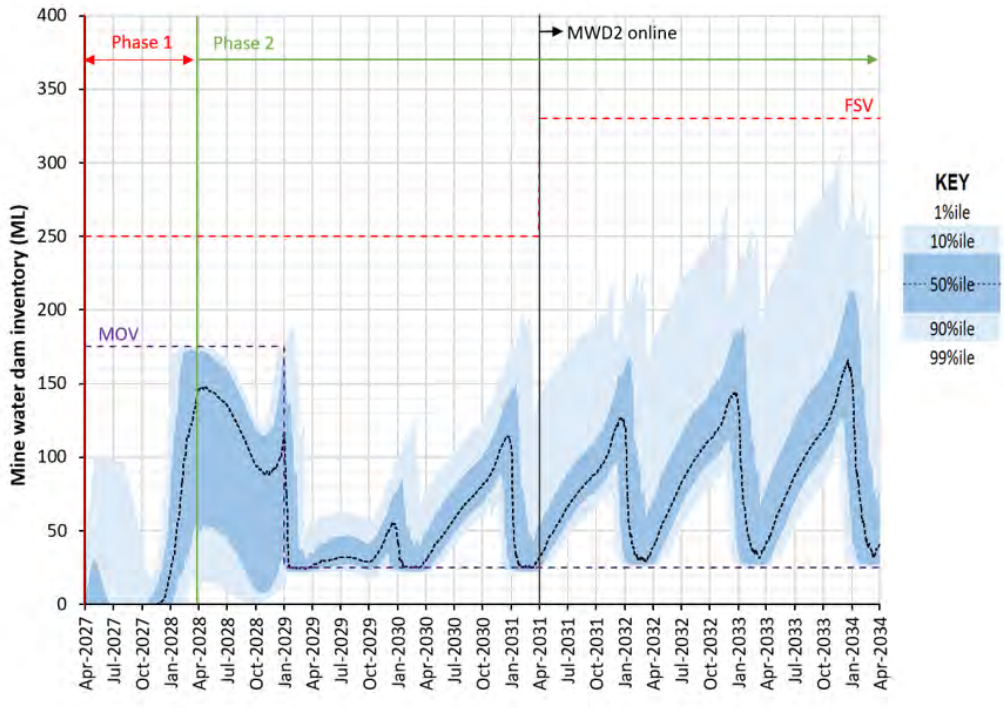


Figure 5.3 Total mine water storage inventory in the WMS

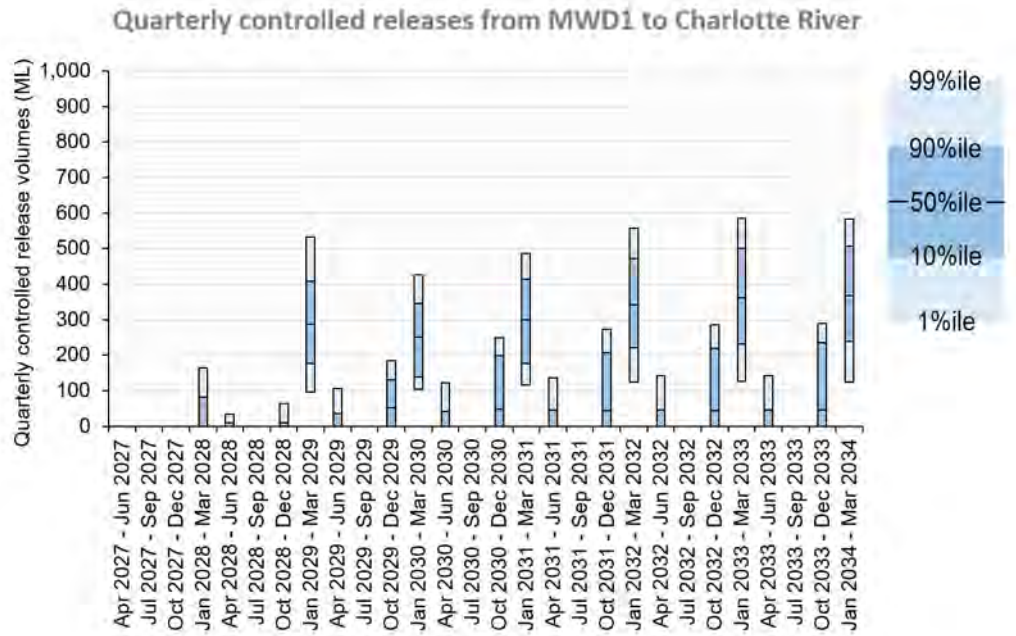


Figure 5.4 **Quarterly controlled releases from MWD1 to the Charlotte River**

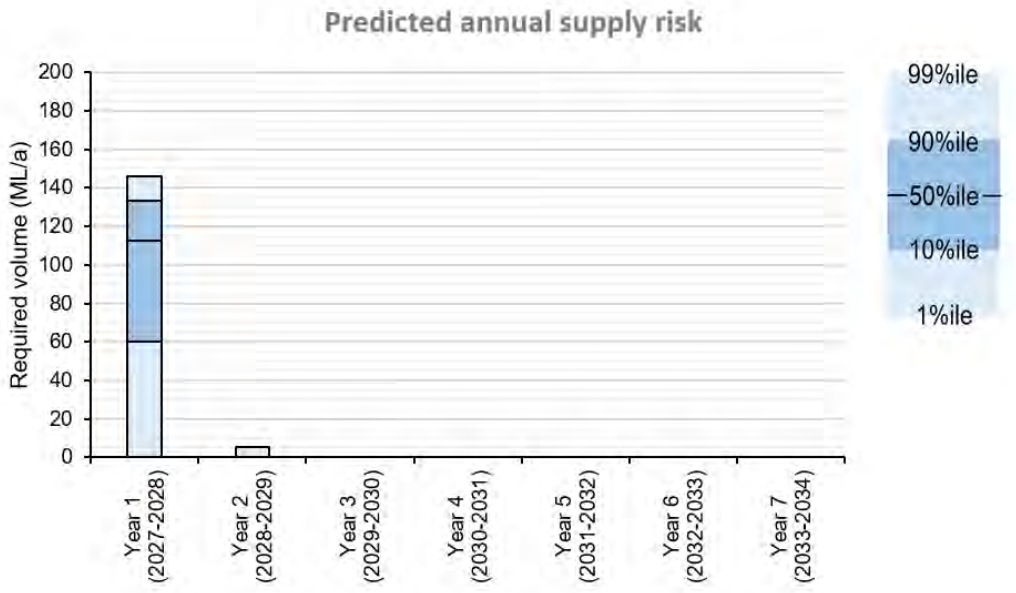


Figure 5.5 **Predicted annual supply risk**

6 WATER QUALITY MONITORING PLAN

6.1 OVERVIEW

The objective of the water quality monitoring plans is to provide early warning and trigger management actions for preventing impacts to surface waters and/or groundwater aquifers. Surface water and groundwater monitoring plans are detailed below.

Water monitoring program design, sampling methods, data assessment criteria and reporting follow the guidance recommended in:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018);
- Darwin Harbour Water Quality Objectives (NT, 2010); and
- AS/NZ Standards 5667:1998 – Water Quality Sampling Parts 1, 4, 6, 10 and 11 (AS/NZS, 1998).

6.2 PARAMETERS MEASURED

Table 6.1 outlines field and laboratory parameters measured at all surface water and groundwater monitoring locations. An extended metals suited, comprising 30+ metals, is required to be undertaken annually in late wet season recessional flows.

Selected parameters aim to detect all identified surface water and groundwater quality-related impacts detailed in this WMP.

Table 6.1 Surface water and groundwater quality field and laboratory parameters

Type	Parameters (Surface Water)	Parameters (Groundwater)
Field	• pH (pH units) • Electrical Conductivity (µS/cm) • Total Dissolved Solids (mg/L) • Turbidity (NTU) • Temperature (°C) • Oxidation Reduction Potential (mV) • Dissolved Oxygen (%saturation) • Salinity (ppt)	• pH (pH units) • Electrical Conductivity (µS/cm) • Total Dissolved Solids (mg/L) • Turbidity (NTU) • Temperature (°C) • Oxidation Reduction Potential (mV) • Dissolved Oxygen (%saturation) • Salinity (ppt) • Standing Water Levels (m)

Laboratory	• Nutrients (ammonia, Nitrate, Nitrite, Nitrite + Nitrate (as NOx), Total Kjeldahl Nitrogen, total nitrogen, total phosphorus, reactive phosphorus)
	• Chlorophyll-a
	• Dissolved and total metals:
	  ○ Aluminium (Al)
	  ○ Arsenic (As)
	  ○ Beryllium (Be)
	  ○ Barium (Ba)
	  ○ Cadmium (Cd)
	  ○ Chromium
	  ○ Cobalt (Co)
	  ○ Copper (Cu)
		• Nutrients (ammonia, Nitrate, Nitrite, Nitrite + Nitrate (as NOx), Total Kjeldahl Nitrogen, total nitrogen, total phosphorus, reactive phosphorus).
		• Dissolved and total metals:
		  ○ Aluminium (Al)
		  ○ Arsenic (As)
		  ○ Beryllium (Be)
		  ○ Barium (Ba)
		  ○ Cadmium (Cd)
		  ○ Chromium
		  ○ Cobalt (Co)
		  ○ Copper (Cu)
		  ○ Lithium (Li)

Type	Parameters (Surface Water)	Parameters (Groundwater)
	○ Lithium (Li) ○ Manganese (Mn) ○ Lead (Pb) ○ Nickel (Ni) ○ Selenium (Se) (Total) ○ Vanadium (V) ○ Zinc (Zn) ○ Boron ○ Iron (Fe) ○ Mercury • Dissolved and total metals measured over 1–4 sampling events in 2023 in addition to the above: ○ Antimony (Sb) ○ Bismuth (Bi) ○ Caesium ○ Molybdenum (Mo) ○ Rubidium (Rb) ○ Silver (Ag) ○ Strontium ○ Thorium ○ Tin ○ Titanium ○ Uranium (U) • Major anions (sulfate, chloride and alkalinity) • Major cations (calcium, magnesium, sodium and potassium) • Hydrocarbons TPH/TRH, BTEXN	○ Manganese (Mn) ○ Lead (Pb) ○ Nickel (Ni) ○ Selenium (Se) (Total) ○ Vanadium (V) ○ Zinc (Zn) ○ Boron ○ Iron (Fe) ○ Mercury ○ Uranium (U) • Major anions (sulfate, chloride and alkalinity) • Major cations (calcium, magnesium, sodium and potassium) • Hydrocarbons TPH/TRH, BTEXN
Field Notes	• Weather condition • Flow condition • Any visible items to note i.e. pollutants, algae etc. • Clarity • Odour • Riparian vegetation condition • Photos.	• Weather condition • Bore condition • Any visible pollutants i.e. algae, organisms, hydrocarbons, sheen • Clarity • Odour

6.3 SURFACE WATER MONITORING PROGRAM

The surface water quality monitoring aims to achieve:

- Early detection of contaminants originating from mining operations entering drainage lines and waterways. Potential contaminant sources may include:
  - WRD seepage;
  - Water dewatered from the cut and cover tunnel and underground mine;
  - Flocculants/chemicals used to treat water across site;
  - Stormwater runoff from the mine site; and
  - Fuel or chemical spills/leaks.
- Monitor cut and cover tunnel water;
- Monitor underground water pumped to the surface for storage during the Operational Phase (Phase 2);
- Detect traces of acid mine drainage from the WRD, if any;
- Detect secondary effects on waterways from physical stressors, such as excess nutrient and organic matter inputs from mine run-off/discharge causing eutrophication and algal blooms.
- Monitor contaminant levels in the underground mine pumped to the surface for storage (during the mining phase) for guiding water treatment strategies to meet water quality objectives.
- Verify water quality in mine site storages meets discharge criteria prior to release or use in dust suppression.

6.3.1 Surface water quality monitoring sites

Proposed surface water monitoring site locations are shown in Figure 6.1 and detailed in Table 6.2. All sampling will be conducted in accordance with the frequency stipulated in Table 6.2, unless sampling is not possible due to access constraints or dry site conditions.

Table 6.2 Surface water quality monitoring sites details

Site ID	Purpose	Sampling frequency
SW1	• Impact location • Located on an overland flowpath associated with the site. • Monitors impacts from downstream of the site. • Monitors water quality on site, where water quality is generally associated with freshwater (however has some influence during high tides in the Charlotte River). • Planned controlled release point/discharge location.	**Monthly November to April and quarterly May to October**: Field and laboratory parameters
SW2	• Impact location • Monitors impacts sediment dam discharges from the site. • Monitors water quality on site, where water quality is generally associated with freshwater (however has some influence during high tides in the Charlotte River).	• **Monthly November to April and quarterly May to October**: Field and laboratory parameters

Site ID	Purpose	Sampling frequency
SW3	• Reference location • Site upstream of any mine site impacts. • Monitors water quality in the Charlotte River, where water quality generally transitions between freshwater and marine water.	• **Monthly November to April and quarterly May to October**: Field and laboratory parameters
SW4	• Reference location • Monitors water quality in local tributary	• **Monthly November to April and quarterly May to October**: Field and laboratory parameters
SW5	• Impact location • Location downstream of any mine site impacts. • The planned downstream monitoring location of the WDL. • Monitors impacts from discharges from the site. • Monitors water quality in the lower reaches of the Charlotte River, where water quality is generally associated with marine waters.	• **Monthly November to April and quarterly May to October**: Field and laboratory parameters
New 1	• Impact location • Monitors potential impacts from the mine site due to overflows from RWD and MWD2. • Monitors water quality in the lower reaches of the unnamed tributary, where water quality generally transitions between sea water and freshwater.	• Quarterly sampling frequency, with monthly during periods of uncontrolled discharge from RWD and MWD2. • Field and laboratory parameters
New 2	• Reference location • Site upstream of any site impacts in the unnamed northern tributary. • Monitors water quality in the upper reaches of the unnamed tributary, where water quality generally indicates fresh water. • Potentially impacted by external mining activities in the upstream catchment	• Quarterly sampling frequency, with monthly during periods of uncontrolled discharge from RWD and MWD2. • Field and laboratory parameters
New Upstream	• Reference location • Site upstream of any site impacts in the Charlotte River. • Monitors water quality in the upper reaches of the Charlotte River, where the water quality generally indicates fresh water.	• **Monthly November to April and quarterly May to October**: Field and laboratory parameters

Table 6.3 Operational water quality monitoring sites details

Site ID	Purpose	Sampling frequency
SD	• Monitor water quality in sediment basins to assess treatment options, upstream controls and to ensure compliance with IECA (2025) criteria prior to release.	• **Weekly**: Field parameters during wet season (regardless of discharge) • **Weekly**: Laboratory parameters when discharging (passive)

Site ID	Purpose	Sampling frequency
		• **Monthly:** lab parameters during wet season (November – April) regardless of discharge
RWD	• Monitor water quality in raw water dam to assess water quality associated with generally natural catchments.	• **Weekly**: Field parameters during wet season (regardless of discharge) • **Weekly**: Laboratory parameters when discharging (passive) • **Monthly:** laboratory parameters during wet season (November – April) regardless of discharge
MWD1 and MWD2	• Monitor water quality to assess treatment options and ensure compliance with WDL criteria prior to release	• **Prior to controlled release from:** Field parameters • **Weekly**: Field parameters during wet season (regardless of discharge) • **Weekly**: Laboratory parameters when discharging (passive and / or controlled) • **Monthly and prior to controlled release**: laboratory parameters during wet season (November – April) regardless of discharge

6.3.2 Sampling frequency

Sampling frequency will be undertaken as per that outlined in Table 6.2 and Table 6.3.

6.3.3 Sampling methods

Sampling must adhere to the following:

- All surface water quality monitoring must be undertaken by qualified professionals in accordance with the standards listed in Section 6.1.
- All hand-held field parameter meters must be calibrated immediately prior to commencing sampling or in accordance with frequency recommended in the operating manual.
- All laboratory samples are to be placed into the appropriate laboratory supplied bottles and handled in accordance with the standards listed in Section 6.1.
- Samples must be kept cool in eskies until delivered to a NATA accredited laboratory within required holding times.

6.3.4 Surface water flow gauging

Surface water flow in the Charlotte River catchment should be undertaken to provide information for flood assessments, engineering designs and waste discharge calculations. Suggested locations include:

- SW5, the proposed downstream impact monitoring location for the WDL; and
- New Upstream, the upstream background monitoring location.

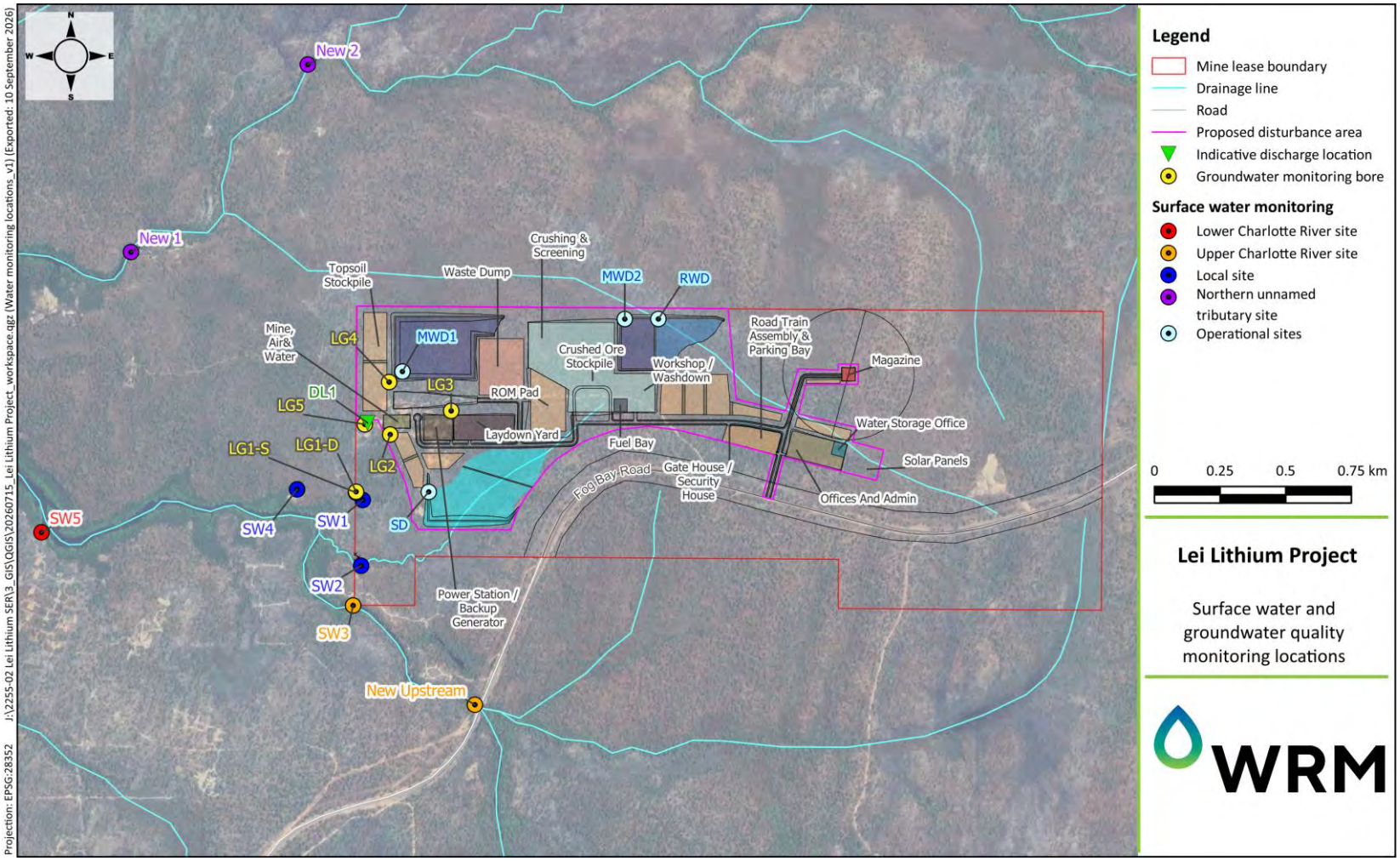


Figure 6.1 Surface water and ground water quality monitoring sites

6.3.5 Assessment criteria

6.3.5.1 Downstream surface water SSTVs

Table 6.4 lists the proposed SSTVs to apply to surface water sites listed in Table 6.2 under a WDL for both marine water and fresh water ecosystems. Background water quality for marine water ecosystems is taken from the pooled tidal reference sites and for freshwater ecosystems from the pooled freshwater reference sites, derived in accordance with the method set out below. SSTVs have been developed for the project impact sites (SW1, SW2, SW5 and NEW1) and will be applied at these locations for operational monitoring and assessment. Monitoring results from all other surface water sites will be used as reference sites to assist in distinguishing project-related changes from natural spatial and temporal variability. For freshwater environments, SSTVs have been derived using data from SW1 and SW2, as these represent the primary freshwater impact sites associated with the project.

Site-specific trigger values are derived as follows. Reference-site data for each ecosystem type are pooled across the relevant reference sites rather than taken from a single site. The trigger value is the 80th percentile of the pooled reference dataset, or the 20th percentile where a lower value indicates a potential impact, in accordance with ANZG (2018). Where an effects-based default guideline value exists and natural background does not exceed it, the default guideline value is adopted. Where natural background exceeds the default guideline value, the reference-derived value is adopted. Where no default guideline value exists, a site-specific value is derived from the available toxicological or beneficial-use evidence, as EGi (2026) has done for lithium. Values are derived from a minimum of two consecutive annual monitoring cycles and are compared against the annual median of test-site data, consistent with ANZG (2018).

Table 6.4 Downstream Surface Water Trigger Values at monitoring locations

Parameter	Abbrev.	Units	Analysis	Trigger value	
				Marine water	Freshwater
Physical parameters					
pH	pH	pH	In situ.	6.0 – 8.5[a]	6.06 [f] – 7.8[e]
Electrical Conductivity	EC	µS/cm		-	521 [f]
Dissolved Oxygen	DO	%		50% - 100%[a]	58.7%[f] – 100%[e]
Turbidity		NTU		-	60[g]
Nutrients					
Ammonia	NH_3	µg/L	In situ.	198 [b]	900 [c]
Total Nitrogen	TN	µg/L		500[b]	400 [f]
Total Phosphorus	TP	µg/L		54[b]	50 [f]
Dissolved metals					
Aluminium	Al	µg/L	Filtered (0.45 µm)	50 [b]	55 [e]
Arsenic	As	µg/L		13[c]	13 [e]
Cobalt	Co	µg/L		1[d]	1.4 [e]

Parameter	Abbrev.	Units	Analysis	Trigger value	
				Marine water	Freshwater
Copper	Cu	µg/L		0.6 [d]	1.4 [e]
Iron	Fe	µg/L		540 [a]	330 [f]
Lead	Pb	µg/L		4.4 [d]	3.4 [e]
Lithium	Li	µg/L		430 [h]	430 [h]
Mercury	Hg	µg/L		0.4 [a]	0.6 [e]
Nickel	Ni	µg/L		5.9 [d]	11 [e]
Zinc	Zn	µg/L		8 [d]	8 [e]

Notes:
a: Darwin Harbour Water Quality Objectives for upper estuary ecosystems.
b: 80th percentile of background data for surface water quality in the Charlotte River (at SW5)
c: ANZG (2018) 95% species protection for freshwater ecosystems.
d: ANZG (2018) 95% species protection for marine water ecosystems.
e: Darwin Harbour Water Quality Objectives for freshwater ecosystems
f: 80th percentile of background data for surface water quality in local stream (at New Upstream)
g: 50th percentile NTU trigger value recommended by IECA (2025) for sediment dam discharges
h: Waste Discharge Licences 248-03 and WDL 253-01 granted in accordance with section 74 of the Water Act 1992 (NT)

The values in Table 6.4 are the water quality standards and guidelines identified for the purposes of items 12 and 14 of the NT EPA direction of 11 March 2025. Operational trigger values for the purposes of the Trigger Action Response Plans in Appendix B will be derived by the method set out in this section from two consecutive annual monitoring cycles and set in the Waste Discharge Licence prior to the first controlled release.

6.3.5.2 MWD discharge water quality criteria

Discharge water quality from MWD1 will aim to meet the WDL criteria. Water treatment will be undertaken prior to release if initial water quality does not meet these criteria. Verification testing after treatment must be undertaken to ensure criteria is met prior to release.

6.3.5.3 Dust suppression water quality criteria

The quality of water used for dust suppression should meet the irrigation water quality trigger values as outlined in Chapter 4 Primary Industries of the ANZECC (2000a) guidelines. This includes:

- Metals: Short-term trigger values outlined in Table 4.2.10 in ANZECC (2000a);
- Salinity, sodicity: the approach outlined in Section 4.2.4 of ANZECC (2000a); and
- Nitrogen and Phosphorus: short-term trigger values outlined in Table 4.2.11 in ANZECC (2000a);
- Site-specific assessment requirements outlined in Volume 3, Section 9.2.6, ANZECC (2000b).

6.3.5.4 Sediment basin discharge water criteria

Turbidity in the sediment basins will be reduced as much as possible, however passive releases from the sediment basins is not always expected to achieve the very low turbidity levels in the receiving drainage lines. As such, the adopted discharge standard recommended for sediment basins in IECA (2025) is 90th percentile NTU reading not exceeding 100, and 50th percentile NTU reading not exceeding 60.

Once discharged, the turbidity of water from the sediment basins is expected to reduce rapidly with dilution in the receiving drainage lines, combined with the filtering effect of the vegetation.

6.3.5.5 Groundwater and surface water quality criteria for Acid and Metalliferous Drainage (AMD) assessment.

Table 6.5 defines absolute Level 1 to 4 thresholds for application at the mine water dams (MWD1 and MWD2), the dewatering discharge from the cut-and-cover tunnel and the underground workings, and the drainage lines and toe seepage points at the waste rock dump and the ROM and ore stockpile areas, consistent with the scope of the Trigger Action Response Plan at Appendix 2 of EGi (2026). The thresholds apply to dissolved metals and metalloids. They are not applied at the surface water monitoring sites listed in Table 6.2 or at the groundwater monitoring bores listed in Table 6.6, where the relative-to-baseline thresholds in Table B.8 apply.

The levels determined by EGi (2026) are based on the risk escalation outline below. These levels are:

- Level 1: Routine (low risk): Concentrations within 0.5x guideline value or no greater than baseline; no abnormal conditions
- Level 2: Moderate Risk: Early deviation from baseline or from 0.5x to 1.0x guideline value.
- Level 3: High Risk: Material deviation from baseline or up to 5x exceedance of guideline value; AMD indicators evident.
- Level 4: Extreme Risk: Severe AMD or acute guideline breach (often order-of-magnitude).

Table 6.5 Absolute Level 1-4 thresholds (EGi, 2026)

Parameter	Level 1 (Low)	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 $CaCO_3$)	< 10	10-50	50-250	> 250
Nitrate as Total N (mg/L)	< 0.25	0.25-5	5-100	> 100
Sulphate (mg/L)	< 429	429-1,000	1,000-5,000	> 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)	< 2.0	2.0-20	20-200	> 200
Ni (µg/L)	< 11	11-70	70-350	> 350
Se (µg/L)	< 11	11-40	40-200	> 200

Parameter	Level 1 (Low)	Level 2 (Moderate)	Level 3 (High)	Level 4 (Extreme)
U (µg/L)	< 0.5	0.5-30	30-150	> 150
Zn (µg/L)	< 8	8-500	500-2,500	> 2,500

Based on the above, TARPs have been developed and are presented in Table B.7, Table B.8, and Table B.9 in Appendix B. Visual indicators, triggers, and corresponding risk-based management responses are also provided.

6.3.6 Surface water quality Trigger Action Response Plan

An indicative operational TARP for surface water quality has been developed for operations and is provided in Table B.1. The TARP will be employed to mitigate and minimise the risk of impacting the environment from a reduction in offsite water quality. The proposed strategy would involve undertaking an investigation to identify the source of contaminants and to develop a more targeted and appropriate management measure depending on the outcomes of the investigation. Surface water quality will be measured at the surface water monitoring locations listed in Table 6.2.

6.4 GROUNDWATER MONITORING PROGRAM

Table 6.1 outlines field and laboratory parameters measured in all bores during all quarterly sampling rounds. An extended metals suite (both total and dissolved) comprising 30+ metals is to be analysed annually.

The parameters aim to allow the detection of all identified groundwater quality-related impacts, or any other contaminants potentially in seepage from the WRD.

Continuous measurement of groundwater levels using Troll Loggers in all bores will allow detection of any groundwater mounding associated with the WRD or any other water storages on site as well as any potential groundwater drawdown.

Sampling will be undertaken throughout operations and post-closure until rehabilitation criteria specified in the Concept Closure and Rehab Plan (Projectick, 2026) are met, noting that sampling frequency may be updated as operations and post-closure activities are conducted. Sampling frequencies may also be changed in response to exceedances of triggers in groundwater quality and groundwater levels.

The objectives of the Groundwater Monitoring Program are to:

- Monitor groundwater levels to assess the effects of dewatering on the underlaying aquifer and surrounding GDEs.
- Confirm that groundwater drawdown remains within predicted and acceptable limits.
- Monitor groundwater quality to identify any changes that may result from mining, dewatering or saltwater intrusion.
- Provide early detection of potential adverse impacts on groundwater environmental values and groundwater users.
- Assess compliance with trigger values and management commitments.
- Evaluate groundwater quality and level trends over time to identify changes from baseline conditions.
- Verify the effectiveness of groundwater management and mitigation measures.
- Provide data to support adaptive management and continual improvement of groundwater management practices.

6.4.1 Groundwater monitoring sites

The groundwater monitoring network comprises all monitoring bores installed in 2023 and included in the baseline monitoring program, ensuring continuity in the collection of groundwater level and quality data. To further strengthen the monitoring network, new bores have been incorporated into the program based on the following:

- Recommendations provided by CloudGMS (2026a and 2026b) and EcoLogical (2026a) regarding a better characterisation of the salinity stratification near the Charlotte River.
- Location of the Waste Dump and ROM PAD.

Details of the monitoring bores, including construction information and monitoring objectives, are provided in Table 6.6 with bore locations shown in Figure 6.1. All sampling will be conducted in accordance with the frequency stipulated in Table 6.6, unless sampling is not possible due to access constraints.

Table 6.6 Groundwater monitoring site details

Bore ID	Registration No. (RN0)	New/ Existing	Location		Depth (mBGL)	Screen depth (mBGL)	Purpose	Sampling frequency
			Easting GDA94 Z52	Northing GDA94 Z52				
LG1-s	43918	Existing	693615	8590960	12	8.0 - 11.0	Nested bores. Assess groundwater conditions down gradient south-west of the mine. Establish on-lease nested monitoring site to assess potential impacts between mine workings and the Charlotte River.	Quarterly: Field and Lab parameters. Continuous: Standing water levels Annually: Extended metals (total and dissolved suite)
LG1-d	43917	Existing	693615	8590960	79	73.5 - 76.5		
LG2	43915	Existing	693745	8591190	73	68.5 - 71.5	Monitor groundwater quality down hydraulic gradient of cut-and-cover excavation.	
LG3	43913	Existing	693980	8591290	60.6	52.1 - 55.1	Background bore. Monitor groundwater quality up hydraulic gradient of cut-and-cover excavation.	
LG4	43914	Existing	693760	8591530	73	68.5 - 71.5	Assess groundwater conditions to the north of the mine and south of mine water dam.	
LG5	43916	Existing	693650	8591240	69.5	65.0 - 68.0	Assess groundwater conditions down hydraulic gradient of cut-and-cover excavation.	
LG6	N/A	New	693650	8591240	TBC (approx. 70-73)	TBC (screen length: 3 m)	Assess groundwater quality north of water dams.	
LG7-s	N/A	New	692909	8590468	TBC (max. 12)	TBC (screen length: 3 m)	Characterise salinity stratification near the Charlotte River.	

WORKING DRAFT

							Targets shallow alluvial aquifer (if present)
LG7-d	N/A	New	692909	8590468	TBC (approx. 70-80)	TBC (screen length: 3 m)	Characterise salinity stratification near the Charlotte River. Targets BCF.

Note:

mBGL: meters below ground level;

N/A: Not applicable;

TBC: To be confirm

WORKING DRAFT

6.4.2 Sampling frequency

Sampling frequency will be undertaken as per that outlined in Table 6.6.

6.4.3 Sampling standards

Sampling is to be conducted in accordance with the following standards:

- Australian/New Zealand Standard on Water Quality - Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998), Standards Australia, New South Wales.
- Australian/New Zealand Standard on Water Quality - Sampling - Part 11: Guidance on sampling of groundwater (AS/NZS 5667.11:1998), Standards Australia, New South Wales.
- Groundwater Sampling Guidelines (Publication 669.1 February 2022), EPA Victoria, Victoria.
- Guidelines for Regulatory Monitoring and Testing - Groundwater Sampling (ISBN 978-1-921125-48-5), EPA South Australia, South Australia.

6.4.4 Assessment criteria

Groundwater quality will be assessed via trend analysis not SSTVs. Management actions as per Table 6.7 will be triggered by a greater than 10% variation from baseline conditions. Shallow groundwater background ranges will be applied to LG1-s and LG7-s, while deep groundwater background ranges will apply to the remaining monitoring bores. During the assessment of groundwater quality results, measured concentrations will be compared against the relevant baseline ranges to identify any meaningful changes from background conditions.

For parameters that have not been previously monitored and for which baseline data are not available, temporal trends will be assessed using data from the previous four monitoring rounds. A similar approach will be adopted for new monitoring bores, particularly the nested LG7 bores, as their proximity to the Charlotte River may influence groundwater chemistry and result in conditions that differ from those observed at the upgradient monitoring bores.

Table 6.8 presents preliminary operational groundwater level thresholds for assessing groundwater levels during mine operations. These thresholds are based on the preliminary trigger levels and the maximum predicted annual drawdown relative to the observed baseline annual minimum water levels. The purpose of these thresholds is to determine whether observed drawdown remains within predicted levels and to inform management actions where drawdown exceeds the predicted range.

Table 6.7 Groundwater analyte background ranges

Parameter	Abbrev.	Units	Analysis	Trigger value		
				Shallow	Deep	Combined
Physical parameters						
pH	pH	pH	In situ.	6.00 – 6.39	6.34 – 7.42	6.19 – 7.20
Electrical Conductivity	EC	µS/cm		131.44 - 143.62	193.9 - 415.26	137.5 – 402.38
Dissolved Oxygen	DO	%		16.7 – 31.8	1.98 – 17.7	4.04 – 26
Total Suspended Solids	TSS	mg/L		140.8 – 197.2	130.6 – 213.6	124.2 – 214

WORKING DRAFT

Parameter	Abbrev.	Units	Analysis	Trigger value		
				Shallow	Deep	Combined
Nutrients						
Ammonia	NH_3	µg/L	In situ.	-	-	-
Nitrite and Nitrate	NO_X	µg/L		58	30	40
Total Nitrogen	TN	µg/L		600	500	580
Total Phosphorus	TP	µg/L		300	624	458
Dissolved metals						
Aluminium	Al	µg/L	Filtered (0.45 µm)	122	5[a]	5[a]
Arsenic	As	µg/L		12	123.8	114.6
Cobalt	Co	µg/L		0.5[a]	0.5[a]	0.5[a]
Copper	Cu	µg/L		2	0.5[a]	0.9
Iron	Fe	µg/L		192	1,640	1,326
Lead	Pb	µg/L		0.5[a]	0.5[a]	0.5[a]
Lithium	Li	µg/L		121.2	216.8	142.6
Mercury	Hg	µg/L		0.05[a]	0.05[a]	0.05[a]
Nickel	Ni	µg/L		7.2	1	2
Silver	Ag	µg/L		-	-	-
Zinc	Zn	µg/L		35.2	10	19.2

Table 6.8 Preliminary operational groundwater-level ranges at available Lei monitoring sites (CloudGMS, 2026b)

Bore ID	Baseline range (mAHD)	Year 1 (mAHD)	Year 2 (mAHD)	Year 3 (mAHD)	Year 4 (mAHD)	Year 5 (mAHD)
LG1-D	5.26 to 6.73	-9.14 to -7.67	-16.24 to -14.77	-19.14 to -17.67	-20.24 to -18.77	-20.84 to -19.37
LG1-s	1.02 to 3.94	-1.78 to 1.14	-2.78 to 1.14	-3.18 to -0.26	-3.08 to -0.16	-2.88 to 0.04
LG2	7.66 to 9.27	-41.34 to -39.73	-43.64 to -42.03	-44.04 to -42.43	-44.24 to -42.63	-44.44 to -42.83
LG3	6.95 to 9.57	-2.95 to -0.33	-5.45 to -2.83	-6.75 to -4.13	-7.65 to -5.03	-8.05 to -5.43
LG4	6.37 to 9.10	-14.33 to -11.60	-18.73 to -16.00	-20.63 to -17.90	-22.33 to -19.60	-23.03 to -20.30
LG5	5.76 to 9.49	-31.14 to -27.41	-32.54 to -28.81	-33.44 to -29.71	-33.94 to -30.21	-34.14 to -30.41

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6.4.5 Additional groundwater monitoring

It is proposed to monitor the dewatered volumes in the cut and cover tunnel and underground mine across the dry season to record the daily groundwater inflows to understand how groundwater affects the site. The dry season is a key period for recording groundwater data as rainfall doesn't occur frequently and the only movement of water would be from evaporation, pumped water to other storages or groundwater.

The following attributes/data should be captured to understand the groundwater interactions better:

- Pumped volumes from the underground mine to other storages/demands; and
- Pumped volumes into the underground mine for underground operational demands during operations.

The above attributes would increase the quality of the groundwater data across the mining period, which would provide a dataset to improve calibration of the water balance model.

6.4.6 Groundwater quality Trigger Action Response Plan

An indicative operational TARP for groundwater quality and levels has been developed to continually monitor the groundwater quality and determine the impact of operations on the receiving environment.

Table B.2 shows the recommended operational TARP for groundwater quality.

Specific TARP triggers and response actions for cumulative groundwater impacts have not been developed, as the primary potential cumulative impact identified by the groundwater assessment is groundwater drawdown. Should cumulative drawdown effects be observed, the response actions outlined in the groundwater level TARPs would remain applicable. In particular, continued monitoring of groundwater levels in the northern monitoring bores will be critical to verify whether drawdown associated with neighbouring mining operations is consistent with model predictions. Where monitoring indicates groundwater responses differ from those predicted by the groundwater model, further investigation may be required, including refinement of the conceptual model, model assumptions, and/or operational practices, to ensure potential impacts are appropriately managed and avoided where practicable.

6.5 SURFACE WATER AND GROUNDWATER QUALITY AND HYDROLOGIC RECORDING AND REPORTING

All results from surface water and groundwater monitoring are automatically uploaded into a management program, where the database contains all baseline and operational field and laboratory data.

Reporting requirements will align with those required for annual Environmental Mining Report and additional reporting required under WDL conditions.

6.6 WASTE DISCHARGE LICENCE

WDL monitoring will be undertaken in accordance with requirements of the proposed WDL.

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7 EMERGENCY AND CONTINGENCY PLANNING

7.1 OVERVIEW

The water management strategy has been developed for both normal operation periods and during extreme wet weather events in order to:

- Ensure mine affected water accumulation is appropriately managed to minimise the risk of uncontrolled discharge to the environment; and
- Manage and monitor ground and surface waters to ensure risk of environmental harm is minimised and social and environmental objectives are maintained.

The emergency response plan for site is managed in the sites Safety and Health Management System. A summary of the emergency response, should a failure of the water management system occur, is provided below.

7.2 CONTINGENCY ACTIONS

Contingency actions for a number of specific WMS-related trigger events are provided in Table 7.1.

Table 7.1 Surface water management contingency actions

Trigger	Action
Mechanical failure of pumping equipment prevents scheduled transfers	• Ensure adequate spares are available. Source temporary equipment if possible.
Damage to water storage infrastructure	• Regular visual inspections of infrastructure, especially following significant rainfall. • Annual geotechnical inspection.
Failure of water storage structures	• Notify downstream residents (if applicable) and NT EPA and DLPE of the failed structure. • Investigate the downstream impacts of the failure and complete a detailed report on the impacts of the failure, including an assessment of likely water volume and quality, and required remedial actions. • Investigate the reason for failure of the structure and ensure the stability of other water storages at risk. • Assess the effects of the failure on the WMS and implement mitigation measures

Forecasts of significant rainfall / storm event or water storages nearing capacity.	• Pump water from any storage at risk of unlicensed or uncontrolled discharges.
	• If groundwater inflows are significant, investigate alternative measures to dewater additional water on site. Measures may include:
	  ○ Assess whether groundwater extracted from the mine is suitable for use in surface dust control;
	  ○ Additional mine water storages;
	  ○ Evaporation fans;
	  ○ Dewatering through irrigation fields;
	  ○ Water quality treatment to achieve acceptable water quality for dilution to discharge into the Charlotte River.

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Trigger	Action
Exceedances in groundwater inflows into the underground works/cut and cover tunnel	• Increase the pumping infrastructure to MWDs. • Dewater mine-affected water through controlled releases (under the WDL). • If the above measures are not possible, there may be temporary flooding of the underground mining works to prevent uncontrolled releases into the environment.
Water demands or catchment yield depart from assumed values used in modelling	• Investigate reasons. • Revisit site water balance modelling if required.
Water quality in sediment basin(s) indicates mine-affected water.	• Investigate potential sources of contaminants in the catchment (e.g., topsoil stockpile, haul roads, etc.) that are contributing to poor water quality. • Investigate options to divert runoff from the source of poor water quality to a mine water storage if required. • Investigate the option of converting the sediment basin into a mine-affected water storage (and prevent uncontrolled spills into the environment) if the sources cannot be diverted or remediated. • Investigate the option of constructing an additional mine water storage and drains to capture runoff from the contaminated area.
Routine monitoring indicates siltation is causing loss of water storage capacity in water management dams (including Raw Water Dams, Mine Water Dams and Sediment Dams)	• Undertake desilting operation to reinstate design storage volume.
Water monitoring indicates an exceedance of the Mine Affected Water Release Limits required to ensure mine water is adequately diluted to meet SSTVs at the downstream compliance point (SW5) per the proposed WDL.	• Cease any discharges which may be causing non-compliance. • Contain any contaminated water where possible to prevent environmental harm. • Continue to monitor water quality in the area of interest. • Undertake an investigation to ascertain the cause of the non-compliance. • Report the non-compliance to the Administrating Agency and other relevant parties.
Receiving water quality monitoring indicates exceedance of Receiving Waters Contaminant Trigger Levels	• Cease any controlled discharges which may be causing the non-compliance until further analysis is undertaken. • Undertake an investigation in accordance with the WDL.
Exceedances in groundwater bore water quality indicating an impact on groundwater bores.	• Undertake an investigation to ascertain the cause of the non-compliance. (from waste rock or underground works) • Report the non-compliance to the Administrating Agency and other relevant parties. • A risk-based approach consistent with the GARD Guide (INAP, 2014), will use the results of long-term kinetic testing to inform development of prevention and mitigation measures required in the detailed mine design to prevent metalliferous mine drainage.

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Trigger	Action
Community complaints received of impacts to stock and domestic water supply.	• Undertake an investigation in accordance with the WDL.
Uncontrolled discharge	• Monitor water quality and quantity of the discharge and assess the potential for environmental harm. • Contain any contaminated water where possible to prevent environmental harm. • Investigate the use of the discharge and modify the water management system where necessary to prevent future uncontrolled discharges. • Report the non-compliance to the Administering Agency and other relevant parties.
Riparian vegetation monitoring – Change in covered riparian vegetation exceedances	• Undertake a riparian vegetation assessment and prepare a management response based on the findings. • Report on the outcomes of the actions undertaken to the regulator.
GDE Management	• Undertake works in accordance with the GDE Monitoring Plan (EcOz, 2026b).

7.3 OTHER RELEVANT CONTINGENCY ACTIONS

7.3.1 No offsite discharge – mine affected water

During significant rainfall events, discharge from MWD1 to the receiving waters would only occur if the water quality met the applicable release criteria and the discharge complies with the WDL conditions. MWD1 is a mine water dam and is driven by both catchment runoff from mine-affected water areas (such as the waste rock dump, workshop pad, crushing and ore stockpile areas) and the groundwater inflows from underground operations. It is likely that groundwater inflows into MWD1 will control the frequency and rate at which water will be able to be discharged into the receiving waters in compliance the WDL conditions. In the event where water quality within the release dams exceeds the release criteria for the observed flow event, no releases will be made to the downstream waterways.

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8 REPORTING AND REVIEW

8.1 REVIEW OF THE WMP

The water management plan will be updated/revised in accordance with the conditions of the Environmental Assessment approval and if there are any material changes to the operation of the water management system.

Some monitoring bores may be located within, or adjacent to, future mining and infrastructure development areas and may therefore be at risk of damage, loss of access, or decommissioning as the project progresses. To ensure the monitoring objectives of this Plan continue to be achieved, the groundwater monitoring network will be periodically reviewed against the latest mine layout, development schedule and available hydrogeological information.

Where a monitoring bore is damaged, destroyed, decommissioned, or becomes inaccessible for sampling, a replacement bore should be installed in a suitable location to maintain monitoring coverage and continuity of the groundwater monitoring program. Replacement bores should, where practicable, target the same hydrogeological unit and fulfil the same monitoring objectives as the original bore.

8.2 ROLES AND RESPONSIBILITIES

Table 8.1 shows responsibilities for implementation of various aspects of the WMP.

Table 8.1 Roles and responsibilities

Role	Responsibility/Accountability

HSE Manager	• Ensure a site WMP is prepared, implemented and maintained.
	• Ensure water management projects are planned and budgeted for.
	• Ensure adequate storage is available to enable ongoing production through wet and dry climatic conditions.
	• Manage implementation of water management improvement projects.
	• Ensure that water is managed in accordance with the WMP.
	• Design, budget for and arrange the construction of sediment, erosion control and mine water drains/dams.
	• Communicate the WMP to the Project Management team and other relevant stakeholders.
	• Ensure the Plan of Operations addresses water management. Specifically plan to ensure that:
	  ○ Adequate storage is available to enable ongoing production through wet and dry climatic conditions;
	  ○ Contingencies are in place for climatic extremes;
	  ○ Interaction with waste disposal strategies is understood;
	  ○ Closure planning is incorporated.
	• Ensure that planned infrastructure is in compliance with the WMP.
	• Ensure planned maintenance schedules are implemented to maximise the availability of fixed and mobile pumps in the mining area.
	• Ensure all water pipelines and control structures in the maintenance area are regularly inspected, maintained and promptly repaired.
	• Communicate the WMP to operational teams

Environmental	• Ensure that water is managed in compliance with the Water Management Plan.

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Role	Responsibility/Accountability

Superintendent	• Ensure all water pipelines and control structures are regularly inspected, maintained and promptly repaired. Specifically:
	  ○ Prevent spills, leaks and unlicensed discharges;
	  ○ Maintain adequate dewatering capability for high rainfall events;
	  ○ Ensure systems to protect against sudden inrushes of water are fully operational at all times;
	  ○ Maintain storage capacity in runoff capture dams;
	  ○ Ensure efficient recycling and preferential use of mine water.
	  ○ Ensure water supply meets supply demands.
	• Ensure all storages are maintained and operated in accordance with the WDL.
	• Ensure contingency plans for climatic extremes are adhered to.

Environmental Advisor	• Preparation, implementation & maintenance of the site Water Management Plan. • Advise the Environmental Superintendent on water management control & planning requirements. • Prepare site water balances to define water use, storage & discharges; and to monitor and forecast site water management needs. • Arrange the inspection & maintenance of clean, sediment, erosion control & mine water drains & dams. • Treat sediment basins and mine water dams with water quality treatment measures, if required. • Communicate requirements for incident reporting to Project team. • Advise the Environmental Superintendent on water metering requirements. • Design, implement and maintain the water monitoring program. • Report on and communicate performance against water plans and targets. • Audit record report.
Environmental Officer / Technician	• Calibration of water monitoring instrumentation. • Surface and ground water quality field readings, sampling and data entry. • Inform the Environmental Advisor on water quality samples. • Communicate water quality outcomes to Environment Adviser.

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9 INFORMATION/KNOWLEDGE GAPS

9.1 GAPS IN INFORMATION

This WMP has been prepared based on the mine site design and operational assumptions, consistent with the current stage of mine planning. Throughout the document, information and knowledge gaps have been identified that required further work to inform the development of risk management strategies. Information and knowledge gaps and actions proposed to address these are summarised in Table 9.1.

Table 9.1 Information/knowledge gaps, how and when they will be addressed

Information/knowledge gap	Work required	Timing
Toxicant (metal) concentrations in seepage from temporary WRDs	• Incorporate contaminants of concerns and monitoring locations into surface water monitoring program. • Review Kinetic Column Leach (KCL) testing results and update water quality predictions, where required.	• Prior to commencement of mining operations. • Following completion of KCL testing.
Groundwater inflows	• Monitor groundwater dewatering from cut and cover tunnel and underground mine to determine if it's required to increase site storage volumes or investigate other disposal options such as evaporation fans.	• During the first year of operation, or Year 2
Potential water quality impacts from dewatering, ASS and mine infrastructure	• Implement integrated surface water and shallow groundwater monitoring. Where the monitoring indicates a plausible drawdown and exposure pathway, undertake an acid sulfate soil investigation and prepare a management response based on the findings.	• Commence prior to operations and continue during operations
Water quality model uncertainty	• Refine and validate the WQ model using operational monitoring data and additional targeted monitoring locations where required.	• First 12-18 months of operation
Forecast v actual water use	• Install automated flow gauges to record water use across the mine site	• Progressively to improve model forecasts over the operational mine life.

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	for mining operations and dust suppression.	
	• Review forecast versus actual water use.	• End of each year of operations as part of annual reporting.
	• Establish water use targets and actions.	• During the first year of operation, or Year 2and reviewed annually.

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9.2 WATER MANAGEMENT SYSTEM – OPTIONS UNDER CONSIDERATION

Section 4 and Section 5 provides details of water management strategies and forecast surplus water volumes. Water will be pumped to the MWD storages and used as a water supply for the mine operations, which will minimise the need to source water externally and will account for most of the site water inflows. Table 9.2 lists potential options to manage water on site and provides details of the further work required to inform detailed design of the site water management system.

The management strategies in Table 9.2 are based on the assumption that groundwater inflows exceed the predicted amount and require management strategies to reduce the risk of uncontrolled spills and impacts to the environment.

Table 9.2 Management of surplus water strategies

Water management system options	Information considered	Uncertainties/information gaps
Discharge strategy from MWD1	• Controlled releases from MWD1 into the environment has been assumed to be active during a flow event in the Charlotte River and will be based on the WDL. • Storages have been conservatively sized based on a flow event from catchment runoff in the Charlotte River.	• It may be possible that releases into the Charlotte River tidal zone, in addition to catchment runoff. • A mixing zone assessment should be investigated as an option to determine if releasing mine-affected water at certain times of the tide cycle is feasible.
Controlled discharge of water from MWD1	• Controlled releases from MWD1 into the environment (discharging to the Charlotte River). • Dilution ratios will be tied with the trigger values listed in the WDL once applied. • If it is not possible to dilute, treatment options can be applied.	• If dilution ratio cannot be achieved in stream, investigate treatment options of water, to discharge water. This will include additional bench test of water quality treatment measures to confirm dosage rates and treated wastewater quality (ie. Achievable reduction in phosphorus and arsenic concentrations).
Additional internal water storage capacity	• If groundwater inflows exceed predicted amount it, it may be required to increase site storages.	• Investigate if increases of internal water storages is possible in the current footprint. • Regulatory approvals required (DLPE / NT EPA)

Water quality treatment	• If water quality on site exceeds the SSTVs, it may be required to treat the water by:
	  ○ Reverse Osmosis plant;
	  ○ Resin filtration;
	  ○ Flocculating/Coagulating agents.
	• After treatment, controlled discharge into the environment or prioritise usage for site demands.
		• Investigate contaminants of potential concern and select appropriate water treatment process.
		• Investigate other methodologies of removing specific contaminants (ie. Phoslock for phosphorus, UV or chlorine disinfection for bacteria, carbon filters for iron).

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APPENDIX A WATER QUALITY RESULTS

Table A.1 Site baseline surface water quality (SW1)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		13	5.87	6.04	6.41
Temperature	°C	13	28.02	29.34	29.89
Electrical Conductivity	µS/cm	13	30.08	46.0	260.5
Total Dissolved Solids	mg/L	13	18.8	29.9	159
Salinity	ppt	13	0.01	0.02	0.124
Dissolved Oxygen	%	13	61.56	80.5	90.54
Oxidation-Reduction Potential	mV	12	165.1	206.5	222.2
Turbidity	NTU	13	3.524	5	8.262
Total Suspended Solids	mg/L	9	2.5	2.5	8.2
Nutrients					
Ammonia	mg/L	13	0.011	0.04	0.188
Nitrite	mg/L	13	0.005	0.005	0.005
Nitrate	mg/L	13	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	13	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	13	0.1	0.2	0.36
Total Nitrogen	mg/L	13	0.1	0.2	0.36
Total Phosphorus	mg/L	13	0.005	0.005	0.048
Reactive Phosphorus	mg/L	13	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	11	0.5	0.5	1
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	13	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	13	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	13	4.4	7	10
Total Alkalinity as CaC03	mg/L	13	4.4	7	10
Sulfate as S04	mg/L	13	0.5	0.5	2
Chloride	mg/L	13	3	4	4
Calcium	mg/L	13	0.5	0.5	0.5
Magnesium	mg/L	13	0.5	0.5	0.8
Sodium	mg/L	13	3	4	4
Potassium	mg/L	13	0.5	0.5	0.5

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Anions	mg/L	13	0.194	0.23	0.34
Total Cations	mg/L	13	0.13	0.17	0.244
Total Hardness	mg/L	9	0.5	0.5	9.2
Dissolved metals					
Aluminium Al	mg/L	13	0.005	0.005	0.02
Antimony Sb	mg/L	1	0.0005	0.0005	0.0005
Arsenic As	mg/L	13	0.0005	0.001	0.001
Beryllium Be	mg/L	12	0.0005	0.0005	0.0005
Barium Ba	mg/L	12	0.0142	0.0175	0.02
Bismuth Bi	mg/L	1	0.0005	0.0005	0.0005
Cadmium Cd	mg/L	13	0.00005	0.00005	0.00005
Caesium	mg/L	2	0.0005	0.0005	0.0005
Chromium	mg/L	13	0.0005	0.0005	0.0005
Cobalt Co	mg/L	12	0.0005	0.0005	0.001
Copper Cu	mg/L	13	0.0005	0.0005	0.0005
Lead Pb	mg/L	13	0.0005	0.0005	0.0005
Lithium Li	mg/L	13	0.0034	0.005	0.0066
Manganese Mn	mg/L	11	0.016	0.031	0.075
Molybdenum Mo	mg/L	1	0.0005	0.0005	0.0005
Nickel Ni	mg/L	13	0.0005	0.0005	0.0005
Rubidium Rb	mg/L	1	0.002	0.002	0.002
Selenium Se (Total)	mg/L	12	0.005	0.005	0.005
Silver Ag	mg/L	2	0.0005	0.0005	0.0005
Strontium	mg/L	2	0.003	0.003	0.003
Thorium	mg/L	2	0.0005	0.0005	0.0005
Tin	mg/L	2	0.0005	0.0005	0.0005
Titanium	mg/L	1	0.005	0.005	0.005
Uranium U	mg/L	2	0.0005	0.0005	0.0005
Vanadium V	mg/L	12	0.005	0.005	0.005
Zinc Zn	mg/L	13	0.0025	0.0025	0.0046
Boron	mg/L	12	0.025	0.025	0.025
Iron Fe	mg/L	13	0.078	0.14	0.212
Mercury	mg/L	13	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	13	10	10	10

Parameter	Units	No. of data points	20%ile	Median	80%ile
C10 - C14 Fraction	µg/L	13	25	25	25
C15 - C28 Fraction	µg/L	13	50	50	50
C29 - C36 Fraction	µg/L	13	25	25	25
C10 - C36 Fraction (sum)	µg/L	13	25	25	25
C6 - C10 Fraction	mg/L	13	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	13	10	10	10
>C10 - C16 Fraction	mg/L	13	50	50	50
>C16 - C34 Fraction	mg/L	13	50	50	50
>C34 - C40 Fraction	mg/L	13	50	50	50
>C10 - C40 Fraction (sum)	mg/L	13	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	13	50	50	50
Benzene	µg/L	13	0.5	0.5	0.5
Toluene	µg/L	13	1	1	1
Ethylbenzene	µg/L	13	1	1	1
meta-Xylene	µg/L	13	1	1	1
para-Xylene	µg/L	13	1	1	1
ortho-Xylene	µg/L	13	1	1	1
Total Xylenes	µg/L	13	1	1	1
Sum of BTEX	µg/L	13	0.5	0.5	0.5
Naphthalene	µg/L	13	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	13	98.34	104	109.2
Toluene-D8	%	13	93.4	99.8	104.4
4-Bromofluorobenzene	%	13	99.56	108	119.6

Table A.2 Site baseline surface water quality (SW2)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		23	5.952	6.5	7.038
Temperature	°C	23	25.44	28.6	29.54
Electrical Conductivity	µS/cm	23	55.94	686	18180.8
Total Dissolved Solids	mg/L	23	36.34	446	11820.4
Salinity	ppt	23	0.03	0.33	10.808
Dissolved Oxygen	%	23	54.56	75	85.34
Oxidation-Reduction Potential	mV	22	143.62	187.05	220.18
Turbidity	NTU	23	2.036	4.27	5.134
Total Suspended Solids	mg/L	18	2.5	2.5	7.6
Nutrients					
Ammonia	mg/L	23	0.007	0.06	0.202
Nitrite	mg/L	23	0.005	0.005	0.005
Nitrate	mg/L	23	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	23	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	23	0.2	0.25	0.4
Total Nitrogen	mg/L	23	0.2	0.3	0.4
Total Phosphorus	mg/L	23	0.005	0.01	0.04
Reactive Phosphorus	mg/L	23	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	20	0.5	0.5	2
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	23	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	23	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	23	6	9	54.4
Total Alkalinity as CaC03	mg/L	23	6	9	54.4
Sulfate as S04	mg/L	23	0.7	5	1120
Chloride	mg/L	23	15.6	46	7528
Calcium	mg/L	23	0.5	2	166
Magnesium	mg/L	23	1	4	485
Sodium	mg/L	23	8.8	29	3664
Potassium	mg/L	23	0.5	1	135.8
Total Anions	mg/L	23	0.626	1.58	236.64
Total Cations	mg/L	23	0.482	1.72	211

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	17	4.8	49	4956
Dissolved metals					
Aluminium Al	mg/L	22	0.005	0.015	0.05
Antimony Sb	mg/L	1	0.0005	0.0005	0.0005
Arsenic As	mg/L	23	0.0005	0.0005	0.0038
Beryllium Be	mg/L	22	0.0005	0.0005	0.0041
Barium Ba	mg/L	22	0.016	0.025	0.0328
Bismuth Bi	mg/L	1	0.0005	0.0005	0.0005
Cadmium Cd	mg/L	23	0.00005	0.00005	0.00032
Caesium	mg/L	3	0.0005	0.0005	0.0005
Chromium	mg/L	23	0.0005	0.0005	0.0032
Cobalt Co	mg/L	22	0.0005	0.0005	0.0042
Copper Cu	mg/L	23	0.0005	0.0005	0.0046
Lead Pb	mg/L	23	0.0005	0.0005	0.0032
Lithium Li	mg/L	22	0.003	0.0045	0.07
Manganese Mn	mg/L	20	0.0134	0.0285	0.0588
Molybdenum Mo	mg/L	1	0.0005	0.0005	0.0005
Nickel Ni	mg/L	23	0.0005	0.0005	0.0034
Rubidium Rb	mg/L	1	0.002	0.002	0.002
Selenium Se (Total)	mg/L	22	0.005	0.005	0.017
Silver Ag	mg/L	3	0.0005	0.0005	0.0005
Strontium	mg/L	3	0.0074	0.011	0.017
Thorium	mg/L	3	0.0005	0.0005	0.0005
Tin	mg/L	3	0.0005	0.0005	0.0005
Titanium	mg/L	2	0.005	0.005	0.005
Uranium U	mg/L	3	0.0005	0.0005	0.0005
Vanadium V	mg/L	22	0.005	0.005	0.041
Zinc Zn	mg/L	23	0.0025	0.0025	0.0186
Boron	mg/L	22	0.025	0.025	1.606
Iron Fe	mg/L	22	0.062	0.135	0.418
Mercury	mg/L	23	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	23	10	10	10
C10 - C14 Fraction	µg/L	23	25	25	25
C15 - C28 Fraction	µg/L	23	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	23	25	25	25
C10 - C36 Fraction (sum)	µg/L	23	25	25	25
C6 - C10 Fraction	mg/L	23	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	23	10	10	10
>C10 - C16 Fraction	mg/L	23	50	50	50
>C16 - C34 Fraction	mg/L	23	50	50	50
>C34 - C40 Fraction	mg/L	23	50	50	50
>C10 - C40 Fraction (sum)	mg/L	23	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	23	50	50	50
Benzene	µg/L	23	0.5	0.5	0.5
Toluene	µg/L	23	1	1	1
Ethylbenzene	µg/L	23	1	1	1
meta-Xylene	µg/L	23	1	1	1
para-Xylene	µg/L	22	1	1	1
ortho-Xylene	µg/L	23	1	1	1
Total Xylenes	µg/L	23	1	1	1
Sum of BTEX	µg/L	23	0.5	0.5	0.5
Naphthalene	µg/L	23	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	23	97.46	108	115.6
Toluene-D8	%	23	91.78	101	109
4-Bromofluorobenzene	%	23	95.92	105	114.6

Table A.3 Site baseline surface water quality (SW3)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		31	6.15	6.78	7.19
Temperature	°C	31	26.6	29	30.9
Electrical Conductivity	µS/cm	31	56.6	9512	44010
Total Dissolved Solids	mg/L	31	37	6181.5	26760
Salinity	ppt	31	0.02	5.29	28.43
Dissolved Oxygen	%	31	63.3	86.9	92.7
Oxidation-Reduction Potential	mV	30	162.6	209	240.46
Turbidity	NTU	31	3.21	5.54	10.98
Total Suspended Solids	mg/L	26	2.5	8	28
Nutrients					
Ammonia	mg/L	31	0.02	0.09	0.19
Nitrite	mg/L	31	0.005	0.005	0.005
Nitrate	mg/L	31	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	31	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	31	0.2	0.4	0.5
Total Nitrogen	mg/L	31	0.2	0.4	0.5
Total Phosphorus	mg/L	31	0.005	0.03	0.05
Reactive Phosphorus	mg/L	31	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	28	0.5	0.5	3.6
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	31	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	31	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	31	6	26	107
Total Alkalinity as CaC03	mg/L	31	6	26	107
Sulfate as S04	mg/L	31	4	366	2380
Chloride	mg/L	31	31	2510	15600
Calcium	mg/L	31	0.5	56	402
Magnesium	mg/L	31	2	170	1140
Sodium	mg/L	31	17	1410	9500
Potassium	mg/L	31	0.5	48	345
Total Anions	mg/L	31	1.04	78.9	489
Total Cations	mg/L	31	0.9	79.4	537

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	26	4.82	2009	5820
Dissolved metals					
Aluminium Al	mg/L	30	0.005	0.04	0.05
Antimony Sb	mg/L	1	0.0005	0.0005	0.0005
Arsenic As	mg/L	31	0.0005	0.001	0.005
Beryllium Be	mg/L	30	0.0005	0.0005	0.005
Barium Ba	mg/L	30	0.0116	0.018	0.0222
Bismuth Bi	mg/L	1	0.0005	0.0005	0.0005
Cadmium Cd	mg/L	31	0.00005	0.00005	0.0005
Caesium	mg/L	3	0.0005	0.0005	0.0005
Chromium	mg/L	31	0.0005	0.0005	0.005
Cobalt Co	mg/L	30	0.0005	0.0005	0.005
Copper Cu	mg/L	31	0.0005	0.001	0.005
Lead Pb	mg/L	31	0.0005	0.0005	0.005
Lithium Li	mg/L	30	0.002	0.031	0.1466
Manganese Mn	mg/L	28	0.0078	0.039	0.0676
Molybdenum Mo	mg/L	1	0.0005	0.0005	0.0005
Nickel Ni	mg/L	31	0.0005	0.001	0.005
Rubidium Rb	mg/L	1	0.002	0.002	0.002
Selenium Se (Total)	mg/L	30	0.005	0.005	0.05
Silver Ag	mg/L	3	0.0005	0.0005	0.0005
Strontium	mg/L	3	0.0074	0.011	0.2312
Thorium	mg/L	3	0.0005	0.0005	0.0005
Tin	mg/L	3	0.0005	0.0005	0.0005
Titanium	mg/L	2	0.005	0.005	0.005
Uranium U	mg/L	3	0.0005	0.0005	0.0005
Vanadium V	mg/L	30	0.005	0.005	0.05
Zinc Zn	mg/L	31	0.0025	0.0025	0.025
Boron	mg/L	30	0.025	0.69	4.068
Iron Fe	mg/L	30	0.05	0.055	0.136
Mercury	mg/L	31	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	31	10	10	10
C10 - C14 Fraction	µg/L	31	25	25	25
C15 - C28 Fraction	µg/L	31	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	31	25	25	25
C10 - C36 Fraction (sum)	µg/L	31	25	25	25
C6 - C10 Fraction	mg/L	31	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	31	10	10	10
>C10 - C16 Fraction	mg/L	31	50	50	50
>C16 - C34 Fraction	mg/L	31	50	50	50
>C34 - C40 Fraction	mg/L	31	50	50	50
>C10 - C40 Fraction (sum)	mg/L	31	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	31	50	50	50
Benzene	µg/L	31	0.5	0.5	0.5
Toluene	µg/L	31	1	1	1
Ethylbenzene	µg/L	31	1	1	1
meta-Xylene	µg/L	31	1	1	1
para-Xylene	µg/L	30	1	1	1
ortho-Xylene	µg/L	31	1	1	1
Total Xylenes	µg/L	31	1	1	1
Sum of BTEX	µg/L	31	0.5	0.5	0.5
Naphthalene	µg/L	31	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	31	98.1	105	112
Toluene-D8	%	31	93.8	99.5	112
4-Bromofluorobenzene	%	31	94.2	109	122

Table A.4 Site baseline surface water quality (SW4)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		11	5.83	5.93	6.07
Temperature	°C	11	27.8	28.7	29.2
Electrical Conductivity	µS/cm	11	62	158.9	474
Total Dissolved Solids	mg/L	11	40	103	318.5
Salinity	ppt	11	0.03	0.07	0.24
Dissolved Oxygen	%	11	61.25	83.4	86.6
Oxidation-Reduction Potential	mV	10	161.42	221.8	241
Turbidity	NTU	11	1.21	2.69	5
Total Suspended Solids	mg/L	8	2.5	2.5	2.5
Nutrients					
Ammonia	mg/L	11	0.02	0.03	0.23
Nitrite	mg/L	11	0.005	0.005	0.005
Nitrate	mg/L	11	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	11	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	11	0.1	0.2	0.4
Total Nitrogen	mg/L	11	0.1	0.2	0.4
Total Phosphorus	mg/L	11	0.005	0.01	0.02
Reactive Phosphorus	mg/L	11	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	9	0.5	0.5	0.5
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	11	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	11	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	11	4	6	13
Total Alkalinity as CaC03	mg/L	11	4	6	13
Sulfate as S04	mg/L	11	2	4	7
Chloride	mg/L	11	12	31	51
Calcium	mg/L	11	0.5	0.5	1
Magnesium	mg/L	11	0.5	2	4
Sodium	mg/L	11	8	22	31
Potassium	mg/L	11	0.5	0.5	2
Total Anions	mg/L	11	0.56	1.06	1.66
Total Cations	mg/L	11	0.35	1.12	1.78

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	8	8	8	25.6
Dissolved metals					
Aluminium Al	mg/L	11	0.005	0.02	0.03
Antimony Sb	mg/L	0	-	-	-
Arsenic As	mg/L	11	0.0005	0.001	0.002
Beryllium Be	mg/L	10	0.0005	0.0005	0.0005
Barium Ba	mg/L	10	0.005	0.0075	0.009
Bismuth Bi	mg/L	0	-	-	-
Cadmium Cd	mg/L	11	0.00005	0.00005	0.00005
Caesium	mg/L	1	0.0005	0.0005	0.0005
Chromium	mg/L	11	0.0005	0.0005	0.0005
Cobalt Co	mg/L	10	0.0005	0.0005	0.0005
Copper Cu	mg/L	11	0.0005	0.0005	0.0005
Lead Pb	mg/L	11	0.0005	0.0005	0.0005
Lithium Li	mg/L	11	0.003	0.004	0.005
Manganese Mn	mg/L	9	0.005	0.007	0.0102
Molybdenum Mo	mg/L	0	-	-	-
Nickel Ni	mg/L	11	0.0005	0.0005	0.0005
Rubidium Rb	mg/L	0	-	-	-
Selenium Se (Total)	mg/L	10	0.005	0.005	0.005
Silver Ag	mg/L	1	0.0005	0.0005	0.0005
Strontium	mg/L	1	0.011	0.011	0.011
Thorium	mg/L	1	0.0005	0.0005	0.0005
Tin	mg/L	1	0.0005	0.0005	0.0005
Titanium	mg/L	1	0.005	0.005	0.005
Uranium U	mg/L	1	0.0005	0.0005	0.0005
Vanadium V	mg/L	10	0.005	0.005	0.005
Zinc Zn	mg/L	11	0.0025	0.0025	0.0025
Boron	mg/L	10	0.025	0.025	0.025
Iron Fe	mg/L	11	0.025	0.05	0.08
Mercury	mg/L	11	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	11	10	10	10
C10 - C14 Fraction	µg/L	11	25	25	25
C15 - C28 Fraction	µg/L	11	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	11	25	25	25
C10 - C36 Fraction (sum)	µg/L	11	25	25	25
C6 - C10 Fraction	mg/L	11	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	11	10	10	10
>C10 - C16 Fraction	mg/L	11	50	50	50
>C16 - C34 Fraction	mg/L	11	50	50	50
>C34 - C40 Fraction	mg/L	11	50	50	50
>C10 - C40 Fraction (sum)	mg/L	11	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	11	50	50	50
Benzene	µg/L	11	0.5	0.5	0.5
Toluene	µg/L	11	1	1	1
Ethylbenzene	µg/L	11	1	1	1
meta-Xylene	µg/L	11	1	1	1
para-Xylene	µg/L	11	1	1	1
ortho-Xylene	µg/L	11	1	1	1
Total Xylenes	µg/L	11	1	1	1
Sum of BTEX	µg/L	11	0.5	0.5	0.5
Naphthalene	µg/L	11	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	11	93.1	107	115
Toluene-D8	%	11	91.8	97.8	104
4-Bromofluorobenzene	%	11	95.4	109	123

Table A.5 Site baseline surface water quality (SW5)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		25	6.862	7.1	7.346
Temperature	°C	25	26.56	29.5	31.36
Electrical Conductivity	µS/cm	25	15502	40029	52115.2
Total Dissolved Solids	mg/L	25	10562.6	26046	32679.2
Salinity	ppt	25	11.242	25.48	34.01
Dissolved Oxygen	%	25	69.28	83.8	90.56
Oxidation-Reduction Potential	mV	24	214.74	232.85	284.58
Turbidity	NTU	25	1.714	5.19	8.716
Total Suspended Solids	mg/L	20	2.5	7	24.2
Nutrients					
Ammonia	mg/L	25	0.052	0.13	0.198
Nitrite	mg/L	25	0.005	0.005	0.005
Nitrate	mg/L	25	0.005	0.005	0.006
Nitrite + Nitrate (as NOx)	mg/L	25	0.005	0.005	0.006
Total Kjeldahl Nitrogen	mg/L	25	0.2	0.4	0.5
Total Nitrogen	mg/L	25	0.2	0.4	0.5
Total Phosphorus	mg/L	25	0.01	0.025	0.054
Reactive Phosphorus	mg/L	25	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	23	0.5	2	4.6
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	25	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	25	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	25	53.8	115	129.4
Total Alkalinity as CaC03	mg/L	25	53.8	115	129.4
Sulfate as S04	mg/L	25	868	2450	2880
Chloride	mg/L	25	6664	15100	19060
Calcium	mg/L	25	144.8	393	461.4
Magnesium	mg/L	25	435.8	1140	1330
Sodium	mg/L	25	3660	9370	10820
Potassium	mg/L	25	137.6	337	403.2
Total Anions	mg/L	25	207	479	602.4
Total Cations	mg/L	25	205.2	527	611.4

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	21	2210	6010	6570
Dissolved metals					
Aluminium Al	mg/L	25	0.005	0.05	0.05
Antimony Sb	mg/L	1	0.0005	0.0005	0.0005
Arsenic As	mg/L	25	0.0005	0.005	0.005
Beryllium Be	mg/L	24	0.0005	0.005	0.005
Barium Ba	mg/L	24	0.011	0.013	0.016
Bismuth Bi	mg/L	1	0.0005	0.0005	0.0005
Cadmium Cd	mg/L	25	0.00005	0.0005	0.0005
Caesium	mg/L	2	0.0005	0.0005	0.0005
Chromium	mg/L	25	0.0005	0.005	0.005
Cobalt Co	mg/L	24	0.0005	0.005	0.005
Copper Cu	mg/L	25	0.0009	0.005	0.005
Lead Pb	mg/L	25	0.0005	0.005	0.005
Lithium Li	mg/L	25	0.0524	0.139	0.164
Manganese Mn	mg/L	23	0.0164	0.026	0.0368
Molybdenum Mo	mg/L	1	0.003	0.003	0.003
Nickel Ni	mg/L	25	0.0005	0.005	0.005
Rubidium Rb	mg/L	1	0.038	0.038	0.038
Selenium Se (Total)	mg/L	25	0.005	0.05	0.05
Silver Ag	mg/L	2	0.0005	0.0005	0.0005
Strontium	mg/L	2	1.984	2.245	2.506
Thorium	mg/L	2	0.0005	0.0005	0.0005
Tin	mg/L	2	0.0005	0.0005	0.0005
Titanium	mg/L	1	0.005	0.005	0.005
Uranium U	mg/L	2	0.0006	0.00075	0.0009
Vanadium V	mg/L	24	0.005	0.05	0.05
Zinc Zn	mg/L	25	0.0025	0.025	0.025
Boron	mg/L	24	1.564	3.63	4.646
Iron Fe	mg/L	25	0.025	0.05	0.05
Mercury	mg/L	25	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	25	10	10	10
C10 - C14 Fraction	µg/L	25	25	25	25
C15 - C28 Fraction	µg/L	25	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	25	25	25	25
C10 - C36 Fraction (sum)	µg/L	25	25	25	25
C6 - C10 Fraction	mg/L	25	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	25	10	10	10
>C10 - C16 Fraction	mg/L	25	50	50	50
>C16 - C34 Fraction	mg/L	25	50	50	50
>C34 - C40 Fraction	mg/L	25	50	50	50
>C10 - C40 Fraction (sum)	mg/L	25	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	25	50	50	50
Benzene	µg/L	25	0.5	0.5	0.5
Toluene	µg/L	25	1	1	1
Ethylbenzene	µg/L	25	1	1	1
meta-Xylene	µg/L	25	1	1	1
para-Xylene	µg/L	25	1	1	1
ortho-Xylene	µg/L	25	1	1	1
Total Xylenes	µg/L	25	1	1	1
Sum of BTEX	µg/L	25	0.5	0.5	0.5
Naphthalene	µg/L	25	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	25	98.2	108	115.8
Toluene-D8	%	25	94.82	104	112.8
4-Bromofluorobenzene	%	25	93.8	110	115.6

Table A.6 Site baseline surface water quality (New 1)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		22	6.162	6.715	7.154
Temperature	°C	22	25.82	28.9	30.18
Electrical Conductivity	µS/cm	22	647.4	23837.5	55648
Total Dissolved Solids	mg/L	22	421	15496.5	36174.8
Salinity	ppt	22	0.316	14.33	36.772
Dissolved Oxygen	%	22	79.08	88.25	92.48
Oxidation-Reduction Potential	mV	22	185.96	224.56	257.48
Turbidity	NTU	22	3.514	5.48	7.604
Total Suspended Solids	mg/L	21	2.5	6	13
Nutrients					
Ammonia	mg/L	22	0.03	0.06	0.158
Nitrite	mg/L	22	0.005	0.005	0.005
Nitrate	mg/L	22	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	22	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	22	0.2	0.3	0.5
Total Nitrogen	mg/L	22	0.2	0.3	0.5
Total Phosphorus	mg/L	22	0.006	0.03	0.056
Reactive Phosphorus	mg/L	22	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	22	0.5	0.5	3
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	22	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	22	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	22	7.2	50	117.4
Total Alkalinity as CaC03	mg/L	22	7.2	50	117.4
Sulfate as S04	mg/L	22	8.4	981.5	2796
Chloride	mg/L	22	61.4	7105	17240
Calcium	mg/L	22	1.2	166.5	410.8
Magnesium	mg/L	22	3.4	457	1276
Sodium	mg/L	22	37.8	3815	10318
Potassium	mg/L	22	2	134.5	390
Total Anions	mg/L	22	1.934	222	547.2
Total Cations	mg/L	22	1.998	215	586.6

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	20	13.6	1415	6504
Dissolved metals					
Aluminium Al	mg/L	22	0.006	0.045	0.05
Antimony Sb	mg/L	0	-	-	-
Arsenic As	mg/L	22	0.0005	0.001	0.005
Beryllium Be	mg/L	22	0.0005	0.0005	0.005
Barium Ba	mg/L	22	0.0122	0.0175	0.0218
Bismuth Bi	mg/L	0	-	-	-
Cadmium Cd	mg/L	22	0.00005	0.00005	0.0005
Caesium	mg/L	0	-	-	-
Chromium	mg/L	22	0.0005	0.0005	0.005
Cobalt Co	mg/L	22	0.0005	0.00075	0.005
Copper Cu	mg/L	22	0.0005	0.004	0.005
Lead Pb	mg/L	22	0.0005	0.0005	0.005
Lithium Li	mg/L	22	0.0032	0.058	0.1624
Manganese Mn	mg/L	22	0.0086	0.0355	0.0556
Molybdenum Mo	mg/L	0	-	-	-
Nickel Ni	mg/L	22	0.0005	0.003	0.005
Rubidium Rb	mg/L	0	-	-	-
Selenium Se (Total)	mg/L	22	0.005	0.005	0.05
Silver Ag	mg/L	0	-	-	-
Strontium	mg/L	0	-	-	-
Thorium	mg/L	0	-	-	-
Tin	mg/L	0	-	-	-
Titanium	mg/L	0	-	-	-
Uranium U	mg/L	0	-	-	-
Vanadium V	mg/L	22	0.005	0.005	0.05
Zinc Zn	mg/L	22	0.0025	0.006	0.025
Boron	mg/L	22	0.025	1.595	4.62
Iron Fe	mg/L	22	0.05	0.05	0.088
Mercury	mg/L	22	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	22	10	10	10
C10 - C14 Fraction	µg/L	22	25	25	25
C15 - C28 Fraction	µg/L	22	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	22	25	25	25
C10 - C36 Fraction (sum)	µg/L	22	25	25	25
C6 - C10 Fraction	mg/L	22	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	22	10	10	10
>C10 - C16 Fraction	mg/L	22	50	50	50
>C16 - C34 Fraction	mg/L	22	50	50	50
>C34 - C40 Fraction	mg/L	22	50	50	50
>C10 - C40 Fraction (sum)	mg/L	22	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	22	50	50	50
Benzene	µg/L	22	0.5	0.5	0.5
Toluene	µg/L	22	1	1	1
Ethylbenzene	µg/L	22	1	1	1
meta-Xylene	µg/L	22	1	1	1
para-Xylene	µg/L	22	1	1	1
ortho-Xylene	µg/L	22	1	1	1
Total Xylenes	µg/L	22	1	1	1
Sum of BTEX	µg/L	22	0.5	0.5	0.5
Naphthalene	µg/L	22	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	22	102.4	109.5	118.8
Toluene-D8	%	22	94.84	107.5	115.8
4-Bromofluorobenzene	%	22	101	112.5	122.6

Table A.7 Site baseline surface water quality (New 2)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		17	6.074	6.3	6.7
Temperature	°C	17	23.48	27.7	28.98
Electrical Conductivity	µS/cm	17	27.84	56.7	868.84
Total Dissolved Solids	mg/L	17	18.32	37	564.6
Salinity	ppt	17	0.01	0.03	0.42
Dissolved Oxygen	%	17	62.26	74.2	81.88
Oxidation-Reduction Potential	mV	17	166.44	195.9	232.66
Turbidity	NTU	17	3.216	5.1	10.022
Total Suspended Solids	mg/L	16	2.5	2.5	5
Nutrients					
Ammonia	mg/L	17	0.01	0.07	0.108
Nitrite	mg/L	17	0.005	0.005	0.005
Nitrate	mg/L	17	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	17	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	17	0.2	0.3	0.5
Total Nitrogen	mg/L	17	0.2	0.3	0.5
Total Phosphorus	mg/L	17	0.005	0.01	0.05
Reactive Phosphorus	mg/L	17	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	17	0.5	0.5	1.8
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	17	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	17	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	17	4.2	8	13.2
Total Alkalinity as CaC03	mg/L	17	4.2	8	13.2
Sulfate as S04	mg/L	17	0.5	0.5	5.2
Chloride	mg/L	17	4	7	55.2
Calcium	mg/L	17	0.5	0.5	1.8
Magnesium	mg/L	17	0.5	1	4.4
Sodium	mg/L	17	3	5	29.6
Potassium	mg/L	17	0.5	0.5	1.7
Total Anions	mg/L	17	0.19	0.34	1.816
Total Cations	mg/L	17	0.13	0.22	1.77

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	16	0.5	2.25	26
Dissolved metals					
Aluminium Al	mg/L	17	0.005	0.02	0.05
Antimony Sb	mg/L	0	-	-	-
Arsenic As	mg/L	17	0.0005	0.002	0.0038
Beryllium Be	mg/L	17	0.0005	0.0005	0.0005
Barium Ba	mg/L	17	0.0114	0.022	0.0348
Bismuth Bi	mg/L	0	-	-	-
Cadmium Cd	mg/L	17	0.00005	0.00005	0.00005
Caesium	mg/L	0	-	-	-
Chromium	mg/L	17	0.0005	0.0005	0.0005
Cobalt Co	mg/L	17	0.0005	0.0005	0.0017
Copper Cu	mg/L	17	0.0005	0.0005	0.0025
Lead Pb	mg/L	17	0.0005	0.0005	0.0005
Lithium Li	mg/L	17	0.002	0.003	0.0048
Manganese Mn	mg/L	17	0.0078	0.028	0.0666
Molybdenum Mo	mg/L	0	-	-	-
Nickel Ni	mg/L	17	0.0005	0.0005	0.001
Rubidium Rb	mg/L	0	-	-	-
Selenium Se (Total)	mg/L	17	0.005	0.005	0.005
Silver Ag	mg/L	0	-	-	-
Strontium	mg/L	0	-	-	-
Thorium	mg/L	0	-	-	-
Tin	mg/L	0	-	-	-
Titanium	mg/L	0	-	-	-
Uranium U	mg/L	0	-	-	-
Vanadium V	mg/L	17	0.005	0.005	0.005
Zinc Zn	mg/L	17	0.0025	0.0025	0.0068
Boron	mg/L	17	0.025	0.025	0.068
Iron Fe	mg/L	17	0.136	0.21	0.362
Mercury	mg/L	17	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	17	10	10	10
C10 - C14 Fraction	µg/L	17	25	25	25
C15 - C28 Fraction	µg/L	17	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	17	25	25	25
C10 - C36 Fraction (sum)	µg/L	17	25	25	25
C6 - C10 Fraction	mg/L	17	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	17	10	10	10
>C10 - C16 Fraction	mg/L	17	50	50	50
>C16 - C34 Fraction	mg/L	17	50	50	50
>C34 - C40 Fraction	mg/L	17	50	50	50
>C10 - C40 Fraction (sum)	mg/L	17	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	17	50	50	50
Benzene	µg/L	17	0.5	0.5	0.5
Toluene	µg/L	17	1	1	1
Ethylbenzene	µg/L	17	1	1	1
meta-Xylene	µg/L	17	1	1	1
para-Xylene	µg/L	16	1	1	1
ortho-Xylene	µg/L	17	1	1	1
Total Xylenes	µg/L	17	1	1	1
Sum of BTEX	µg/L	17	0.5	0.5	0.5
Naphthalene	µg/L	17	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	17	101.4	107	115.8
Toluene-D8	%	17	92.58	102	115.6
4-Bromofluorobenzene	%	17	100.04	107	119

Table A.8 Site baseline surface water quality (New Upstream)

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		26	6.06	6.85	7.8
Temperature	°C	26	24.6	27.65	29.1
Electrical Conductivity	µS/cm	26	40.5	104.1	521
Total Dissolved Solids	mg/L	26	26.65	68	339
Salinity	ppt	26	0.02	0.07	0.22
Dissolved Oxygen	%	26	58.7	73.8	82.5
Oxidation-Reduction Potential	mV	26	115.3	186.05	233.1
Turbidity	NTU	26	2.19	5.06	11.3
Total Suspended Solids	mg/L	25	2.5	2.5	7.2
Nutrients					
Ammonia	mg/L	26	0.01	0.04	0.08
Nitrite	mg/L	26	0.005	0.005	0.005
Nitrate	mg/L	26	0.005	0.005	0.005
Nitrite + Nitrate (as NOx)	mg/L	26	0.005	0.005	0.005
Total Kjeldahl Nitrogen	mg/L	26	0.2	0.3	0.4
Total Nitrogen	mg/L	26	0.2	0.35	0.4
Total Phosphorus	mg/L	26	0.005	0.02	0.05
Reactive Phosphorus	mg/L	26	0.005	0.005	0.005
Chlorophyll a	mg/m3= µg/L	26	0.5	0.75	3
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	26	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	26	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	26	6	9	12
Total Alkalinity as CaC03	mg/L	26	6	9	12
Sulfate as S04	mg/L	26	0.5	0.5	0.5
Chloride	mg/L	26	4	5	7
Calcium	mg/L	26	0.5	0.5	1
Magnesium	mg/L	26	0.5	1	2
Sodium	mg/L	26	3	4.5	7
Potassium	mg/L	26	0.5	0.5	1
Total Anions	mg/L	26	0.23	0.34	0.4
Total Cations	mg/L	26	0.13	0.3	0.48

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	22	0.5	4	11
Dissolved metals					
Aluminium Al	mg/L	26	0.005	0.015	0.04
Antimony Sb	mg/L	0	-	-	-
Arsenic As	mg/L	26	0.0005	0.0005	0.001
Beryllium Be	mg/L	26	0.0005	0.0005	0.0005
Barium Ba	mg/L	26	0.012	0.0205	0.024
Bismuth Bi	mg/L	0	-	-	-
Cadmium Cd	mg/L	26	0.00005	0.00005	0.00005
Caesium	mg/L	0	-	-	-
Chromium	mg/L	26	0.0005	0.0005	0.0005
Cobalt Co	mg/L	26	0.0005	0.0005	0.001
Copper Cu	mg/L	26	0.0005	0.0005	0.001
Lead Pb	mg/L	26	0.0005	0.0005	0.0005
Lithium Li	mg/L	26	0.002	0.005	0.006
Manganese Mn	mg/L	26	0.01	0.035	0.08
Molybdenum Mo	mg/L	0	-	-	-
Nickel Ni	mg/L	26	0.0005	0.0005	0.001
Rubidium Rb	mg/L	0	-	-	-
Selenium Se (Total)	mg/L	26	0.005	0.005	0.005
Silver Ag	mg/L	0	-	-	-
Strontium	mg/L	0	-	-	-
Thorium	mg/L	0	-	-	-
Tin	mg/L	0	-	-	-
Titanium	mg/L	0	-	-	-
Uranium U	mg/L	0	-	-	-
Vanadium V	mg/L	26	0.005	0.005	0.005
Zinc Zn	mg/L	26	0.0025	0.0025	0.007
Boron	mg/L	26	0.025	0.025	0.08
Iron Fe	mg/L	26	0.11	0.245	0.33
Mercury	mg/L	26	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	26	10	10	10
C10 - C14 Fraction	µg/L	26	25	25	25
C15 - C28 Fraction	µg/L	26	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	26	25	25	25
C10 - C36 Fraction (sum)	µg/L	26	25	25	25
C6 - C10 Fraction	mg/L	26	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	26	10	10	10
>C10 - C16 Fraction	mg/L	26	50	50	50
>C16 - C34 Fraction	mg/L	26	50	50	50
>C34 - C40 Fraction	mg/L	26	50	50	50
>C10 - C40 Fraction (sum)	mg/L	26	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	26	50	50	50
Benzene	µg/L	26	0.5	0.5	0.5
Toluene	µg/L	26	1	1	1
Ethylbenzene	µg/L	26	1	1	1
meta-Xylene	µg/L	26	1	1	1
para-Xylene	µg/L	26	1	1	1
ortho-Xylene	µg/L	26	1	1	1
Total Xylenes	µg/L	26	1	1	1
Sum of BTEX	µg/L	26	0.5	0.5	0.5
Naphthalene	µg/L	26	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	26	92.5	104	109
Toluene-D8	%	26	91.9	100.45	112
4-Bromofluorobenzene	%	26	95.7	108	118

Table A.9 Site baseline groundwater quality

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		49	6.188	6.68	7.2
Temperature	°C	49	29.3	30.5	31.4
Oxidation-Reduction Potential	mV	49	-63.5	44	187.1
Electrical Conductivity	µS/cm	49	137.54	226.6	402.38
Total Dissolved Solids	mg/L	49	89.42	146	261.4
Salinity	ppt	49	0.06	0.11	0.188
Dissolved Oxygen	%	49	4.04	11.3	26
Turbidity	NTU	49	1.932	10.48	114.52
Total Suspended Solids	mg/L	12	124.2	172	214
Nutrients					
Ammonia	mg/L	-	-	-	-
Nitrite	mg/L	3	0.005	0.005	0.02
Nitrate	mg/L	-	-	-	-
Nitrite + Nitrate (as NOx)	mg/L	49	0.005	0.01	0.04
Total Kjeldahl Nitrogen	mg/L	52	0.1	0.3	0.58
Total Nitrogen	mg/L	52	0.1	0.3	0.58
Total Phosphorus	mg/L	52	0.172	0.25	0.458
Reactive Phosphorus	mg/L	52	0.102	0.195	0.366
Chlorophyll a	mg/m3= µg/L	-	-	-	-
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	52	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	52	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	52	60.2	93.5	125.6
Total Alkalinity as CaC03	mg/L	52	61	94.5	132.2
Sulfate as S04	mg/L	52	0.5	0.5	1.8
Chloride	mg/L	52	4	5	8.8
Calcium	mg/L	52	6	12	16.8
Magnesium	mg/L	52	2	4	5
Sodium	mg/L	52	12	17.5	35.8
Potassium	mg/L	52	4	5	13.4
Total Anions	mg/L	52	1.362	2.055	2.846
Total Cations	mg/L	52	1.364	2.1	2.706

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Hardness	mg/L	3	24	45	51.6
Dissolved metals					
Aluminium Al	mg/L	52	0.005	0.005	0.005
Antimony Sb	mg/L	-	-	-	-
Arsenic As	mg/L	52	0.012	0.0305	0.1146
Beryllium Be	mg/L	52	0.0005	0.0005	0.0005
Barium Ba	mg/L	52	0.0322	0.0465	0.0668
Bismuth Bi	mg/L	-	-	-	-
Cadmium Cd	mg/L	52	0.00005	0.00005	0.00005
Caesium	mg/L	-	-	-	-
Chromium	mg/L	52	0.0005	0.0005	0.0005
Cobalt Co	mg/L	52	0.0005	0.0005	0.0005
Copper Cu	mg/L	52	0.0005	0.0005	0.0009
Lead Pb	mg/L	52	0.0005	0.0005	0.0005
Lithium Li	mg/L	49	0.0786	0.1	0.1426
Manganese Mn	mg/L	52	0.0132	0.0835	0.1776
Molybdenum Mo	mg/L	-	-	-	-
Nickel Ni	mg/L	52	0.0005	0.0005	0.002
Rubidium Rb	mg/L	-	-	-	-
Selenium Se (Total)	mg/L	52	0.005	0.005	0.005
Silver Ag	mg/L	-	-	-	-
Strontium	mg/L	-	-	-	-
Thorium	mg/L	-	-	-	-
Tin	mg/L	-	-	-	-
Titanium	mg/L	-	-	-	-
Uranium U	mg/L	-	-	-	-
Vanadium V	mg/L	52	0.005	0.005	0.005
Zinc Zn	mg/L	52	0.0025	0.00375	0.0192
Boron	mg/L	52	0.025	0.025	0.025
Iron Fe	mg/L	52	0.025	0.285	1.326
Mercury	mg/L	52	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	52	10	10	10
C10 - C14 Fraction	µg/L	52	25	25	25
C15 - C28 Fraction	µg/L	52	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
C29 - C36 Fraction	µg/L	52	25	25	25
C10 - C36 Fraction (sum)	µg/L	52	25	25	25
C6 - C10 Fraction	mg/L	52	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	52	10	10	10
>C10 - C16 Fraction	mg/L	52	50	50	50
>C16 - C34 Fraction	mg/L	52	50	50	50
>C34 - C40 Fraction	mg/L	52	50	50	50
>C10 - C40 Fraction (sum)	mg/L	52	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	52	50	50	50
Benzene	µg/L	52	0.5	0.5	0.5
Toluene	µg/L	52	1	1	1
Ethylbenzene	µg/L	52	1	1	1
meta-Xylene	µg/L	52	1	1	1
para-Xylene	µg/L	52	1	1	1
ortho-Xylene	µg/L	52	1	1	1
Total Xylenes	µg/L	52	1	1	1
Sum of BTEX	µg/L	52	0.5	0.5	0.5
Naphthalene	µg/L	52	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	52	90.54	97.45	104.8
Toluene-D8	%	52	93.64	101	111
4-Bromofluorobenzene	%	52	100.24	112.5	120.8

Table A.10 Site baseline groundwater quality – shallow bore

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		7	6.002	6.17	6.394
Temperature	°C	7	28.16	29.3	29.76
Oxidation-Reduction Potential	mV	7	121.04	187.7	199.06
Electrical Conductivity	µS/cm	7	131.44	137.3	143.62
Total Dissolved Solids	mg/L	7	89	89.7	97.2
Salinity	ppt	7	0.06	0.06	0.068
Dissolved Oxygen	%	7	16.74	25.4	31.8
Turbidity	NTU	7	149.544	1000	1334.2

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Suspended Solids	mg/L	2	140.8	169	197.2
Nutrients					
Ammonia	mg/L	-	-	-	-
Nitrite	mg/L	1	0.03	0.03	0.03
Nitrate	mg/L	-	-	-	-
Nitrite + Nitrate (as NOx)	mg/L	7	0.034	0.05	0.058
Total Kjeldahl Nitrogen	mg/L	8	0.28	0.5	0.6
Total Nitrogen	mg/L	8	0.32	0.5	0.6
Total Phosphorus	mg/L	8	0.226	0.26	0.3
Reactive Phosphorus	mg/L	8	0.18	0.215	0.246
Chlorophyll a	mg/m3= µg/L	-	-	-	-
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	8	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	8	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	8	58.4	60.5	64.8
Total Alkalinity as CaC03	mg/L	8	58.4	60.5	64.8
Sulfate as S04	mg/L	8	0.5	0.5	3
Chloride	mg/L	8	4	4	5
Calcium	mg/L	8	6.4	7	8
Magnesium	mg/L	8	5	5.5	6
Sodium	mg/L	8	10	10.5	11.6
Potassium	mg/L	8	4	4	4.6
Total Anions	mg/L	8	1.304	1.355	1.406
Total Cations	mg/L	8	1.27	1.4	1.482
Total Hardness	mg/L	-	-	-	-
Dissolved metals					
Aluminium Al	mg/L	8	0.005	0.005	0.122
Antimony Sb	mg/L	-	-	-	-
Arsenic As	mg/L	8	0.0094	0.011	0.012
Beryllium Be	mg/L	8	0.0005	0.0005	0.0005
Barium Ba	mg/L	8	0.048	0.056	0.0638
Bismuth Bi	mg/L	-	-	-	-
Cadmium Cd	mg/L	8	0.00005	0.00005	0.00005
Caesium	mg/L	-	-	-	-

Parameter	Units	No. of data points	20%ile	Median	80%ile
Chromium	mg/L	8	0.0005	0.0005	0.0005
Cobalt Co	mg/L	8	0.0005	0.0005	0.0005
Copper Cu	mg/L	8	0.0005	0.00075	0.002
Lead Pb	mg/L	8	0.0005	0.0005	0.0005
Lithium Li	mg/L	7	0.0984	0.113	0.1212
Manganese Mn	mg/L	8	0.013	0.0175	0.02
Molybdenum Mo	mg/L	-	-	-	-
Nickel Ni	mg/L	9	0.0008	0.002	0.0072
Rubidium Rb	mg/L	-	-	-	-
Selenium Se (Total)	mg/L	8	0.005	0.005	0.005
Silver Ag	mg/L	-	-	-	-
Strontium	mg/L	-	-	-	-
Thorium	mg/L	-	-	-	-
Tin	mg/L	-	-	-	-
Titanium	mg/L	-	-	-	-
Uranium U	mg/L	-	-	-	-
Vanadium V	mg/L	8	0.005	0.005	0.005
Zinc Zn	mg/L	8	0.0084	0.0265	0.0352
Boron	mg/L	9	0.025	0.025	0.067
Iron Fe	mg/L	8	0.025	0.0425	0.192
Mercury	mg/L	8	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	8	10	10	10
C10 - C14 Fraction	µg/L	8	25	25	25
C15 - C28 Fraction	µg/L	8	50	50	50
C29 - C36 Fraction	µg/L	8	25	25	25
C10 - C36 Fraction (sum)	µg/L	8	25	25	25
C6 - C10 Fraction	mg/L	8	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	8	10	10	10
>C10 - C16 Fraction	mg/L	8	50	50	50
>C16 - C34 Fraction	mg/L	8	50	50	50
>C34 - C40 Fraction	mg/L	8	50	50	50
>C10 - C40 Fraction (sum)	mg/L	8	50	50	50

Parameter	Units	No. of data points	20%ile	Median	80%ile
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	8	50	50	50
Benzene	µg/L	8	0.5	0.5	0.5
Toluene	µg/L	8	1	1	1
Ethylbenzene	µg/L	8	1	1	1
meta-Xylene	µg/L	8	1	1	1
para-Xylene	µg/L	8	1	1	1
ortho-Xylene	µg/L	8	1	1	1
Total Xylenes	µg/L	8	1	1	1
Sum of BTEX	µg/L	8	0.5	0.5	0.5
Naphthalene	µg/L	8	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	8	95.02	99.3	103.6
Toluene-D8	%	8	99.06	102.5	110
4-Bromofluorobenzene	%	8	106.4	115.5	122

Table A.11 Site baseline groundwater quality – deep bore

Parameter	Units	No. of data points	20%ile	Median	80%ile
Field parameters					
pH		42	6.34	6.73	7.422
Temperature	°C	42	29.82	30.65	31.4
Oxidation-Reduction Potential	mV	42	-78.36	18.7	156.44
Electrical Conductivity	µS/cm	42	193.9	242.5	415.26
Total Dissolved Solids	mg/L	42	122	157.15	269.8
Salinity	ppt	42	0.09	0.11	0.196
Dissolved Oxygen	%	42	1.98	9	17.7
Turbidity	NTU	42	1.362	6.78	23.35
Total Suspended Solids	mg/L	10	130.6	172	213.6
Nutrients					
Ammonia	mg/L	-	-	-	-
Nitrite	mg/L	2	0.005	0.005	0.005
Nitrate	mg/L	-	-	-	-
Nitrite + Nitrate (as NOx)	mg/L	42	0.005	0.005	0.03
Total Kjeldahl Nitrogen	mg/L	44	0.05	0.2	0.5

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Nitrogen	mg/L	44	0.05	0.25	0.5
Total Phosphorus	mg/L	44	0.17	0.235	0.624
Reactive Phosphorus	mg/L	44	0.096	0.185	0.422
Chlorophyll a	mg/m3= µg/L	-	-	-	-
Major Anions & Cations					
Hydroxide Alkalinity as CaC03	mg/L	44	0.5	0.5	0.5
Carbonate Alkalinity as CaC03	mg/L	44	0.5	0.5	0.5
Bicarbonate Alkalinity as CaC03	mg/L	44	76.4	96	128.4
Total Alkalinity as CaC03	mg/L	44	84	100.5	137.2
Sulfate as S04	mg/L	44	0.5	0.5	1
Chloride	mg/L	44	4	5	9.4
Calcium	mg/L	44	5.6	13	18.4
Magnesium	mg/L	44	2	4	5
Sodium	mg/L	44	12.6	20.5	37
Potassium	mg/L	44	4	5.5	16.4
Total Anions	mg/L	44	1.878	2.275	2.908
Total Cations	mg/L	44	1.792	2.17	2.808
Total Hardness	mg/L	3	24	45	51.6
Dissolved metals					
Aluminium Al	mg/L	44	0.005	0.005	0.005
Antimony Sb	mg/L	-	-	-	-
Arsenic As	mg/L	44	0.0196	0.0525	0.1238
Beryllium Be	mg/L	44	0.0005	0.0005	0.0005
Barium Ba	mg/L	44	0.03	0.044	0.0668
Bismuth Bi	mg/L	-	-	-	-
Cadmium Cd	mg/L	44	0.00005	0.00005	0.00005
Caesium	mg/L	-	-	-	-
Chromium	mg/L	44	0.0005	0.0005	0.0005
Cobalt Co	mg/L	44	0.0005	0.0005	0.0005
Copper Cu	mg/L	44	0.0005	0.0005	0.0005
Lead Pb	mg/L	44	0.0005	0.0005	0.0005
Lithium Li	mg/L	42	0.0652	0.0995	0.2168
Manganese Mn	mg/L	44	0.0182	0.096	0.1794
Molybdenum Mo	mg/L	-	-	-	-

Parameter	Units	No. of data points	20%ile	Median	80%ile
Nickel Ni	mg/L	44	0.0005	0.0005	0.001
Rubidium Rb	mg/L	-	-	-	-
Selenium Se (Total)	mg/L	44	0.005	0.005	0.005
Silver Ag	mg/L	-	-	-	-
Strontium	mg/L	-	-	-	-
Thorium	mg/L	-	-	-	-
Tin	mg/L	-	-	-	-
Titanium	mg/L	-	-	-	-
Uranium U	mg/L	-	-	-	-
Vanadium V	mg/L	44	0.005	0.005	0.005
Zinc Zn	mg/L	44	0.0025	0.0025	0.01
Boron	mg/L	44	0.025	0.025	0.025
Iron Fe	mg/L	44	0.025	0.445	1.64
Mercury	mg/L	44	0.00005	0.00005	0.00005
Hydrocarbons & BTEXN					
C6 - C9 Fraction	µg/L	44	10	10	10
C10 - C14 Fraction	µg/L	44	25	25	25
C15 - C28 Fraction	µg/L	44	50	50	50
C29 - C36 Fraction	µg/L	44	25	25	25
C10 - C36 Fraction (sum)	µg/L	44	25	25	25
C6 - C10 Fraction	mg/L	44	10	10	10
C6 - C10 Fraction minus BTEX (F1)	mg/L	44	10	10	10
>C10 - C16 Fraction	mg/L	44	50	50	50
>C16 - C34 Fraction	mg/L	44	50	50	50
>C34 - C40 Fraction	mg/L	44	50	50	50
>C10 - C40 Fraction (sum)	mg/L	44	50	50	50
>C10 - C16 Fraction minus Naphtalene (F2)	mg/L	44	50	50	50
Benzene	µg/L	44	0.5	0.5	0.5
Toluene	µg/L	44	1	1	1
Ethylbenzene	µg/L	44	1	1	1
meta-Xylene	µg/L	44	1	1	1
para-Xylene	µg/L	44	1	1	1
ortho-Xylene	µg/L	44	1	1	1

Parameter	Units	No. of data points	20%ile	Median	80%ile
Total Xylenes	µg/L	44	1	1	1
Sum of BTEX	µg/L	44	0.5	0.5	0.5
Naphthalene	µg/L	44	2.5	2.5	2.5
1.2-Dichloroethane-D4	%	44	90.3	97.35	105.4
Toluene-D8	%	44	93.36	101	111
4-Bromofluorobenzene	%	44	99.32	111	120.4

APPENDIX B WATER MANAGEMENT TARPS

Table B.1 Operational surface water quality TARP

Level	Triggers	Action	Response
Level 1	No exceedances in surface water quality within the adopted trigger values for all parameters at the downstream monitoring point.	• No action required • Continue routine monitoring in accordance with the monitoring program.	• No response required.
Level 2	Exceedance in surface water quality parameter trigger values for one monitoring event	• Review laboratory quality assurance/quality control results • Request a review if a suspected laboratory error is identified. • Commence an investigation to determine potential cause of elevated trigger value. • Investigate the potential source associated with the trigger exceedance.	• Investigate any mitigation strategy and contingency measures to mitigate any contamination sources based on the outcomes of the investigation on the potential contamination source.
Level 3	Exceedance in surface water quality parameter trigger values for two consecutive monitoring events	• Investigate potential cause of elevated trigger values. • Identify the potential source associated with the trigger exceedance. • Increase frequency of monitoring.	• Implement the relevant Level 2 mitigation and contingency measures. • Apply relevant water quality treatment procedures to water storages prior to release, where required.
Level 4	Exceedance in surface water quality parameter trigger values for three consecutive monitoring events; or Exceedance greater than three times the trigger value.	• Validate relevant data to confirm trigger exceedance. • Investigate potential cause of elevated trigger values. • Engage suitably qualified personnel to identify the potential source associated with the trigger exceedance. • Initiate investigation for reasons of increase water quality concentrations.	• Implement appropriate corrective actions based on the investigation outcomes. • Review current management plans and updated them if necessary. • Notification will be undertaken in accordance with the Waste Discharge Licence and approval conditions.

Table B.2 Groundwater bore water quality TARP

Level	Triggers	Action	Response
Groundwater quality impact resulting from mine operation			
Level 1	All results within the baseline range for that bore and analyte.	• No action required.	• No response required.
Level 2	Background WQ variation greater than 10% in two consecutive quarterly samples for any analyte	• Investigate surrounding bores monitoring data. • Investigate any operational events which may affect groundwater quality. • Inspect site infrastructure, including bore condition. Investigate source of contamination on contaminants of concern and bore location. • Review historical monitoring data to determine any trend.	• Internal notification. • Investigate any mitigation strategy and contingency measures to mitigate contamination of groundwater bores based on the outcomes of the investigation on the contamination source.
Level 3	Background WQ variation greater than: 10% in four consecutive quarterly samples or 20% for two consecutive samples for any analyte.	• Review historical monitoring data to determine historical trends. • Conduct water quality trend analysis with surrounding bores. • Investigate source of contamination on contaminants of concern and bore location. • Assess risk to receptors. If required, increase surface water sampling frequency to monitor potential impacts on receiving environment.	• Increase frequency of monitoring. • Investigation on potential causes from operation on groundwater quality. • Apply mitigation and contingency measures in level 2.
Level 4	Background WQ variation greater than: 20% in four consecutive quarterly samples or 50% for two consecutive samples for any analyte.	• Investigate surrounding bores monitoring data. • Investigate potential sources of contaminants on the environment and implement mitigation measures at the source if possible. • Implement controls at receptors if modelling indicates potential impact.	• Assessment of plume extent and fate by qualified hydrogeologist. • Notification will be undertaken in accordance with the Waste Discharge Licence and approval conditions. • Continued high-frequency monitoring.

Level	Triggers	Action	Response
Groundwater quality impact resulting from ASS exposure due to groundwater drawdown			
Level 1	No exceedances greater than 10% in any background water quality range.	• No action required	• No response required

Level 2	Background WQ variation greater than:
	10% in four consecutive quarterly samples
	or
	20% for two consecutive samples for any analyte
	and
	there is a sustained decline in pH accompanied by increasing sulfate and/or dissolved metals
		• Initiate targeted investigation:
		  ○ Review of groundwater levels
		  ○ Water quality trends
		  ○ Spatial patterns between (deep and shallow bore).
		• Assess whether dewatering rates are influencing the results obtained.
		• Assess water quality trends at surface water and dewatering monitoring sites.
		• Investigate surrounding bores monitoring data.
		• Investigate any operational events which may affect groundwater quality.
		• Inspect site infrastructure, including bore condition.
		• Investigate source of contamination on contaminants
			• Assess groundwater level trends and spatial distribution of impacts.
			• Assess water quality trends in groundwater, surface water, and dewatering monitoring locations.
			• Undertake ASS investigations where a plausible drawdown and exposure pathway exists.
			• Assess whether dewatering or water management activities require modification.
			• Implement precautionary controls where ASS risk is supported by the investigation.
			• Develop a management response for any potentially impacted areas.

Level 3	ASS investigations confirm actual or potential ASS; and Groundwater chemistry indicates associated acidification and/or metal mobilisation.	• Implement source/pathway controls, including changes to dewatering, water level management, treatment of acidic water, containment and neutralisation of soils. • Increase monitoring frequency (to monthly) at affected bores, surface water and dewatering monitoring sites.	• Notify internally. • Notify regulators if required under approvals/licence conditions or if there is risk of environmental harm. • Prepare a corrective action plan and update the TARP, groundwater monitoring program and develop ASS Management Plan based on investigation findings. • Continue monthly monitoring until groundwater trends stabilise and return to within acceptable limits/historical variability.
Changes to dewatered water quality due to saline intrusion			

Level	Triggers	Action	Response
Level 1	All results within the baseline range for that bore and analyte.	• No action required	• No response required

Level 2	Background WQ variation greater than:
	10% in four consecutive quarterly samples
	or
	20% for two consecutive samples for any analyte
	and
	there is continue increasing trend indicating ongoing saline intrusion
		• Detailed investigation:
		  ○ identify source aquifer or pathway
		  ○ assess pit vs regional groundwater contribution
		  ○ Compare surface water and groundwater quality to identify changes in groundwater characteristics (including major ions).
		• Increase monitoring frequency (to monthly).
		• Assess compliance against discharge licence criteria.
		• Review potential implications for discharge water quality.
		• Review hydrogeological drivers, including:
		  ○ drawdown extent and cone of depression;
		  ○ connectivity with potentially saline units.
			• Implement management measures:
			• modify dewatering strategy
			• isolate or reduce inflow (where practicable)
			• implement water treatment or dilution.
			Notify regulator if discharge limits are at risk or exceeded.
			• Update Water Management Plan as required.

Level 3	Confirmed saline source and sustained groundwater quality deterioration	• Implement long-term management strategy: • treatment system optimisation • revised water balance and discharge planning • Review mine design or dewatering approach (if needed).	• Formal reporting and regulator engagement • Update TARP and operational controls • Continue groundwater, surface water and discharge water monitoring.

Table B.3 Groundwater levels TARP

level	Triggers	Action	Response
Level 1	Groundwater levels remain within modelled drawdown predictions and expected seasonal variability	• Continue monitoring groundwater in accordance with the Water Management Plan. • Continue GDEs monitoring in accordance with the GDE Monitoring Plan onitoring in accordance with the GDE Monitoring Plan (EcOz, 2026b).	• No response required.
Level 2	Groundwater level decline exceeds predicted modelled drawdown or demonstrates sustained declining trend outside expected seasonal variation (for more than six months continuously) at LG2, LG3, LG4, LG5 and LG6.	• Investigate potential causes of the decline. • Assess results from GDE monitoring	• Review dewatering rates and groundwater model assumptions. • Document findings in monitoring report. • Undertake further hydrogeological assessment, including pumping tests, to verify predicted groundwater responses.
Level 3	Groundwater level decline substantially exceeds model predictions and/or indicates potential impact to environmental receptors, and/or impacts on GDEs are evident during GDEs monitoring.	• Undertake detailed hydrogeological assessment. • Review dewatering strategy and groundwater model. • Assess GDEs health.	• Modify dewatering rates or sequencing. • Increase monitoring frequency and update the monitoring bore network where required. • Report to NT EPA.

Note: For the purposes of Table B.2, background water quality variation is measured against the 80th percentile of the baseline dataset for that bore and analyte, calculated in accordance with ANZG (2018). A variation greater than 10% means a result more than 10% above that value.

Table B.4 Raw water and sediment water quality TARP

Level	Triggers	Action	Response
Level 1	Raw water/Sediment water quality is within than 90% of the SSGVs	• No action required. • Continue routine monitoring in accordance with the monitoring program.	• No response required
Level 2	Raw water/Sediment water quality is between 90% and 100% of the SSGVs	• Review laboratory QA/QC and look for potential quality control issue and request a review if a suspected lab error. • Investigate management measures or treatment procedures to manage any unexpected increases in contaminant concentrations. • Investigate to determine if additional controls or management actions are necessary to achieve compliance.	• Implement appropriate management measures or treatment procedures where required to prevent exceedance of SSGVs. • Increase frequency of monitoring.
Level 3	Raw water/Sediment water quality exceeds one or more of the SSGVs	• Investigate potential sources of contaminants in the catchment (e.g., Stockpile areas, haul roads) that are contributing to poor water quality. • Investigate options to divert runoff from the source of poor water quality to a mine water storage if required. • Investigate the option of converting the sediment basin into a mine-affected water storage (and prevent uncontrolled spills into the environment) if the sources cannot be diverted or remediated. • Investigate the option of constructing an additional mine water storage and drains to capture runoff from the contaminated area.	• Implement relevant mitigation, treatment and contingency measures identified through the investigation. • Apply relevant mitigation, treatment and contingency measures in level 2 before discharging from sediment basins.
Level 4	Raw water/Sediment water quality exceeds one or more of the SSGVs by more than for three consecutive samples or more than 50% for one sample	• Confirm and validate monitoring results. • Undertake detailed investigation into the cause of ongoing exceedances. • Review effectiveness of existing controls and management measures.	• Cease discharging from sediment/raw water dams. • Apply any treatment additives to achieve compliance. • Apply appropriate controls, measures and diversion/remediation options depending on outcomes of investigations in level 3. • Review current management plans and update if necessary. • Notification will be undertaken in accordance with the Waste Discharge Licence and approval condition.

Table B.5 Proposed mine water site storage inventory exceedances

Level	Triggers	Action	Response
Level 1	MWD1 storage volume is less than the maximum operating volume.	• No action required. •	• No response required.
Level 2	MWD1 storage volume exceeds the maximum operating volume with current or forecast heavy rainfall (>50 mm)	• Monitor storage levels in accordance with the monitoring plan. • Undertake a post-event review to confirm event was well managed with the appropriate resources in place. • Investigate any management and contingency measures to prevent uncontrolled spills or underground inundation.	• Continue environmental releases (from MWD1) where possible. • Maximise pumping capacity for dewatering of storage. • Pump from MWD1 to MWD2 (if available). • Suspend any transfers to the mine water dams, if possible.
Level 3	MWD1 and MWD2 combined storage volume exceeds 80% of the combined full storage volume, with inflows still occurring	• Review storage trends and forecast inflows. • Undertake post-event review to confirm suitability of water transfer infrastructure and operational rules. • Assess the need for modifications or upgrades to water infrastructure. • Prepare recommendations for modifications or upgrades to water transfer infrastructure.	• Continue environmental releases where possible. • Apply management and contingency measures in Level 2. • Update operational rules if required. • Implement infrastructure modification or operational changes identified during the review.
Level 4	Uncontrolled discharge of mine water from MWDs to the environment.	• Record start and finish times of the overflow. • Collect water quality samples of spills at dam overflow points and in receiving waterways. • Investigate structural risks of underground mine. • Initiate investigation into reasons for system failure. • Determine measures required to prevent recurrence.	• Notification will be undertaken in accordance with the Waste Discharge Licence and approval condition. • Implement emergency measures to minimise environmental impacts. • Remediate any environmental harm where possible. • Implement corrective actions identified by the investigation to prevent recurrence.

Table B.6 Proposed site storage inventory shortfalls TARP

Level	Triggers	Action	Response
Level 1	Current total site inventory greater than 15% (105 ML) of the total storage inventory	• No action required. • Continue routine monitoring of site water inventories	• No response required.
Level 2	Current total site inventory is between 10% (70 ML) to 15% (105 ML) of the total storage inventory.	• Monitor site storage levels and forecast water demands. • Undertake a post-event review to confirm event was well managed with the appropriate resources in place. • Investigate any management and contingency measures to prevent deficiencies in site inventory or make-up demands.	• Maximise use of sediment water for mine site demands prior to raw water use. • Implement any additional operational measures identified during the review to reduce the risk of supply deficiencies
Level 3	Current total site inventory is between 5% (35 ML) to 10% (70 ML) of the total storage inventory.	• Investigate the feasibility of increasing the storage size of current site storages (to increase the amount of water stored on site towards the end of the wet season). • Investigate the feasibility of constructing an additional water storage. • Investigate procedures which decreases the site water demands. • Investigate the feasibility of trucking water externally from other sites. • Undertake a post-event review to confirm suitability of water transfer infrastructure and operational rules. • Prepare recommendations for infrastructure modifications or upgrades to water transfer infrastructure.	• Conserve water use for non-essential operations. • Update operational rules where required. • Implement infrastructure modifications or operational changes identified during the review. • Arrange external water supplies if necessary to maintain operational requirements.
Level 4	Current total site inventory is less than 5% (35 ML) of the total storage inventory.	• Confirm water balance projections and assess the cause of the supply shortfall. • Evaluate all available water supply and demand reduction measures. • Initiate a detailed review of site water management requirements.	• Truck water from approved external source to meet operational demands. • Implement any water management strategy in level 3 • Restrict non-critical water use until storage inventories recover. • Implement emergency water management measures to maintain critical operations.

AMD visual indicators and triggers are outlined below. Where such indicators are observed at the mine site, these should be documented with photos.

Table B.7 AMD visual indicators and risk-based responses (EGi, 2026)

Trigger Level	Triggers	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 the AMD point source, but extent localised within onsite drainage lines.	High	Assess extent and source; notify Manager, Environment and Sustainability. Implement rectification measures based on detailed investigation findings.
Level 4	Extensive AMD generation with iron/aluminium sulphate salts entrained within drainage lines well beyond the AMD point source, including off-site, where the visual indicators are confirmed by water quality results against the relative-to-baseline thresholds in Table B.8.	Extreme	Cease operation and isolate affected area. Notify Manager, Environment and Sustainability. Where material removal is not possible, activate emergency response procedures, which may include active AMD treatment strategies.

The assessment of surface water and groundwater quality for potential AMD impacts should consider the site-specific baseline water quality at each monitoring location. The absolute thresholds in Table 6.5 apply only at the point sources identified in Section 6.3.5.5. The relative-to-baseline trigger thresholds presented in Table B.8 are applied at the surface water and groundwater monitoring locations to confirm the appropriate risk level and corresponding management response (EGi, 2026). The AMD TARP is presented in Table B.9.

Table B.8 AMD relative to Baseline Level 1-4 thresholds (EGi, 2026)

Parameter	Baseline Definition (median over at least 12 months of baseline data)	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 $CaCO_3$)	Median acidity	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline
Nitrate as Total N (mg/L)	Median nitrate	≥ 2× baseline	≥ 5× baseline	≥ 10× baseline

Parameter	Baseline Definition (median over at least 12 months of baseline data)	Level 2 (Moderate)	Level 3 (High)	Level 4 (Extreme)
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

Table B.9 AMD Trigger-Response summary

Level	Trigger	Action
Level 2	Parameters > Level 1	Investigate source; increase sampling at the affected point source. Collect additional water quality samples for testing.
Level 3	Parameters > Level 2	Increase monitoring frequency and investigate. Assess extent and source; notify Manager, Environment and Sustainability. Rectification based on detailed investigation.
Level 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.



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