



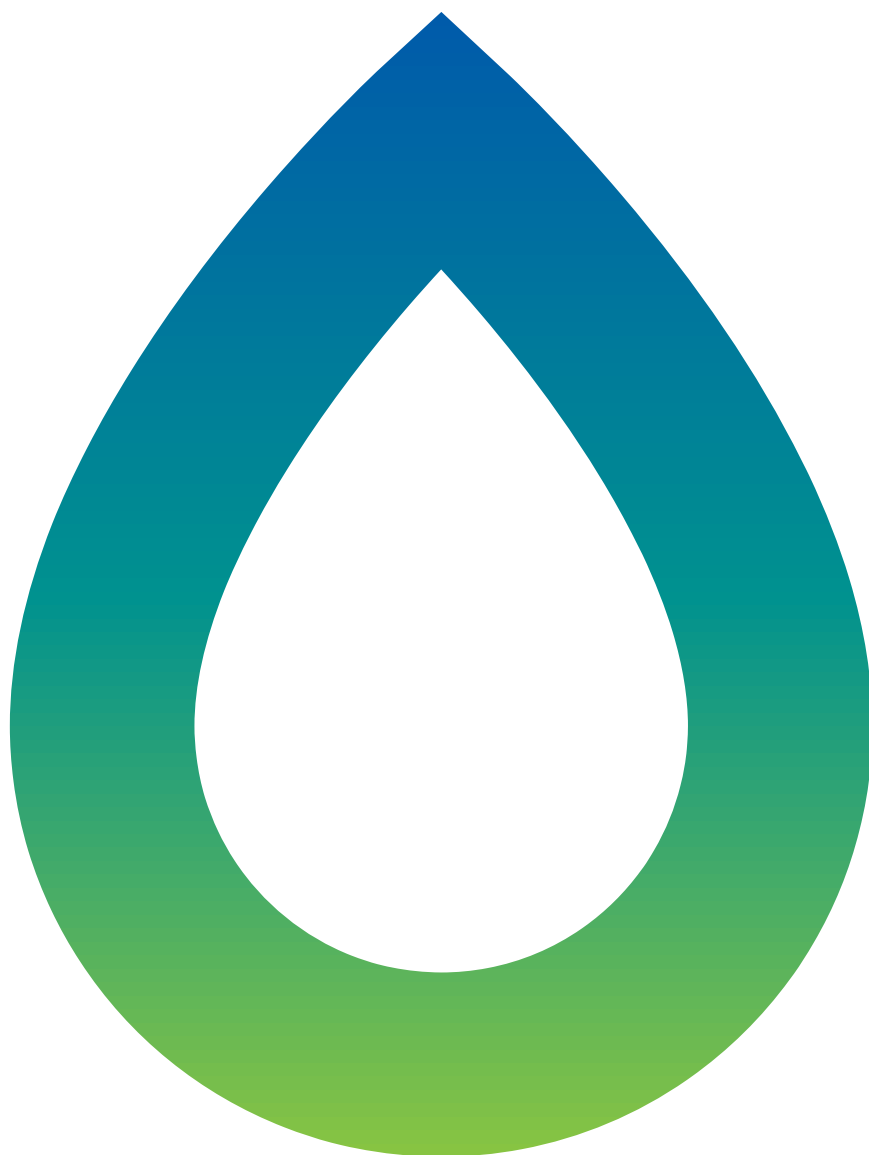
GRANTS LITHIUM

Operational Water Management Plan

Lithium Developments (Grants NT) Pty Ltd

31 May 2024

1727-17-C4



DETAILS

Report Title	Grants Lithium, Operational Water Management Plan
Client	Lithium Developments (Grants NT) Pty Ltd

THIS REVISION

Report Number	1727-17-C4
Date	31 May 2024
Author	KO
Reviewer	JO

NOTE: This report has been prepared on the assumption that all information, data and reports provided to us by our client, on behalf of our client, or by third parties (e.g. government agencies) is complete and accurate and on the basis that such other assumptions we have identified (whether or not those assumptions have been identified in this advice) are correct. You must inform us if any of the assumptions are not complete or accurate. We retain ownership of all copyright in this report. Except where you obtain our prior written consent, this report may only be used by our client for the purpose for which it has been provided by us.

TABLE OF CONTENTS

1	INTRODUCTION	8
1.1	BACKGROUND	8
1.2	PURPOSE AND SCOPE	8
1.3	REPORT STRUCTURE	8
1.4	RELATED DOCUMENTS	9
1.5	SITE CONFIGURATION AND SCHEDULE	9
2	ENVIRONMENTAL SETTING	14
2.1	GENERAL	14
2.2	ENVIRONMENTAL VALUES	14
2.2.1	Land use and surface water use	14
2.2.2	Biodiversity values and Beneficial Uses	14
2.2.3	Groundwater environmental and social values	14
2.3	REGIONAL DRAINAGE CHARACTERISTICS	15
2.4	LOCAL DRAINAGE NETWORK	15
2.4.1	Drainage Line 1	15
2.4.2	Drainage Line 2	15
2.4.3	Drainage Line 3	15
2.4.4	Unnamed Tributary that discharges into the Darwin Harbour (West Arm)	15
2.5	CLIMATE	18
2.5.1	Rainfall	18
2.5.2	Evaporation	18
2.6	GEOLOGY AND SOILS	20
2.6.1	Soil management units	20
2.6.2	Sodic and dispersive soils	22
2.6.3	Soil suitability for irrigation	22
2.7	GROUNDWATER CHARACTERISTICS	22
2.7.1	Aquifer geology	22
2.7.2	Hydraulic conductivity	23
2.7.3	Groundwater levels	23
2.7.4	Groundwater flows and recharge	23
3	CONTAMINANT SOURCE STUDY	24
3.1	OVERVIEW	24
3.2	SITE OPERATING ACTIVITIES	24
3.3	SURFACE WATER TYPES	24
3.4	SURFACE WATER CHARACTERISTICS	25
3.4.1	Raw water	25
3.4.2	Diverted water	25
3.4.3	Sediment water	25
3.4.4	Mine affected water	26
3.5	SITE BACKGROUND SURFACE WATER QUALITY	28

3.6	SITE BACKGROUND GROUNDWATER QUALITY	28
3.7	CHEMICAL AND FUEL STORAGE	28
4	SURFACE WATER MANAGEMENT	29
4.1	OVERVIEW	29
4.2	MANAGEMENT OBJECTIVES	29
4.3	SURFACE WATER MANAGEMENT PRINCIPLES	29
4.4	WATER MANAGEMENT SYSTEM	30
4.4.1	Mine water management	30
4.4.2	Sediment water management	34
4.4.3	Groundwater management	35
4.4.4	Diverted Water Management	35
4.5	WASTE DISCHARGE LICENSE	35
4.6	SURFACE WATER EXTRACTION LICENCE	35
4.6.1	OHD SWEL	35
4.6.2	C5 Dam SWEL	35
4.7	INTERACTION WITH THE BP33 PROJECT	36
5	OPERATIONAL MINE SITE WATER BALANCE	37
5.1	OVERVIEW	37
5.2	WATER BALANCE MODEL METHODOLOGY	37
5.3	ASSESSMENT CRITERIA	38
5.4	SITE WATER BALANCE MODEL CONFIGURATION	38
5.5	MODEL OUTCOMES	42
6	WATER QUALITY MONITORING PLAN	46
6.1	OVERVIEW	46
6.2	PARAMETERS MEASURED	46
6.3	SURFACE WATER MONITORING PROGRAM	47
6.3.1	Surface water quality monitoring sites	48
6.3.2	Sampling frequency	49
6.3.3	Sampling methods	49
6.3.4	Surface water flow gauging	50
6.3.5	Assessment criteria	52
6.4	GROUNDWATER MONITORING PROGRAM	53
6.4.1	Groundwater Monitoring Sites	53
6.4.2	Sampling frequency	54
6.4.3	Sampling methods	54
6.4.4	Assessment criteria	55
6.4.5	Additional groundwater monitoring	55
6.5	SURFACE WATER AND GROUNDWATER QUALITY AND HYDROLOGIC RECORDING AND REPORTING	56
7	ACID ROCK AND SALINE DRAINAGE	57
7.1	OVERVIEW	57

7.2	WASTE ROCK CHARACTERISTICS	57
7.3	MONITORING AND MANAGEMENT	57
8	EMERGENCY AND CONTINGENCY PLANNING	58
8.1	OVERVIEW	58
8.2	CONTINGENCY ACTIONS	58
8.3	OTHER RELEVANT CONTINGENCY ACTIONS	59
8.3.1	Open Cut dewatering	59
8.3.2	Offsite discharge	59
8.3.3	Water management Trigger Action Response Plan	60
9	REPORTING AND REVIEW	61
9.1	REVIEW OF THE WMP	61
9.2	ROLES AND RESPONSIBILITIES	61
10	REFERENCES	63
APPENDIX A WATER QUALITY RESULTS		
APPENDIX B WATER MANAGEMENT TARPS		

FIGURES

Figure 1.1	Finniss Lithium project schedule and current status	9
Figure 1.2	Locality plan	11
Figure 1.3	Grants water management system plan	12
Figure 1.4	Finniss Lithium project layout	13
Figure 2.1	Regional drainage	16
Figure 2.2	Local drainage	17
Figure 2.3	Monthly rainfall at Grants from 134 years of SILO Data Drill rainfall data	19
Figure 2.4	Mean monthly evaporation and evapotranspiration at Grants from 134 years of SILO Data Drill rainfall data	19
Figure 2.5	Distribution of identified land units	21
Figure 4.1	Grants Lithium WMS schematic	33
Figure 5.1	Grants catchment areas and land use mapping	41
Figure 5.2	Total storage inventory in the WMS	44
Figure 5.3	Total site deficit in Grants WMS	44
Figure 5.4	Monthly controlled releases during the Operational period	45
Figure 5.5	Monthly transfers to BP33 during the Operational period	45
Figure 6.1	Surface water and groundwater quality monitoring sites	51

TABLES

Table 2.1	SILO Data Drill mean monthly rainfall, pan evaporation and lake evaporation at Grants	18
Table 2.2	Land units and soils within the mineral lease boundary (EcOz, 2019)	20
Table 3.1	Summary of water quality of mine water storages	27
Table 4.1	Operational water storages	31
Table 4.2	Consequence categories for Grants mine affected water storages (GHD, 2019)	32
Table 4.3	Current and proposed sediment water storages	34
Table 5.1	Simulated inflows and outflows of the WMS	37
Table 5.2	Storage characteristics for Grants WMS	39
Table 5.3	Grants Lithium catchment areas	40
Table 5.4	Grants site water balance for average climatic conditions	43
Table 6.1	Surface water and groundwater quality field and laboratory parameters	46
Table 6.2	Surface water quality monitoring sites details	48
Table 6.3	Operational water quality monitoring sites details	49
Table 6.4	Downstream surface water trigger values	52
Table 6.5	Groundwater monitoring site details	54
Table 6.6	Site specific trigger values for groundwater quality	55
Table 8.1	Surface water management contingency actions	58
Table 9.1	Roles and responsibilities	61
Table A.1	Darwin Harbour catchment water quality results (baseline)	A-1
Table A.2	Bynoe Harbour catchment water quality results (baseline)	A-2
Table A.3	Observation Hill Dam catchment water quality results (baseline)	A-3
Table A.4	Darwin Harbour catchment metal toxicant summary results (baseline)	A-4
Table A.5	Bynoe Harbour catchment toxicant summary results (baseline)	A-6
Table A.6	Observation Hill Dam toxicant summary results (baseline)	A-8
Table A.7	Water quality sampling results - OHD	A-11
Table A.8	Water quality sampling results – Background water quality	A-12
Table A.9	Water quality sampling results – Sediment Dam 1	A-13
Table A.10	Water quality sampling results – Sediment Dam 2	A-14
Table A.11	Water quality sampling results – Sediment Dam 3	A-15
Table A.12	Water quality sampling results – Sediment Dam 4	A-16
Table A.13	Water quality sampling results – Sediment Dam 5	A-17
Table A.14	Water quality sampling results – Pit	A-18
Table A.15	Water quality sampling results – Mine Water Dam 1 Cell 1	A-19

Table A.16	Water quality sampling results – Mine Water Dam 1 Cell 2	A-20
Table A.17	Water quality sampling results – Mine Water Dam 1 Cell 3	A-21
Table A.18	Water quality sampling results – Mine Water Dam 2 Cell 1	A-22
Table A.19	Water quality sampling results – Mine Water Dam 2 Cell 2	A-23
Table A.20	Water quality sampling results – FSF Cell 1	A-24
Table A.21	Water quality sampling results – FSF Cell 2	A-25
Table A.22	Darwin Harbour catchment water quality results (operations)	A-26
Table A.23	Bynoe Harbour catchment water quality results (operations)	A-27
Table A.24	Observation Hill Dam catchment water quality results (operations)	A-28
Table A.25	Darwin Harbour catchment toxicant summary results (operations)	A-29
Table A.26	Bynoe Harbour catchment toxicant summary results (operations)	A-32
Table A.27	Observation Hill Dam toxicant summary results (operations)	A-35
Table B.1	Sediment basin water quality TARP	B-2
Table B.2	Proposed mine water site storage inventory exceedances TARP	B-3
Table B.3	Operational surface water quality TARP	B-4
Table B.4	Proposed groundwater bore water quality TARP	B-5

1 INTRODUCTION

1.1 BACKGROUND

The Grants Lithium Project (Grants) forms a part of the greater Finnis Lithium Project (the Project), which encompasses both Grants and the adjacent underground operation, BP33. The Project is managed by Lithium Developments (Grants NT) Pty Ltd (LD). The Grants area is currently operational and the BP33 underground area commenced construction in July 2023. The Grants and BP33 water management systems (WMSs) will be integrated to enable water transfers between the operations to optimise mine water storage and supply requirements.

This Water Management Plan (WMP) focuses on the Grants area only. A separate WMP has been prepared for BP33.

Grants is located in the Northern Territory approximately 25 km southwest of Darwin. A locality plan of the Project area is shown in Figure 1.2.

1.2 PURPOSE AND SCOPE

The purpose of this Management Plan 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 Grants WMP includes:

- Water aspects of mining operations within Mineral Lease ML31726, which include the open pit, waste rock dump, Fines Storage Facility (FSF), Run of Mine (ROM) pad, processing plant, access/haul roads, water storages and holding dams, stormwater drains, and sediment basins.
- Water storages and infrastructure located outside ML31726 within ML32074 (Observation Hill Dam (OHD) and pipeline linking OHD to the mine site).
- Surface and groundwater systems influenced by mining operations, including those upstream and downstream the mine area and downstream the OHD.

1.3 REPORT STRUCTURE

This report is structured as follows:

- Section 2: A description of the existing environment at Grants.
- Section 3: A description of the contaminant sources produced by site operating activities.
- Section 4: A detailed description on the current water management system
- Section 5: A water balance assessment of the Grants water management system over the Mining Management Plan period.
- Section 6: A description of the adopted water monitoring plan at Grants.
- Section 7: A description of the acid rock and saline drainage characteristics.
- Section 8: A description of the contingency actions for environmental triggers.
- Section 9: A description of the WMP review and the roles and responsibilities required.
- Section 10: A list of references.

- Appendix A: Processed water quality results for monitoring stations and dams for baseline and operations (where applicable).

1.4 RELATED DOCUMENTS

This WMP forms part of the Grants Environmental Management System and should be read in conjunction with the following reports:

- Grants Environmental Impact Statement (EIS) report (Core, 2019);
- Grants Mining Management Plan (MMP) (Core, 2024);
- Groundwater modelling assessment (CloudGMS, 2021);
- Erosion and sediment control plan(s) (EcOz, 2021; WRM 2022);
- Soils and Waste Rock characterisation report (EcOz, 2018);
- Finniss Lithium Project Grants Surface Water Infrastructure Assessment (WRM, 2022)

1.5 SITE CONFIGURATION AND SCHEDULE

Grants forms a part of the greater Finniss Lithium Project, which encompasses both Grants and the adjacent underground operation, BP33. The locations of the two sub-projects are shown in Figure 1.4. BP33 ore would be processed at the Grants facilities and water transfer between the sites would be undertaken to supply demands and provide additional storage capacity as required. Ore processed as part of BP33 would be handled as part of the BP33 water management plan.

Construction of the Grants Open Cut (OC) began in January 2022 (Month 1) and production commenced in April 2022 (Month 4). Ore extraction in the Grants OC is expected to be completed by January 2026 (Month 49). Crushing and processing operations at Grants are expected to continue beyond 2026 as additional reserves are brought online. Figure 1.1 shows the operational time frames of the Finniss Lithium Project. The schedule assumes that there will be no unforeseen closure or periods of care and maintenance.

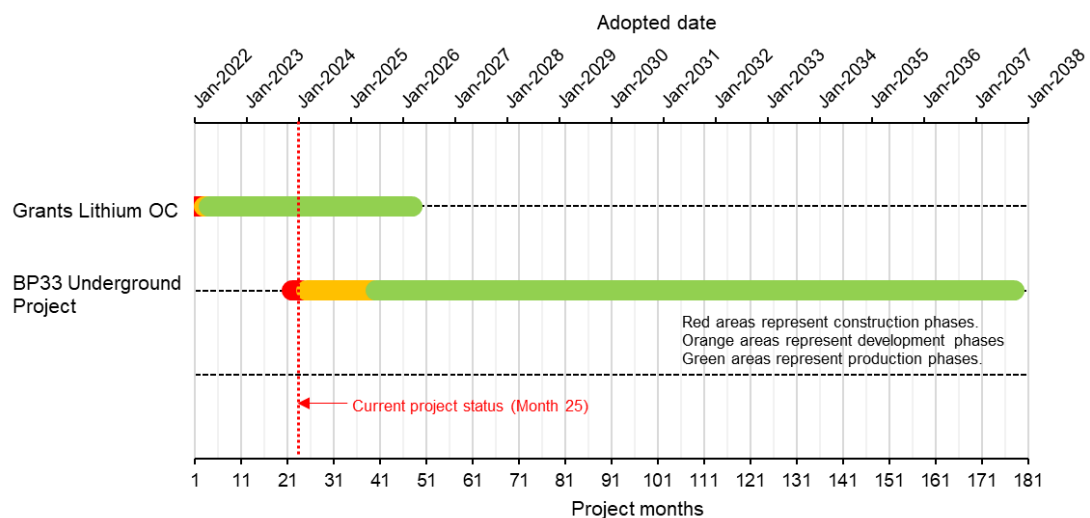


Figure 1.1 Finniss Lithium project schedule and current status

1.6 SUMMARY OF UPDATES

Table 1.1 shows a list of key changes made to the previous Grants WMP.

Table 1.1 Summary of WMP updates

Section	Description
1.1	Added statement around the integrated Grants and BP33 WMS.
1.6	Added summary table of changes in the WMP.
2.4.4	Added description on an additional unnamed tributary
2.5	Updated climate analysis with 2023 data.
3.4	Updated surface water quality data review
3.5	Updated surface water quality data review.
4.4.1	Updated operating rules and schematic to include new storages.
4.7	Updated discussion on the potential interactions with the BP33 project.
5	Updated water balance section with outcomes of the integrated WMS configuration
6.3.5	Updated the Site- Specific Trigger Values based on the WDL.
7.3	Added section on monitoring and management of acid rock and saline drainage
8.3.1	Added water management Trigger Action Response Plan (TARP)
Appendix A	Extended water quality dataset
Appendix B	Updated wording in Table B.1
General	Updated dates as project months.
Figures	Updated figures with new infrastructure layout



Figure 1.2 Locality plan

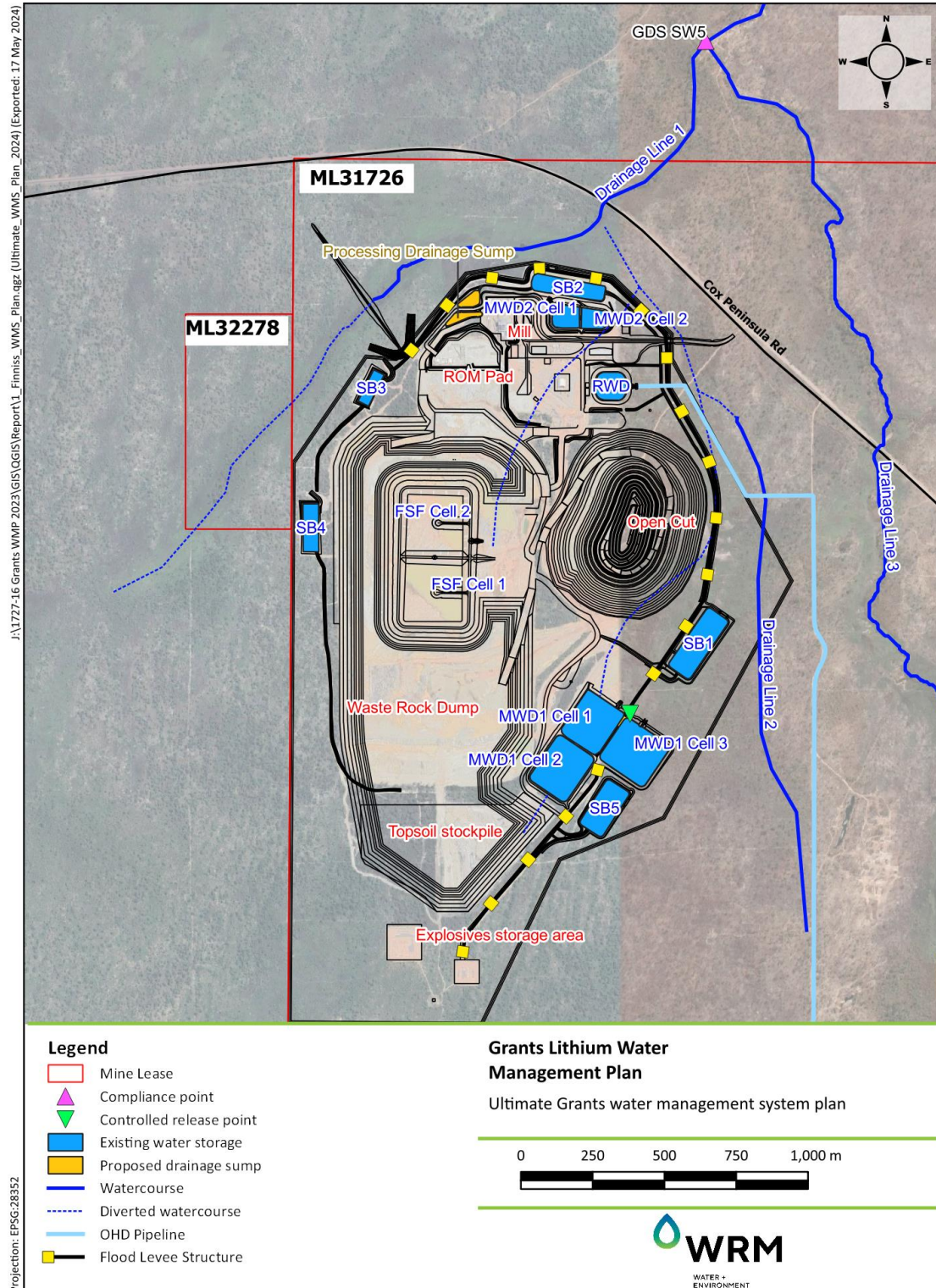


Figure 1.3 Grants water management system plan

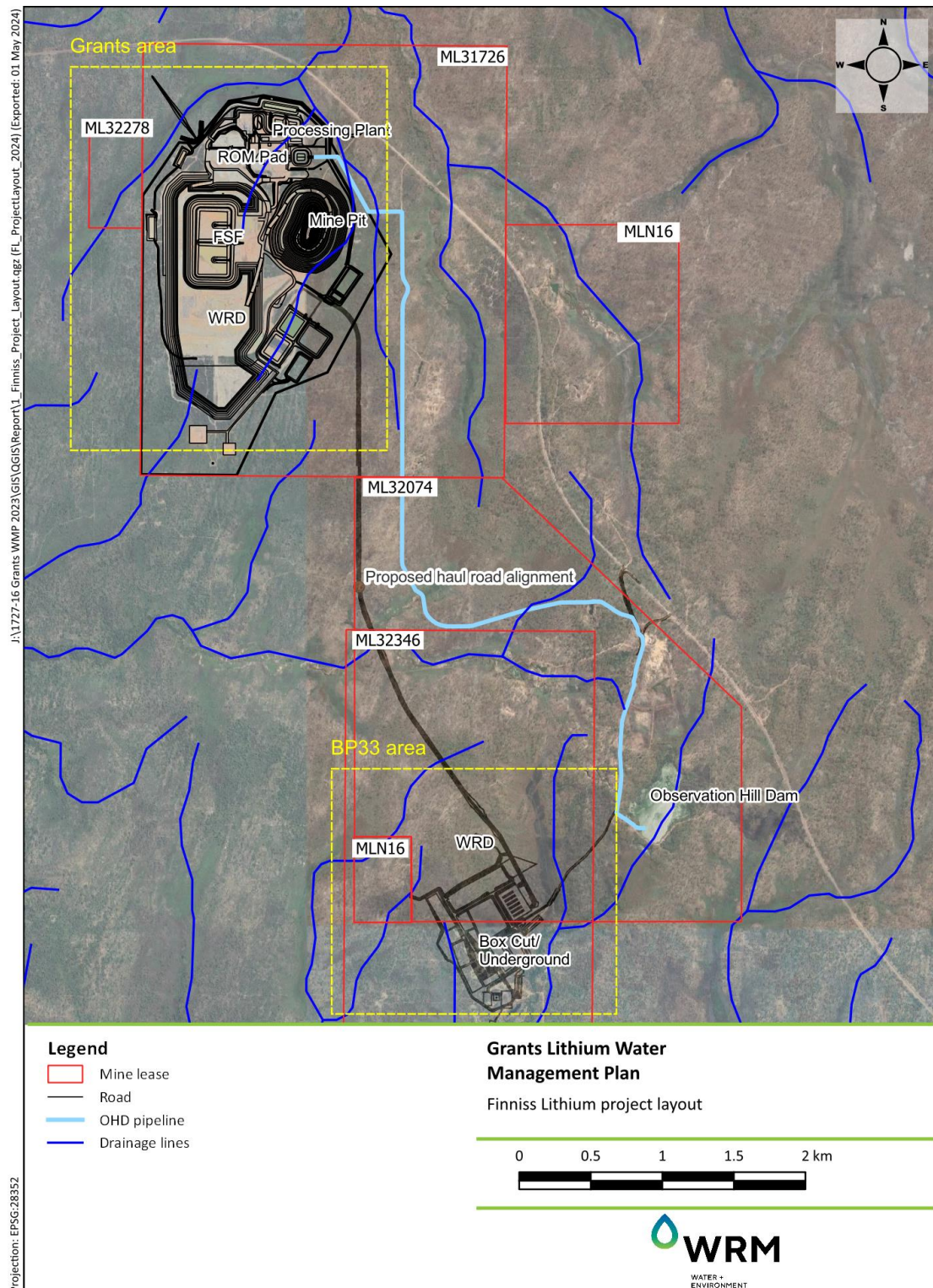


Figure 1.4 Finniss Lithium project layout

2 ENVIRONMENTAL SETTING

2.1 GENERAL

This section of the water management plan describes the regional drainage characteristics in the vicinity of Grants. The environmental values as defined by the ANZECC 2000 guidelines and NT government regulations of these waterways are also described. EcOz (2022) had conducted an assessment and description of the relevant environmental values for Grants which is summarised below.

2.2 ENVIRONMENTAL VALUES

2.2.1 Land use and surface water use

The project area, including both the mine footprint and Observation Hill Dam catchments, are largely undeveloped vacant crown land with only minor disturbances including the sealed Cox Peninsula 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 and industry within the catchment areas upstream or immediately downstream of the mine or Observation Hill Dam.

No beneficial uses for the water currently being extracted from OHD were identified.

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. Ephemeral drainage lines either side of the mine footprint do not maintain flows into the dry season, and do not have a well-defined channel or riparian vegetation.

The NT Government identifies Darwin Harbour as a Site of Conservation Significance (NRETAS, 2009) with the harbour also listed as a wetland of national significance in the Directory of Important Wetlands in Australia (DIWA: NT029 Port Darwin).

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

2.2.3 Groundwater environmental and social values

Groundwater environmental and social values been extensively assessed by CloudGMS (2018) and characterised by EcOz (2022). Key aspects are summarised below:

- There is limited use of this aquifer for domestic, stock, or agricultural water supply. The closest registered bore currently in use is located on the Cox Peninsula Road, approximately 13 km east of the open cut.
- The aquifer does not intersect any of the ephemeral drainage lines around the mine footprint nor are they likely to be groundwater dependent ecosystems (GDEs) on and around the Grants mine
- Baseline groundwater quality monitoring suggests groundwater is contributing to flows in the drainage line downstream of Observation Hill Dam during the wet season. There is no evidence of spring-fed surface water flows during the dry season.
- Observation Hill Dam is likely a source of recharge to the groundwater aquifer. The well-developed riparian vegetation at this point indicates some level of sub-surface input from groundwater is supporting this vegetation community throughout the dry season.

2.3 REGIONAL DRAINAGE CHARACTERISTICS

Grants is located within the Finnis River sub-basin of the greater Timor Sea Basin. The Finnis River sub-basin consists of several major river and creeks which generally do not intersect, and flows are directed into the Timor Sea, as shown in Figure 2.1.

Figure 2.2 also shows the surrounding catchments of the Grants area. The Grants area is not located within a named watercourse catchment and would drain into the Darwin Harbour, via an unnamed tributary. Carrawara Creek is located approximately 11 km northwest of Grants and Charlotte River is located approximately 5 km to the south of Grants.

The catchments surrounding Grants are predominately undisturbed, with some rural residential areas and road infrastructure. Mangroves cover much of the coastal shoreline downstream of Grants.

2.4 LOCAL DRAINAGE NETWORK

Figure 2.2 shows the local drainage features within the vicinity of Grants. Drainage features that cross the Grants area eventually drain to the Timor Sea. The Grants area is drained by a series of first order tributaries including (Figure 2.2):

- Drainage Line 1;
- Drainage Line 2;
- Drainage Line 3; and
- Unnamed tributary that discharges into the Darwin Harbour (West Arm).

2.4.1 Drainage Line 1

Drainage Line 1 has a catchment area of approximately 345 ha upstream of the ML boundary for pre-mining conditions. The catchment is mostly natural and undisturbed and is defined by low lying topography and several permanent pools. The channel is defined and the riparian corridor is vegetated with grasses, reeds and small shrubs. Drainage Line 1 crosses Cox Peninsula Road via two 2.4 m by 1.8 m reinforced concrete box culverts.

2.4.2 Drainage Line 2

Drainage Line 2 has a catchment area of approximately 266 ha upstream of its confluence with Drainage Line 1. The channel is poorly defined through the Drainage Line 2 reach. The channel becomes more defined closer to Cox Peninsula Road. The channel is poorly defined with broad floodplain which are vegetated with grasses, shrubs and small trees. Drainage Line 2 crosses an existing access road to the mining area via six 1.2 m by 0.6 m reinforced concrete box culverts.

2.4.3 Drainage Line 3

Drainage Line 3 has a catchment area of approximately 276 ha upstream of ML boundary. The catchment is mostly natural with some disturbed areas to the west as a result of preliminary exploration activities and historic mining. The channel is poorly defined in the upper reach of Drainage Line 3. The channel becomes more defined closer to Cox Peninsula Road. The channel banks are vegetated with grasses, shrubs and small trees. Drainage Line 3 crosses Cox Peninsula Road via three 1.2 m by 0.9 m reinforced concrete box culverts.

2.4.4 Unnamed Tributary that discharges into the Darwin Harbour (West Arm)

Drainage Line 1, Drainage Line 2 and Drainage Line 3 discharge into an unnamed tributary that discharges into the Darwin Harbour (West Arm). The tributary has an approximate catchment area of 25.2 km² at GDS DH1 (Figure 6.1). The channel is defined towards the lower reach of the unnamed tributary.

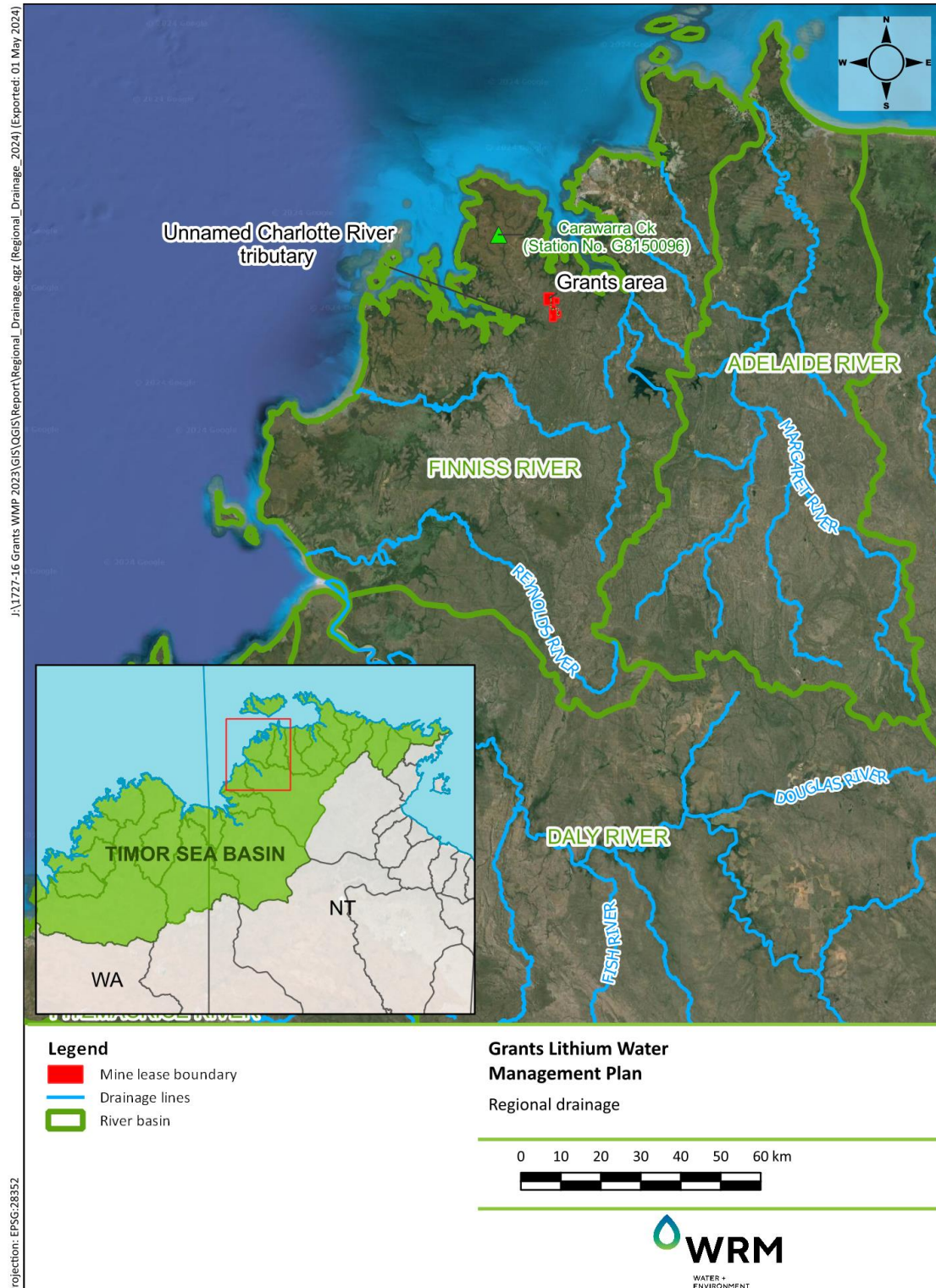


Figure 2.1 Regional drainage

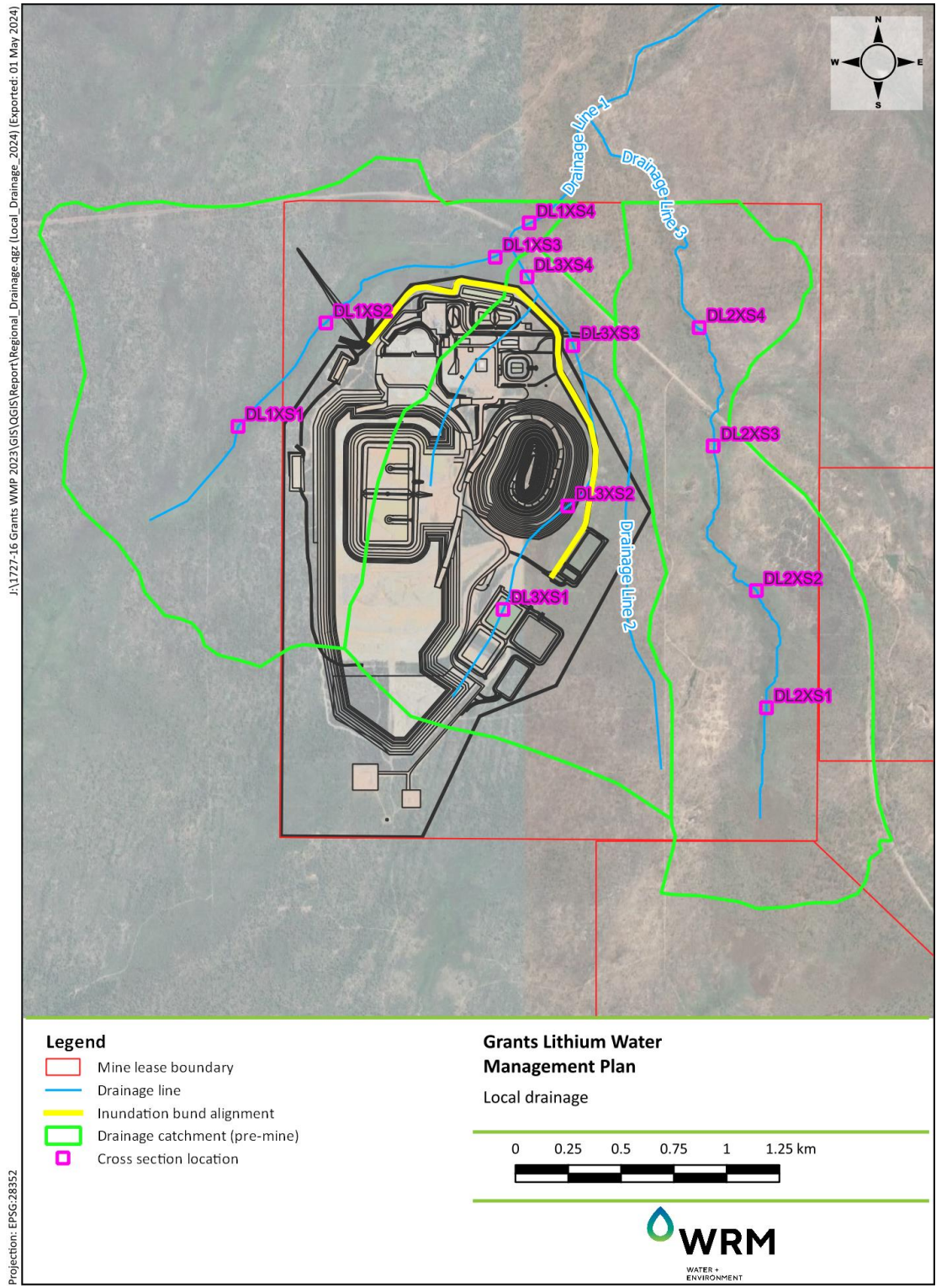


Figure 2.2 Local drainage

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 2023. Derived daily pan evaporation, lake evaporation and actual evapotranspiration rates were also available for Grants from the SILO Data Drill Service.

2.5.1 Rainfall

The average monthly rainfalls at Grants exhibit distinct wet (November to March) and dry (April to October) seasons during the year, with a dry season low of 1.2 mm in July to a wet season high of 389.5 mm in January. The wet season average monthly rainfalls (133 mm to 390 mm) are significantly higher than the equivalent dry season monthly rainfalls (1.2 mm to 57.2 mm). The recorded mean annual rainfall at the Project over the period 1889 to 2023 is approximately 1,528 mm.

Table 2.1 shows the mean monthly and annual SILO Data Drill rainfall, evaporation and Morton's lake evaporation at Grants based on the available 135 years of data. Figure 2.3 shows the statistical variation of monthly rainfall at Grants.

2.5.2 Evaporation

Table 2.1 shows the mean monthly and annual SILO Data Drill pan evaporation values at Grants based on the available 135 years of data. Figure 2.4 shows the variation of mean monthly evaporation and evapotranspiration at Grants. The average annual pan evaporation at the Project is estimated to be approximately 2,296 mm, which is approximately 1.5 times the average annual rainfall.

Soil moisture evapotranspiration losses in the AWBM model were estimated using Morton's Wet evapotranspiration, which is on average 98% of Morton's Lake evaporation in the vicinity of the project. Figure 2.4 shows the mean monthly evaporation and evapotranspiration at Grants.

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

Month	Mean monthly rainfall (mm)	Mean monthly pan evaporation (mm)	Mean Morton's lake evaporation (mm)
January	389.5	173.4	165.5
February	319.3	148.5	151.2
March	272.3	163.9	179.2
April	84.1	176.8	179.6
May	9.7	186.1	164.1
June	2.4	178.3	142.6
July	1.2	193.2	153.1
August	1.3	211.3	177.7
September	14.0	223.6	198.2
October	57.2	238.1	218.3
November	133.1	210.4	203.4
December	243.4	192.2	186.3
Annual	1527.6	2295.6	2119.2

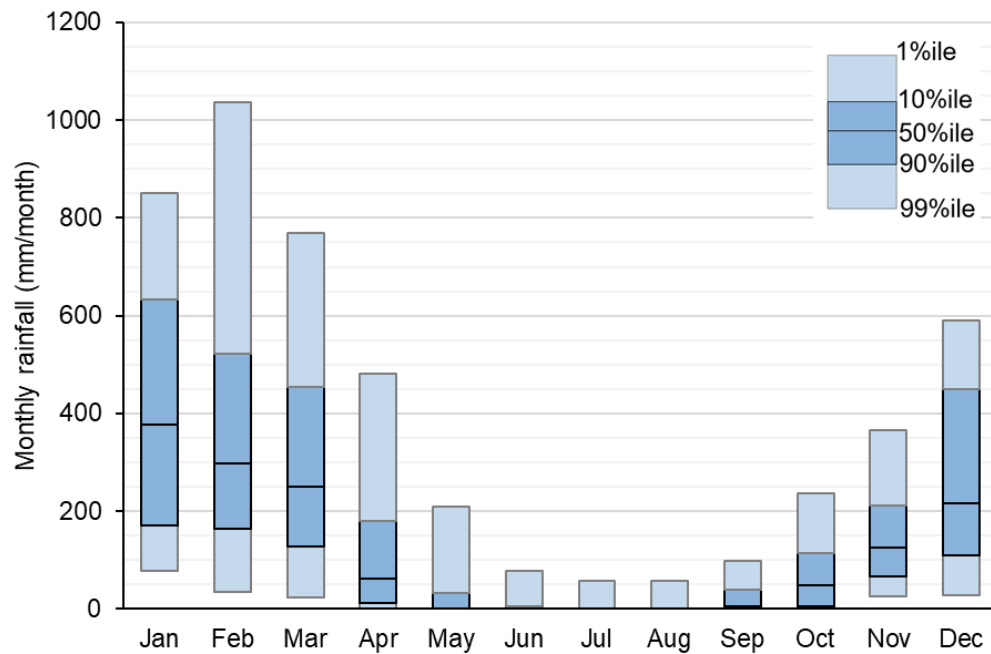


Figure 2.3 Monthly rainfall at Grants from 134 years of SILO Data Drill rainfall data

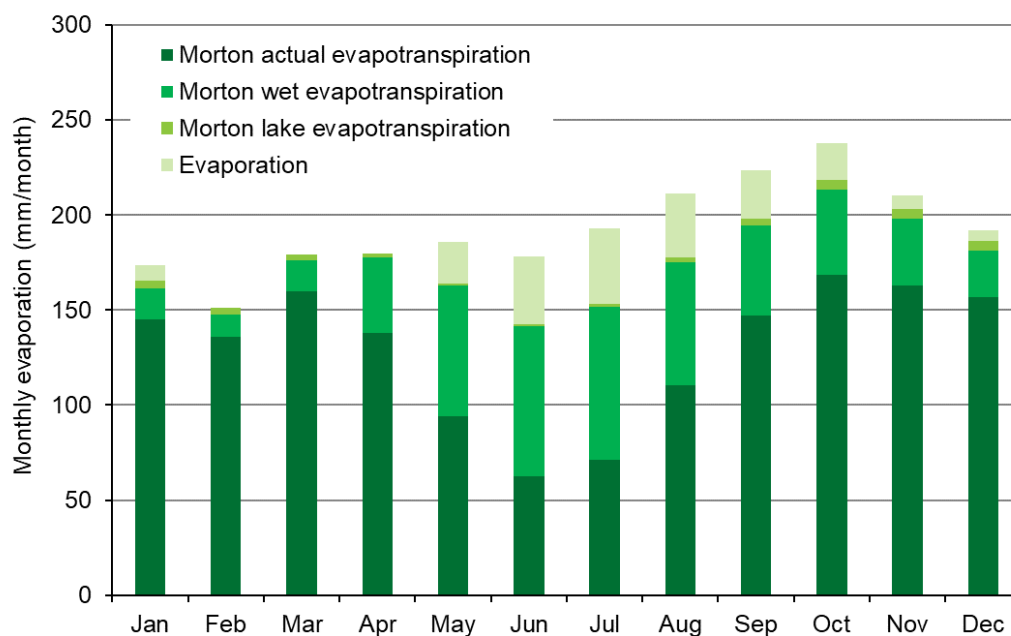


Figure 2.4 Mean monthly evaporation and evapotranspiration at Grants from 134 years of SILO Data Drill rainfall data

2.6 GEOLOGY AND SOILS

EcOz (2019) completed an assessment of the soils in the vicinity of the Project as part of Grant's Erosion and Sediment Control Plan (ESCP). To characterise the soils at the site, EcOz collected 18 detailed soil profiles from the site and surrounds.

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 Grants area is shown in Figure 2.5. The majority of the disturbance area comprises rudisol soils associated with land unit 2a1, with small areas of hydrosols associated with land units 6b (drainage systems) and 5a (alluvial plains).

Land unit mapping shows the project area has a Nil (Class 1) risk of Acid Sulfate Soils which correlates with the Land Systems of the Northern Part of the Northern Territory which shows there is no potential acid sulfate soils within the project area.

Table 2.2 Land units and soils within the mineral lease boundary (EcOz, 2019)

Landform class	Land unit	Landform	Soil description
Rises	2a1	Low rises and associated upper slopes. Gradient 0.5-4 %. Extensive surface gravels	Rudisols. 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.
Plains	6b	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.

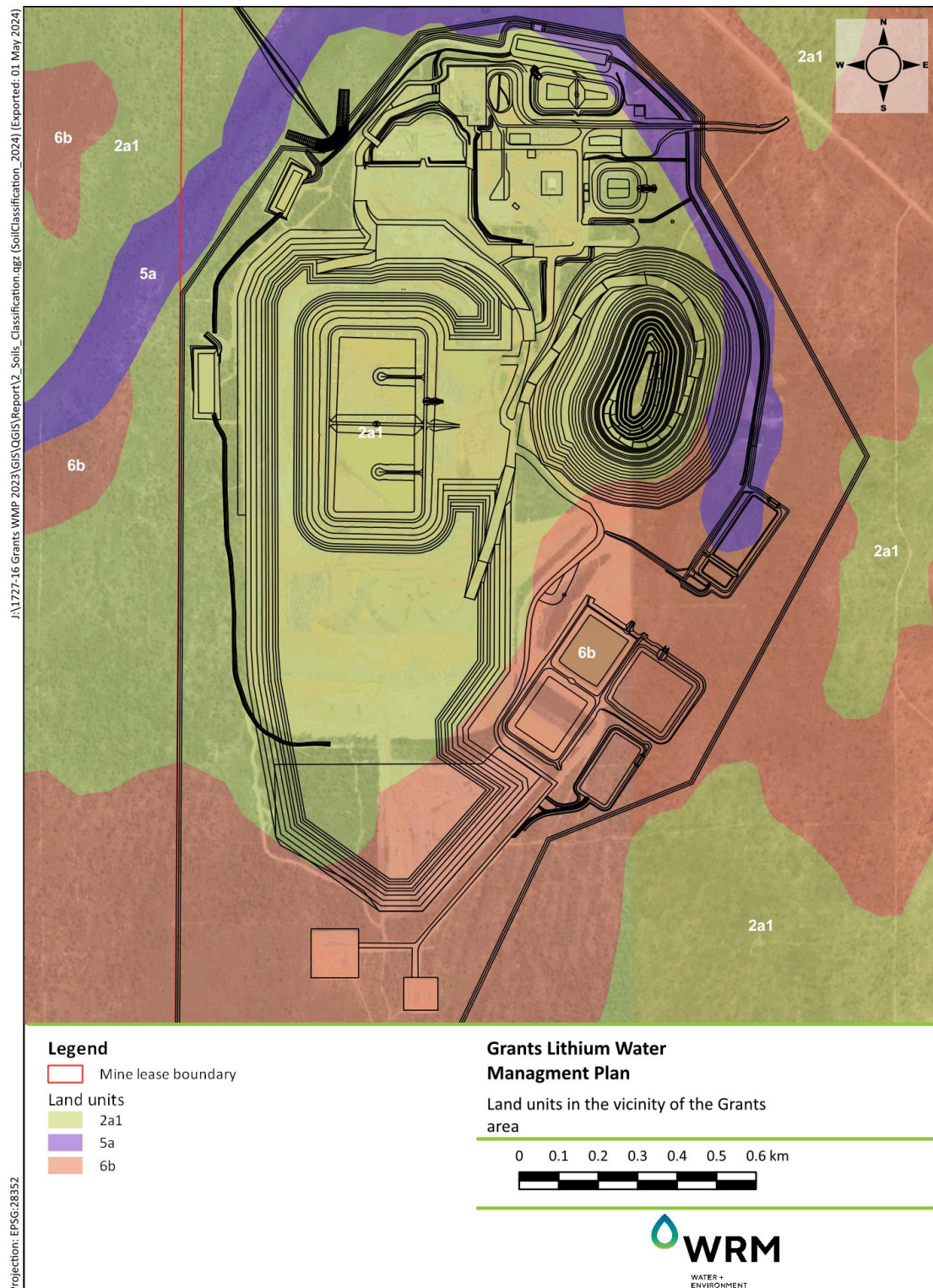


Figure 2.5 Distribution of identified land units

2.6.2 Sodic and dispersive soils

2.6.2.1 Sodicty

Exchangeable sodium percentage (ESP) is a measure of the proportion of sodium ions relative to other cations – referred to as sodicity. Sodicity degrades soil properties by weakening the bonds between soil particles.

EcOz (2019) identified that soils at Grants have ESPs between 1.4% and 37.3%, averaging 11.4%. Thus, a significant portion of the soils at the site may be regarded as moderately to highly sodic.

2.6.2.2 Emerson Class

The Emerson Class is determined from the Emerson Aggregate Test, and eight-class classification describing the behaviour of air-dried aggregates when placed in distilled water. Specifically, it describes whether the soil aggregates slake or disperse. Soil sampling on the site determined the following:

- Land unit 2a1 soils generally exhibited an Emerson Class of 4, with some instances of Emerson Class 8 near the OC and MIA areas.
- Only one sample was collected for the 5a land unit area, which showed an Emerson Class of 4 on the A horizon (surface) and 3 on the B horizon (subsoil).
- Land unit 6b soils generally exhibited an Emerson Class of 4.

To control erosion from sodic dispersive soils, soils will be selectively handled and managed accordingly.

2.6.3 Soil suitability for irrigation

An irrigation suitability assessment was conducted in May 2023 (EcOz, 2023) to illustrate the management and irrigation capacity of water at Grants. The outcomes of the assessment indicated that water quality from groundwater and MWD1 would not significantly impact the soil structure of the irrigation area.

2.7 GROUNDWATER CHARACTERISTICS

Information below is adapted CloudGMS (2018) along with information gained from the sampling the groundwater monitoring bores located 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 weathered and fractured BCF aquifer is a poor groundwater resource with a lack of primary porosity and open fracturing, and bore yields typically less than 0.5 L/s.
- Localised higher yields can occur where drilling intersects fracture zones or quartz veining; also at the base of the weathered zone.
- The weathered zone is more permeable than the un-weathered fresh BCF, with the highest permeability's most likely in the overlying Cenozoic sediments and upper-most weathered (laterised) BCF

- Minor aquifers may occur in the surface Cenozoic sediments in areas with thicker alluvial cover, such as along drainage lines.

2.7.2 Hydraulic conductivity

Slug tests and recovery tests undertaken by GHD (2017b) identified hydraulic conductivity of the following:

- Thin surface laterite aquifer has a moderately high K ranging between 0.068 and 1.7 m/day
- Weathered zone has a moderate K ranging between 0.022 and 0.16 m/day
- Fresh BCF has the lowest K ranging between 0.003 and 0.024 m/day.

Slug and recovery tests of the six groundwater monitoring bores installed in September 2020 confirmed that the permeability of the BCF is dependent on secondary porosity i.e., fracture and joint development (Groundwater Enterprises, 2020).

Bores that intersected fractured Burrell Creek Formation (fresh) showed a hydraulic conductivity an order of magnitude higher with a range from 0.15 – 0.28 m/day. No testing was undertaken on the alluvial sediments, which were unsaturated at the time of drilling.

2.7.3 Groundwater levels

Standing water levels (SWLs), measured in metres below ground level (mBGL), have been recorded continuously by loggers. SWL's are also measured manually during water quality sampling rounds. SWL monitoring identified:

- Groundwater levels in the shallow laterite bore GWB10 are highly responsive to rainfall with water quality reflecting a close connection between surface and groundwater.
- SWLs within the monitoring bores at the end of the dry season range between 14.8 mBGL and 3.2 mBGL.
- Wet season SWLs are within 2 m of the ground surface in all bores.
- GWB1, GWB03 and GWB07 are artisanal at the peak of the wet season.

2.7.4 Groundwater flows and recharge

CloudGMS, (2018) identified the following in respect to regional and local groundwater flows:

- Regional groundwater flows were found to be in a north to north-east direction towards Darwin harbour
- Local groundwater flows would flow from areas of to low topography.
- Diffuse recharge from rainfall is expected to be the dominant recharge mechanism.

3 CONTAMINANT SOURCE STUDY

3.1 OVERVIEW

This section of the water management plan describes the activities at Grants that could potentially generate contaminants that may impact Environmental Values of the receiving waters, if not managed. Sources of the potential contaminants have been identified and evaluated based on water quality data that has been collected on site since June 2017.

3.2 SITE OPERATING ACTIVITIES

The major components of Grants are shown in Figure 1.3. and include:

- The open cut mining pit;
- Integrated Waste Rock Dump (WRD) and Fines Storage Facility (FSF);
- Access and haul roads;
- Mine infrastructure areas including:
 - Office buildings and workshops;
 - ROM stockpiles; and
 - Crushing and DMS processing facilities.
- Flood protection levees; and
- Mine and surface water management structures.

3.3 SURFACE WATER TYPES

Water quality monitoring at Grants includes sample collection from 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 Grants is divided into four types:

- **Raw water:** is water sourced external to the mine operations.
- **Diverted water:** surface runoff from areas where water quality is 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.
- **Mine affected water (or mine water):**
 - Means the following types of water
 - Open cut water, processing plant water and FSF water;
 - Rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with that standards and requirements of an Erosion and Sediment Control Plan (ESCP) to manage such runoff, provided that this water has not been mixed with the Open cut water, processing plant water or workshop water;
 - Groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated;

- Groundwater from the mine's dewatering activities; and
- A mix of mine affected water and other 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.
- **Sediment 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 pit water, processing plant water or workshop water.

3.4 SURFACE WATER CHARACTERISTICS

3.4.1 Raw water

Raw water is captured and stored in OHD and made available for use at Grants. A total of up to 26 individual samples measuring pH, EC and various metals were collected from OHD between 2017 and 2023. These are summarised in Table A.7.

3.4.2 Diverted water

Diverted runoff areas include the diverted catchments from the site. There currently are no dams at Grants which solely capture runoff from clean catchments. However, 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).

A total of up to 85 background water quality samples (upstream and downstream of the site) measuring pH, EC and various metals were taken between 2017 and 2021. These are summarised in Table A.8.

3.4.3 Sediment water

Sediment water includes runoff from the waste dumps and general mine services / administration areas which can discharge through the sediment dams by overtopping or by being pumped.

Sediment dams receive runoff from multiple sources and may not be solely representative of the water quality assigned with the WRDs. Table A.9 to Table A.13 shows the water quality within each of monitored sediment dams.

Results indicate:

- Total phosphorus and total nitrogen recorded in each of the sediment dams is elevated in comparison to the baseline water quality conditions.
- There are elevated recordings in aluminium for the 80th percentiles in SB2, SB4 and SB5A.
- Dissolved metals concentrations for the remaining contaminants are below the Waste Discharge Licence (WDL) trigger values.

The Grants Waste Rock/Acid Mine Drainage Management Plan (Core, 2019b) provides a general description of the implantation of management strategies for the control of acid rock drainage as well as alkaline and saline drainage from the overburden dumps.

3.4.4 Mine affected water

Mine affected water includes all runoff collected within the open cut pits (includes groundwater) and runoff from the crushing and processing areas. It also includes runoff from areas disturbed by mining which are not rehabilitated, except for areas managed under the site ESCP.

Table 3.1 shows a summary of the key mine water storages compared to the Waste Discharge Licence (WDL) Site Specific Trigger Values (SSTV).

During operations, mine affected water is primarily recycled from MWD1 and MWD2 to meet site demands (haul road dust suppression, irrigation and processing) as well as release from MWD1 under conditions of the WDL. Excess mine water can also be released from MWD1 under the conditions of the WDL provided that water is diluted to meet water quality trigger levels.

Table 3.1 Summary of water quality of mine water storages

Parameter	Units	WDL248-02 SSTV ^A	Open Cut			MWD1 Cells ^B			MWD2 Cells ^B			FSF Cells ^B		
			Median	20%ile	80%ile	Median	20%ile	80%ile	Median	20%ile	80%ile	Median	20%ile	80%ile
pH	-	5.2 - 6.6	7.62	6.60	8.16	7.61	6.8	8.7	7.8	7.28	9.27	7.55	7.39	7.60
Electrical conductivity	µS/cm	250	91.0	64.6	201	143.5	122.4	212	117.5	53.8	182.6	129.5	70	205
Turbidity	NTU	12	74.1	27.3	210	11.4	3.24	54.2	99.05	11.26	474.4	1140	413	1840
Nutrients														
Total Nitrogen	mg/L	0.4	7.9	3.0	10.1	13	7.16	16.98	4.25	1.36	9.8	7.35	1.4	14.1
Total Phosphorus	mg/L	0.01	0.08	0.03	0.22	0.02	0.01	0.06	0.3	0.03	1.276	2.22	1.22	3.33
Metals and Metalloids														
Dissolved Aluminium	mg/L	0.07	0.02	<0.01	0.26	<0.01	<0.01	0.052	0.03	0.006	0.102	0.13	0.09	0.38
Dissolved Arsenic	mg/L	0.013	0.003	<0.001	0.026	0.003	0.001	0.015	0.0015	0.0006	0.0054	0.0065	0.001	0.012
Dissolved Iron	mg/L	0.11	<0.05	<0.05	0.15	0.135	<0.05	0.952	<0.05	<0.05	0.148	0.1	<0.05	0.23
Dissolved Lithium	mg/L	0.43	0.136	0.078	1.060	0.325	0.232	0.491	0.688	0.290	1.26	1.098	0.182	1.99
Dissolved Zinc	mg/L	0.008	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Key:

^A The Waste Discharge Licence (WDL) SSTV are detailed in Section 6.3.5.1.

^B The mine water storages water quality summary includes the water quality data for all cells.

Highlighted cells represent values higher than the SSTV

3.5 SITE BACKGROUND SURFACE WATER QUALITY

Table A.22, Table A.23 and Table A.24 summarises the key water quality parameters for each of the key catchments in the vicinity of Grants. The median, 20th percentile and 80th percentile was calculated for each of the water quality parameters of interest. The background water quality data collected during operations indicates:

- Water quality results during operations are generally higher than the baseline water quality records.
- There are increases in TP and TN readings across all sites.
- The pH for the two catchments is generally slightly acidic, which correlates to the acidity of fresh rainwater in tropical regions.
- All metal recorded metal toxicants, with exception of aluminium, iron and lithium, are lower than the ANZECC WQL and the LOR.
- Aluminium, iron and lithium are generally elevated in the environment.
- The OHD baseline water quality results showed minor increases in aluminium, arsenic, iron, lithium and zinc.
- The OHD baseline water quality indicates a more neutral pH in comparison to the Darwin Harbour and Bynoe catchments water quality.

3.6 SITE BACKGROUND GROUNDWATER QUALITY

EcOz (2022) characterised the baseline groundwater quality which identified:

- Groundwater in the weathered and un-weathered BCF aquifer has moderate alkalinity (comprising 100% bicarbonate alkalinity), with anion and cation concentrations increasing with depth into the aquifer.
- Concentrations of total phosphorus, iron, lithium and arsenic were found to be significantly higher than the surface water environment.
- Major anion and cation concentrations measured in the shallow laterite aquifer (GWB10 and GWB10b) show the groundwater has negligible alkalinity, hardness and dissolved major cations; similar to those measured in the surface water around the mine footprint.

3.7 CHEMICAL AND FUEL STORAGE

Primary chemical storage areas are located within the mine services area. These storage facilities have been constructed and banded 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 to be undertaken in accordance with the site operational incident reporting forms and procedures. Incidental spills, fuel storage / use and equipment failures will continue to be a source of hydrocarbons in surface and groundwater.

4 SURFACE WATER MANAGEMENT

4.1 OVERVIEW

This section of the water management plan describes the objectives and principles of the water management system for the existing and proposed mining operations at Grants, including a description of the infrastructure and systems that have been put in place to achieve the objectives and principles.

4.2 MANAGEMENT OBJECTIVES

Overarching objectives of the Water Management System (WMS) is to:

- Ensure mine affected water accumulation is appropriately managed to minimise the risk of uncontrolled discharges to the environment;
- Ensures the site has sufficient water available for operation in dry times; and
- Manage and monitor ground and surface waters to ensure risk of environmental harm is minimised and social and environmental objectives are maintained.

Specific objectives for each water type are as follows:

- **Raw / External water:** Ensure that external water allocation and associated infrastructure is sufficient to meet site demands particularly under low rainfall conditions.
- **Mine affected water:**
 - Ensure controlled releases of mine affected water prevents environmental harm and undertaken in accordance with the conditions of the WDL.
 - Manage water inventories in wet periods to prevent accidental release of mine affected water offsite and maintain the integrity of mine water storages.
 - Understand, manage and minimise potential impacts of mine affected water on the regional groundwater system.
- **Sediment water:** Maintain the quality of water discharging from Erosion and Sediment Control (ESC) structures to as close to background levels as reasonably possible.
- **Diverted water:** Separate from mine affected and sediment water systems as much as practicable and allow it to pass uninterrupted through the catchment.

The identified changes to the water management system due to the project will continue to be managed in accordance with these objectives.

4.3 SURFACE WATER MANAGEMENT PRINCIPLES

The general principles to manage surface water for the site are as follows:

- Maintain separation of diverted water, sediment water and mine affected water runoff as best as reasonably practicable.
- Reduce the area of surface disturbance to minimise the volume of sediment or mine affected runoff.
- Collect and contain all potential mine affected water into dedicated onsite mine water storages. The mine water storages will be used as the primary water source for dust suppression.
- Divert up-catchment water runoff from upstream catchments around disturbance areas;
- Limit external catchment runoff draining into the Open cut;

- Manage sediment from disturbed catchment areas (e.g. WRD, 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 the ESCP and the WDL conditions.
- 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; and
- Manage mine affected water releases to the receiving environment in accordance with the WDL.

4.4 WATER MANAGEMENT SYSTEM

4.4.1 Mine water management

4.4.1.1 Operational system

The existing mine affected water containment is provided by the following existing storages:

- Open cut;
- MWD1 Cell 1, Cell 2 and Cell 3;
- MWD2 Cell 1 and Cell 2;
- RWD;
- FSF Cell 1 and Cell 2; and
- OHD

The locations of the above storages are presented in Figure 1.2.

FSF Cell 1 and FSF Cell 2 receives the fines slurry inflows from the Mill processing circuit. Decant water from the FSF cells would be returned to MWD2, for reuse in the Mill.

MWD1 cell 1 receives dewatering inflows from the Open Cut, MWD1 cell 2 receives surplus water from the FSF, and MWD cell 3 is used to store water for treatment and monitoring for optimised discharge under Waste Discharge Licence conditions if required. Mine affected water stored in MWD1 is used to supply haul road dust suppression and irrigation demands. Controlled releases into Drainage Line 3 may also be undertaken from MWD1 cell 3 per the WDL, when there is excess water stored onsite.

RWD is used to supply raw water demands and supplement mine water demands, where required. RWD receives pumped inflows from OHD.

4.4.1.2 Proposed water management changes

LD propose to undertake the following changes to the mine water management system:

- Conversion of SB3 and SB4 to HES Type B basins, if practicable.
- The OHD dam wall will be raised, in order to increase to total storage capacity within the dam. The upgrade date for OHD has not yet been determined.
- The C5 dam will be constructed, pending approval of LD's SWEL application, to improve water security on site. A construction date for C5 dam has not yet been determined.
- Pipeline construction between Grants MWD1 and BP33 MWD to facilitate transfer of water between operations. The pipeline is subject to approvals with a construction date not yet set.

- Construction of the Mill sump to capture surface water from the crushing plant and processing stockpiling areas. Water collected in the sump will be returned directly to the processing circuit or transferred to MWD2 for reuse.

A schematic of the Grants water management system is given in Figure 4.1.

A summary of the mine water storages, their existing and proposed capacities and surface areas are provided in Table 4.1.

Table 4.1 Operational water storages

Dam Name	Storage volume at full supply (ML)	Maximum operating volume (ML)	Dam surface area (ha)	Maximum catchment area (ha)	Overflows to
MWD1 Cell 1	115.6	92.4	2.8	2.8	Drainage Line 2
MWD1 Cell 2	112.2	92.5	2.9	2.9	MWD1
MWD1 Cell 3	59.0	10	3.3	3.3	Drainage Line 2
MWD2 Cell 1	34.8	29.6	0.8	0.8	SB2
MWD2 Cell 2	34.8	29.6	0.8	0.8	SB2
FSF Cell 1	178.1	-	5.3	5.3	SB2
FSF Cell 2	138.8	-	5.3	5.3	SB2
Mill Sump ²	20	-	0.6	4.5	SB2
RWD	29.1	20	0.9	0.9	SB2
OHD ¹	364 (620 ¹)	-	27.8	93.8	-

Key:

1 The upgrade date for OHD upgrade date is yet to be determined. The proposed upgrade volume is approximately 620 ML.

2 The construction date of the drainage sump is yet to be determined.

4.4.1.3 Consequence category assessment

GHD (2019) had undertaken a preliminary consequence category assessment for:

- FSF (Cell 1 and Cell 2);
- MWD1;
- MWD2; and
- OHD.

A summary of the status for Grants key water storages are provided in Table 4.2, which includes the consequence categories for environmental spills, dam failure and the extreme storm storage (ESS) allowance. GHD (2019) advise that a design storage allowance (DSA) is not required due to the low consequence of an environmental spill.

Table 4.2 Consequence categories for Grants mine affected water storages (GHD, 2019)

Name	Consequence category		
	Environmental spill	Dam failure	ESS
FSF	Low	Significant	1% AEP, 72-hour flood event
MWD1	Low	Significant	1% AEP, 72-hour flood event
MWD2	Low	Significant	1% AEP, 72-hour flood event
OHD	Low	Low	Not required

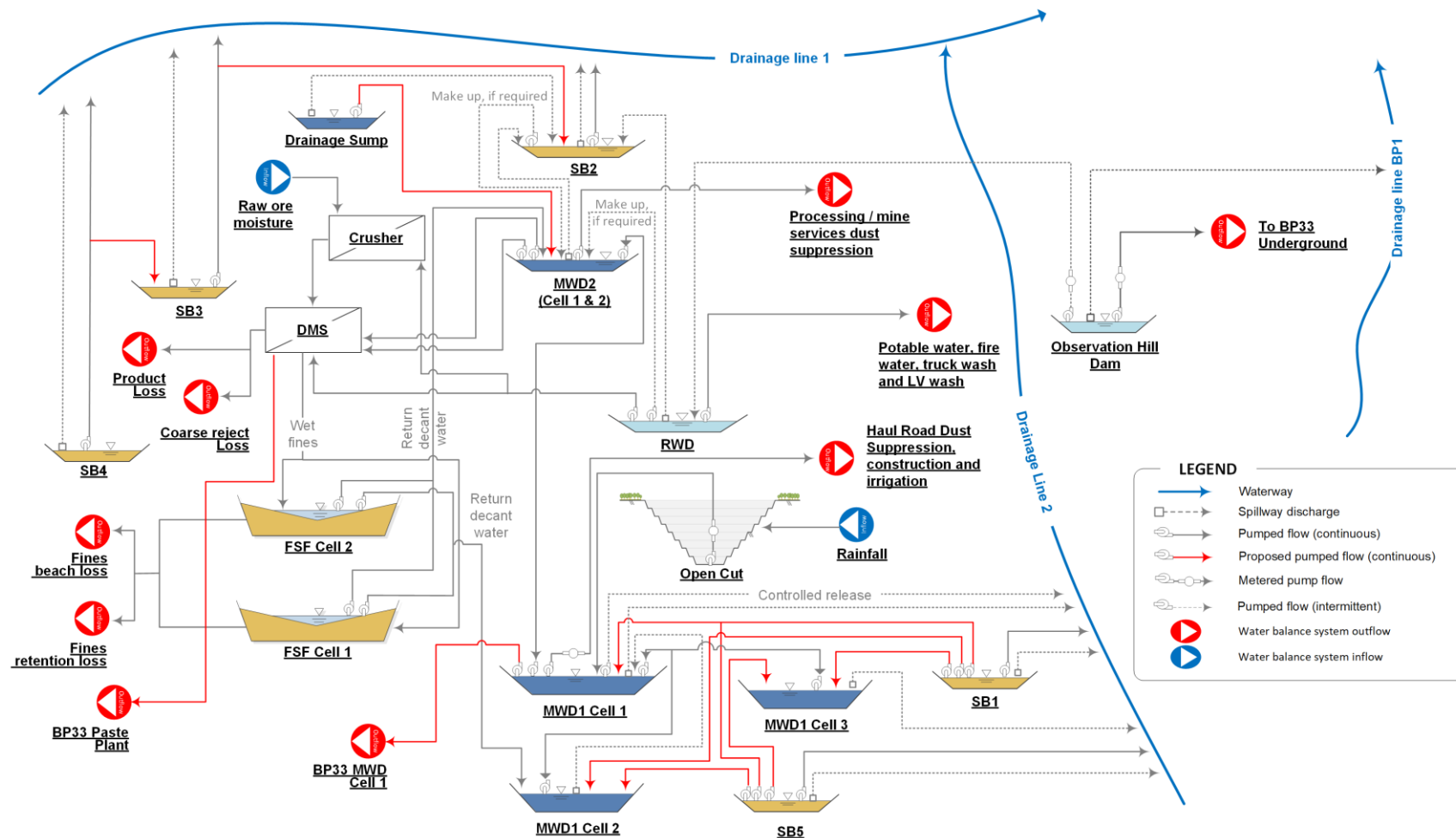


Figure 4.1 Grants Lithium WMS schematic

4.4.2 Sediment water management

Sediment water runoff from the overburden dumps will be managed in accordance with the ESCP and the Grants WRD/Acid Mine Drainage (AMD) Management Plan. The primary purpose of the ESCP is to develop strategies to manage clean water and sediment water at Grants and aims to:

- Examine and address all issues relevant to the generation, management, and mitigation of erosion and sediment transport;
- Provide guidance in erosion and sediment related issues and management techniques applicable;
- Determine the appropriate requirements for sediment and erosion control and management for all land uses; and
- Comply with any relevant regulatory requirements.

Sediment dams have been sized in accordance with the IECA method (IECA, 2008), and have been based on the following design standards and methodology:

- ‘Type D’ sediment basins; and
- Total sediment basin volume = settling zone + sediment storage volume. The sediment storage volume is the portion of the basin storage volume that progressively fills with sediment until the basin is de-silted. The settling zone is the minimum required free storage capacity that should be restored within 5 days after a runoff event or prior to the next runoff event (which ever period is greater);
- Sediment basin settling volume based on 85th percentile 5-day duration rainfall with an adopted volumetric event runoff coefficient of 0.61 (Group C soils – loamy clay) and 1 (hardstand area); and
- Solids storage volume = 50% of settling zone volume.

SB1 and SB5 were relocated to the east of MWD1 in 2023. Due to underlying topography, it was not possible to reconstruct SB5 as a Type B basin. SB1 was reconstructed as a Type B basin in 2023.

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

A summary of the design sediment dam capacities and surface areas is provided in Table 4.3. The locations of the sediment dams are shown in Figure 1.2.

Table 4.3 Current and proposed sediment water storages

Dam name	Dam type	Storage at full supply (ML)	Dam surface area (ha)	Max water depth (m)	Maximum catchment area (ha)	Overflows to
SB1	B	53.2	1.4	3	48.3	Drainage Line 2
SB2	D	39.5	1.8	4	53.3	Drainage Line 1
SB3	D	11.9	0.7	3	18.8	Drainage Line 1
SB4	D	21.6	0.9	3	36.7	Drainage Line 1
SB5	D	32.9	1.0	3	42.5	Drainage Line 2

4.4.3 Groundwater management

LD manage groundwater inflows which are expressed into the Open Cut within the surface water management system. Groundwater inflows entering the Open Cut are actively dewatered to MWD1. Ex-pit water in MWD1 will be either used to supplement site demands or released via the authorised discharge point, per the WDL.

4.4.4 Diverted Water Management

4.4.4.1 Diverted water bunds

A flood levee was constructed along the northern and eastern edges of the mining operations to protect the site from potential floodwater from the existing drainage lines. The location of the flood levee is shown in Figure 1.2.

4.4.4.2 Diverted water drains

The water management system has been designed to divert undisturbed catchments around mining operations wherever practicable. The flood levee was constructed around the site to divert the up-catchment clean runoff around the site and into Drainage Line 1.

4.5 WASTE DISCHARGE LICENCE

Grants currently operates under waste discharge license (WDL) 248-02 for the period July 2022 to July 2025. The WDL permits the following action to occur:

- Controlled discharge of wastewater from Mine Water Dam 1 (MWD1) through authorised discharge point (DP1) and into an unnamed ephemeral stream that feeds into West Arm, Darwin Harbour subject to the conditions of the licence.
- Any authorised discharge must:
 - a. Not include wastewater generated outside of Mineral Lease 31726 (the site);
 - b. Not include wastewater treated with polyacrylamide flocculants with more than 0.05% of the neuro-toxin acrylamide monomer;
 - c. Occur only when the stream gauge at the compliance point GDS SW5 shows there is a sufficient amount of water to dilute discharge water to achieve trigger values presented in Appendix 2 of the WDL;
 - d. In the event wastewater is treated, occurs only when the treatment process has finished, including allowing sufficient residence time for settlement of flocculants and target contaminants.

4.6 SURFACE WATER EXTRACTION LICENCE

4.6.1 OHD SWEL

LD operate under a Surface Water Extraction Licence (SWEL) 8151018, which allows LD to extract water from OHD for use onsite (i.e. supply for dust suppression and Mill processing demand).

4.6.2 C5 Dam SWEL

LD are currently in the process of applying for a second SWEL, to allow the site to extract surface water from the proposed C5 Dam. C5 Dam is located on an ephemeral drainage line immediately west of the mine (Drainage Line 1). The C5 dam would be used as a supplementary water supply source to ensure there is sufficient water for operational requirements. The current C5 Dam design includes the following characteristics:

- a permanent storage capacity of 290 ML;

- a catchment area of 221 ha (excluding 48 ha of site catchments collected in sediment dams); and
- a permanent inundation extent of 19 ha.

4.7 INTERACTION WITH THE BP33 PROJECT

LD is currently developing the BP33 underground mine, which forms part of the greater Finniss Lithium Project. The BP33 underground mine is located south-southeast of the Grants project. As part of the Finniss Lithium Integrated WMS, the Grants and BP33 areas would be interconnected through:

- BP33 ore being processed at the Grants facilities;
- Water transfer between the sites would be undertaken to supply demands and provide additional storage capacity through a pipeline between Grants MWD1 and BP33 MWD;
- The processing fines slurry from Grants is also proposed to be transferred to a paste plant at BP33, where cemented paste backfill will be produced for use in underground mining.

Figure 1.3 shows the location of the BP33 project in relation to Grants and the whole Finniss Lithium project.

Water management objectives for the BP33 project are:

- Divert clean runoff from undisturbed areas around areas disturbed by mining activities and allow to drain from the site;
- Capture suspended sediment in site runoff in accordance with an ESCP. This will include controlling sediment-laden runoff and passing it through sediment control structures prior to releasing it to limit any potential downstream sedimentation;
- Contain mine water in on-site water storages for reuse as a water supply to the mine demands; and
- Mine runoff and groundwater inflows will drain to collection sumps and be pumped to dedicated on-site storage dams or, if required, to the completed Grants Open Cut.

BP33 would have the ability to source water from the OHD, prior to using water from external sources.

Once mining has finished in the Grants area, excess BP33 water may be transferred and stored in the Grants water management infrastructure and pit void as required.

5 OPERATIONAL 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 current site water balance model are summarised in this section. For further details on the water balance model configuration, refer to the Water Balance Model report (WRM, 2024).

5.2 WATER BALANCE MODEL METHODOLOGY

A computer-based operational simulation model (GoldSim) was used to assess the dynamics of the current mine water management system under conditions of varying rainfall, water quality and production rates for two key stages. The key stages are:

- Stage 5: Production of ore from Grants Open cut & development of mining at BP33 (1 March 2024 to 31 March 2024).
- Stage 6: Completion of Grants ore extraction & production of ore from BP33 (1 April 2025 to 31 December 2027)

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 Grants WMS. These included:

- Total Nitrogen; and
- Total Phosphorus.

Tracking these contaminants informs maximum allowable controlled release rates under the WDL should it be required.

The model has been configured to simulate the operations of all major components of the WMS. Simulated inflows and outflows included in the model are given in Table 5.1.

Table 5.1 Simulated inflows and outflows of the WMS

Inflows	Outflows
Direct rainfall on water storage surfaces	Evaporation from water surface of storages
Catchment runoff	Mill operation demand
Groundwater inflows	Dust suppression demand
External water supply	Ancillary (misc.) water use
	Offsite spills from storages
	Controlled Releases
	Transfers to BP33

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 Open Cut (i.e. if the out of pit storages are too full to enable the Open Cut to be dewatered);
- Compliance with the WDL conditions with respect to the frequency and volumes of controlled releases and the risk of uncontrolled discharge; and
- The risk of requiring external water over and above the external supply limit.

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

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

5.4 SITE WATER BALANCE MODEL CONFIGURATION

The water balance simulated the period from Stage 5 and Stage 6 on a daily timestep which includes the Grants area and BP33 operations. For the purpose of this assessment, only the Grants WMS is reported.

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 Grants is shown in Table 5.3 and Figure 5.1.

Table 5.2 Storage characteristics for Grants WMS

Dam name	Current FSV (ML)	Current MOV (ML)
RWD	29.1	26.2
MWD1 Cell 1	115.6	92.4
MWD1 Cell 2	112.2	92.5
MWD1 Cell 3	59.0	47.2
MWD2 Cell 1	34.8	29.6
MWD2 Cell 2	34.8	29.6
SB1 ¹	53.2	-
SB2 ¹	39.5	-
SB3 ¹	11.9	-
SB4 ¹	21.6	-
SB5 ¹	32.9	-
FSF Cell1 Decant Pond	178.1	-
FSF Cell2 Decant Pond	138.8	-
Processing Drainage Sump	20 ²	-
Observation Hill Dam	364 ³	-

1 sediment dams are operated as per the sediment dam design requirements in the ESCP (EcOz, 2019).

2 The construction date of Processing Drainage Sump is yet to be determined. For the purpose of this assessment, it was assumed that the sump would be constructed by May 2024 and at approximately 20 ML.

3 The construction date of the Observation Hill Dam wall upgrade is yet to be determined.

Table 5.3 Grants Lithium catchment areas

Dam name	OHD area (ha)	Undisturbed area (ha)	Hardstand area (ha)	Fines area (ha)	Pit area (ha)	Waste Rock area (ha)	Cleared area (ha)	Total area (ha)
Open Cut	-	0.1	2.6	-	23.2	-	4.1	30.1
RWD	-	-	0.9	-	-	-	-	0.9
MWD1 Cell 1	-	-	2.8	-	-	-	-	2.8
MWD1 Cell 2	-	-	3.2	-	-	-	-	3.2
MWD1 Cell 3	-	-	3.6	-	-	-	-	3.6
MWD2 Cell 1	-	-	0.8	-	-	-	-	0.8
MWD2 Cell 2	-	-	0.8	-	-	-	-	0.8
SB1	-	5.3	10.9	-	-	14.6	7.9	38.8
SB2	-	7.1	47.6	-	-	10.3	5.8	70.9
SB3	-	2.7	2.6	-	-	11.4	0.4	17.1
SB4	-	3.8	2.4	-	-	14.8	-	21.0
SB5	-	7.9	2.7	-	-	14.8	12.6	37.9
FSF Cell 1 decant pond	-	-	1.7	3.6	-	-	-	5.3
FSF Cell 2 decant pond	-	-	1.8	3.5	-	-	-	5.2
Processing Drainage Sump	-	0.4	4.1	-	-	-	-	4.5
Observation Hill Dam	92.8	-	1	-	-	-	-	93.8
Total	92.8	119.7	85.5	7.1	23.2	49.6	30.6	332.1



Figure 5.1 Grants catchment areas and land use mapping

5.5 MODEL OUTCOMES

Key outcomes from the water balance modelling assessment for the Stage 5 and Stage 6 are as follows:

- For all climatic conditions, it is predicted that there is sufficient storage in the WMS to prevent any uncontrolled spills into the environment for the forecast period. The storage volume above the Total FSV is water accumulated in the Open cut.
- The WMS total storage shows that:
 - For very wet climatic conditions (1%ile), it is predicted that up to 700 ML may accumulate at Grants over the forecast period.
 - For median climatic conditions (50%ile), it is predicted that up to 550 ML may accumulate at Grants over the forecast period.
- There are pumped transfers from Grants to BP33. It is predicted that:
 - For very wet climatic conditions (1%ile), up to 78 ML/month (m) and 450 ML/annum (a) may be transferred to BP33.
 - For median climatic conditions (50%ile), up to 55 ML/m and 370 ML/a may be transferred to BP33.
- There are controlled releases under WDL248-02 to manage the direct rainfall and catchment runoff in the WMS. It is predicted that:
 - For very wet climatic conditions (1%ile), up to 250 ML/m and 530 ML/a is released during the wet seasons of the forecast period;
 - For median climatic conditions (50%ile), up to 80 ML/m and 280 ML/a will be released during the wet seasons of the forecast period; and
- There is some risk of site deficits at Grants over the forecast period. It is predicted that:
 - Up to 55 ML/m and 150 ML/a may be required during the very dry climatic conditions (99%ile) in Stage 6 (2025). Deficits would generally occur during the drier climatic conditions during the dry season.

Table 5.4 shows the summary of inflows and outflows of the water management system for the four-year forecast period for average climatic conditions. Figure 5.2 shows the total storage inventory for the WMS (including OHD). Figure 5.3 shows the predicted monthly deficits at Grants. Figure 5.4 shows the predicted monthly discharges and dilution ratio from Grants. Figure 5.5 shows the predicted monthly transfers to BP33 from Grants MWD1.

Further information regarding the water balance modelling results is documented in WRM (2024).

Table 5.4 Grants site water balance for average climatic conditions

Description		Stage 5 (ML/a)	Stage 6 (ML/a)
Water sources	Surface water inflow	2,037	2,040
	Groundwater inflow	73	73
	Inflows from OHD	115	124
	Feed moisture	15	21
	External water	0	4
	Total inflow	2,240	2,263
Water losses and usage	Evaporation (from water storage)	314	218
	Dust suppression demands	235	103
	Miscellaneous demands	37	36
	Offsite overflows	926	585
	Transfers to BP33	236	341
	Total loss	1,747	1,284
Mill losses	Product loss	3	16
	Fines Beach loss	24	0
	Reject loss	14	21
	Crusher loss	9	9
	Gland loss and crusher requirements	44	42
	FSF moisture retention	78	0
	Tailings to BP33	0	225
	Total mill loss	171	314
Water disposal measures	Controlled releases offsite	290	215
	Total disposal	290	215
Site water balance		32	451

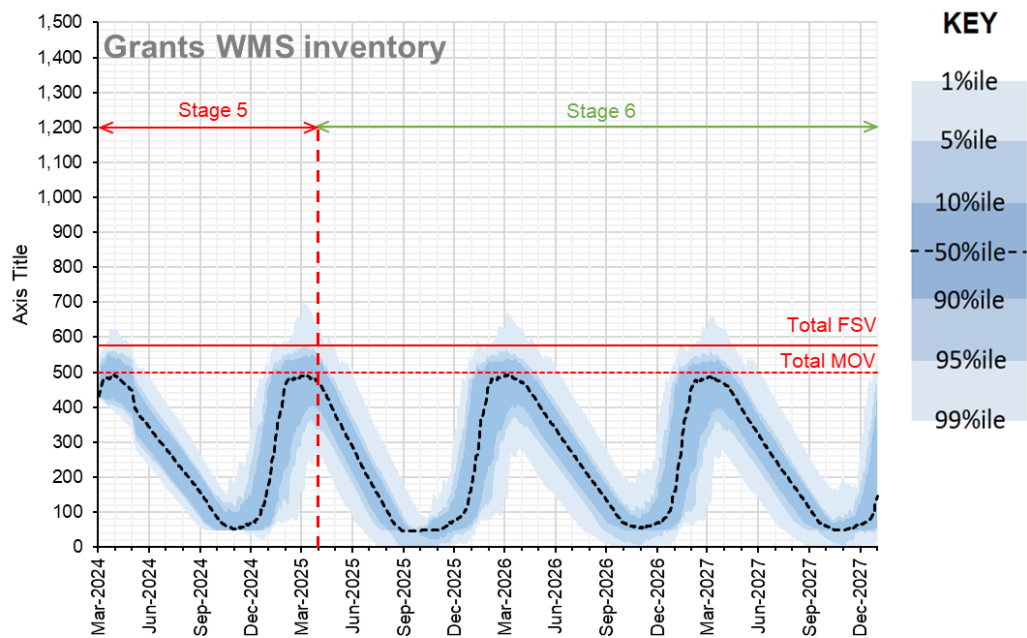


Figure 5.2 Total storage inventory in the WMS

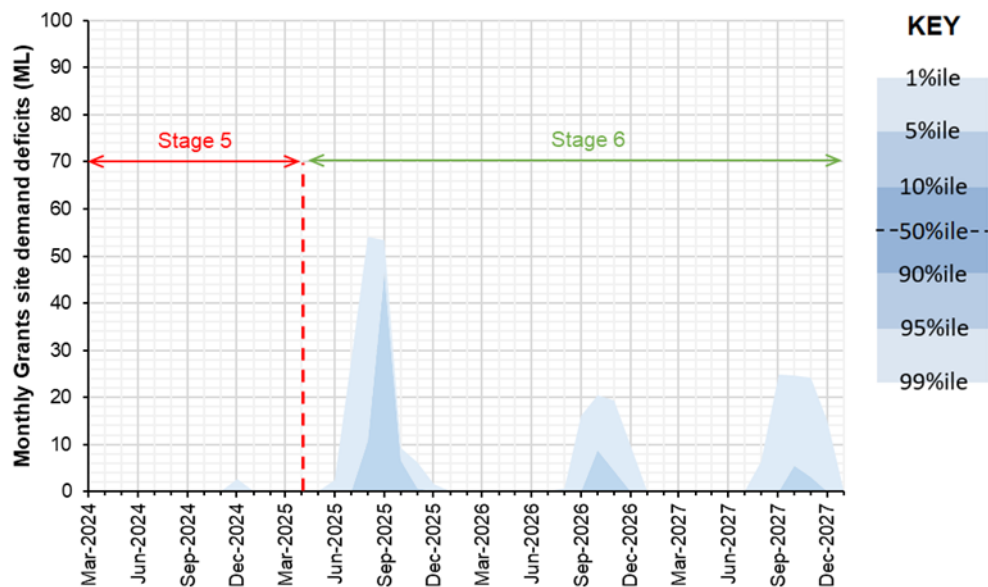


Figure 5.3 Total site deficit in Grants WMS

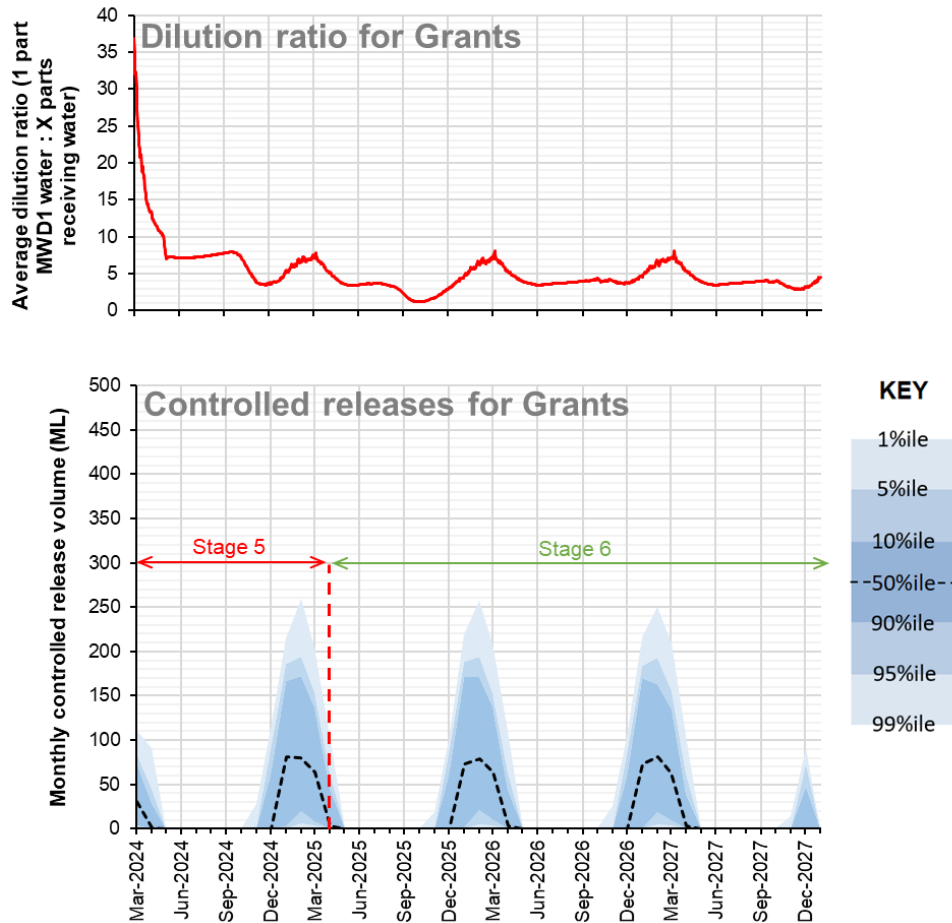


Figure 5.4 Monthly controlled releases during the Operational period

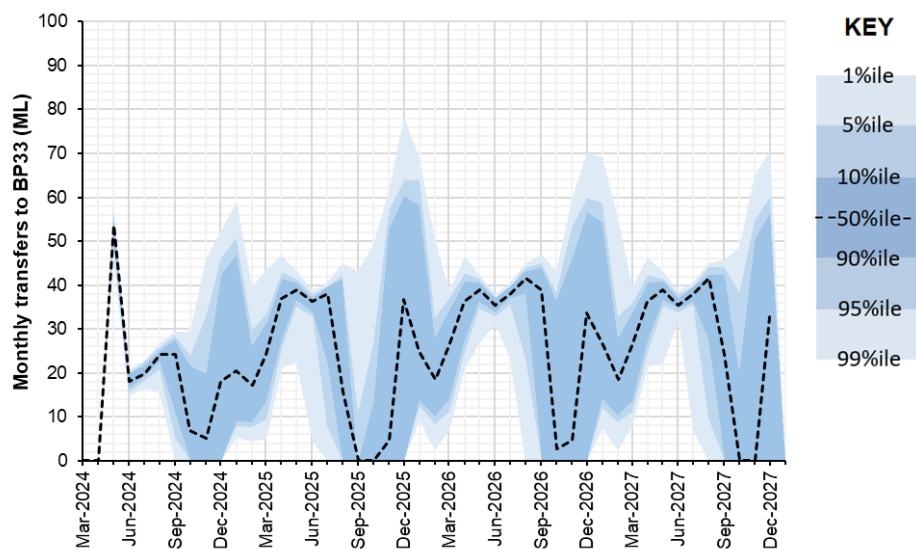


Figure 5.5 Monthly transfers to BP33 during the Operational period

6 WATER QUALITY MONITORING PLAN

6.1 OVERVIEW

The objective 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, National Water Quality Management Strategy Paper No 4;
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 7; and
- AS/NZ Standards 5667:1998 – Water Quality Sampling Parts 1, 4, 6, 10 and 11.

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 (uS/cm) • Total Dissolved Solids (mg/L) • Turbidity (NTU) • Temperature (oC) • Oxidation Reduction Potential (mV) • Dissolved Oxygen (%saturation)	• pH (pH units) • Electrical Conductivity (uS/cm) • Total Dissolved Solids (mg/L) • Turbidity (NTU) • Temperature (oC) • Oxidation Reduction Potential (mV) • Dissolved Oxygen (%saturation) • Standing Water Levels
Laboratory	• Nutrients (ammonia, Nitrate, Nitrite, total nitrogen, total phosphorus, reactive phosphorus). • Dissolved and total metals: ○ Aluminium ○ Arsenic ○ Cadmium ○ Chromium	• Nutrients (ammonia, Nitrate, Nitrite, total nitrogen, total phosphorus, reactive phosphorus). • Dissolved and total metals: ○ Aluminium ○ Arsenic ○ Cadmium ○ Chromium

Type	Parameters (Surface water)	Parameters (Groundwater)
	○ Copper ○ Iron ○ Lithium ○ Mercury ○ Lead ○ Nickel ○ Zinc ● Dissolved and total metals extended suite of 30+ metals in addition to the above. ● Major anions (sulfate, chloride and alkalinity) ● Major cations (calcium, magnesium, sodium and potassium) ● Hydrocarbons TPH/TRH, BTEXN (Sediment basins only) ● Constituents contained within the flocculants /chemicals used to treat water in sediment basins, MWD1, ore processing or fines thickening	○ Copper ○ Iron ○ Lithium ○ Mercury ○ Lead ○ Nickel ○ Zinc ● Dissolved and total metals extended suite of 30+ metals in addition to the above. ● Major anions (sulfate, chloride and alkalinity) ● Major cations (calcium, magnesium, sodium and potassium) ● Hydrocarbons TPH/TRH, BTEXN ● Constituents contained within the flocculants /chemicals used to treat water in sediment basins, MWD1, ore processing or fines thickening
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 include:
 - FSF/WRD seepage;
 - Water dewatered from the Open cut;
 - Flocculants/chemicals used to treat water across site
 - Stormwater runoff from the mine site;
 - Acid mine drainage from the FSF/WRD and Open cut water;

- Fuel or chemical spills/leaks; and
- Flocculants/additives used in ore processing and fines thickening; and
- 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 Open cut 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

Surface water monitoring site locations are shown in Figure 6.1 and detailed in Table 6.2. The operational water quality monitoring locations for the water storages are detailed in Table 6.3.

Table 6.2 Surface water quality monitoring sites details

Site ID	Purpose	Sampling frequency
GDS SW1	● Impact location ● Monitors downstream of eastern side of mine footprint including MWD1 discharge and Sed1 discharge	● Monthly: Field and lab parameters during wet season (November to April).
GDS SW2	● Impact location ● Monitors downstream after the confluence of the eastern and western drainage lines	
GUS SW3	● Impact location ● Site upstream of mine footprint prior to C5 Dam construction. Then will be monitored at the C5 Dam after construction.	
GUS SW4	● Impact location ● Monitors downstream of site in a separate waterway that receives impacted water during significant rain events.	
GDS SW5	● Impact location ● Monitors downstream of GDS SW2 and representative of water entering Darwin Harbour ● Compliance location for WDL248	
GUS SW7	● Reference location ● Monitors upstream of all mine impacts.	

Site ID	Purpose	Sampling frequency
	Data can be used for refining SSTVs.	
GDS DH1	- Impact location - Monitors downstream of GDS SW5 and representative of water entering Darwin Harbour	
OHD	Monitor raw water source for site use.	Monthly: Field and lab parameters year round.

Table 6.3 Operational water quality monitoring sites details

Site ID	Purpose	Sampling frequency
SB1A, SB2, SB3, SB4 and SB5A	Monitor water quality in sediment basins to assess treatment options, upstream controls and to ensure compliance with IECA (2008) criteria prior to release.	Prior to controlled release: Field parameters Weekly: Field and lab parameters when discharging (passive and / or controlled)
MWD1 Cell 1, MWD1 Cell 2, MWD1 Cell 3	Monitor water quality to assess treatment options and ensure compliance with irrigation and / or WDL criteria prior to release	Monthly: Field and lab parameters during wet season (November - April) regardless of discharge
MWD2 Cell 1, MWD2 Cell 2	Monitor quality of FSF decant to inform detection of any FSF seepage in groundwater or surface water monitoring results.	Monthly: Field and lab parameters when dam is receiving water.
Open Cut	Monitor quality to provide early warning of any unusually high levels of contamination or AMD risk.	Weekly: Field parameters. Monthly: Field and lab parameters.

6.3.2 Sampling frequency

Sampling frequency will be undertaken as per 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

LD monitors surface water flow in the Grants catchment at a number of gauging stations to provide information for flood assessments, engineering designs and waste discharge calculations.

There are four primary water level loggers across the Finnis Lithium project, two of which are located in the Grants catchment and two in the BP33 catchment:

- Grants catchment:
 - GDS SW2 located downstream of the mine and upstream of the culverts under the Cox Peninsula Road; and
 - GDS SW5 located downstream the mine and at the compliance point.
- BP33 catchment:
 - OHD Spillway located at the Observation Hill Dam; and
 - BPDS SW2 located at downstream OHD and the BP33 site.

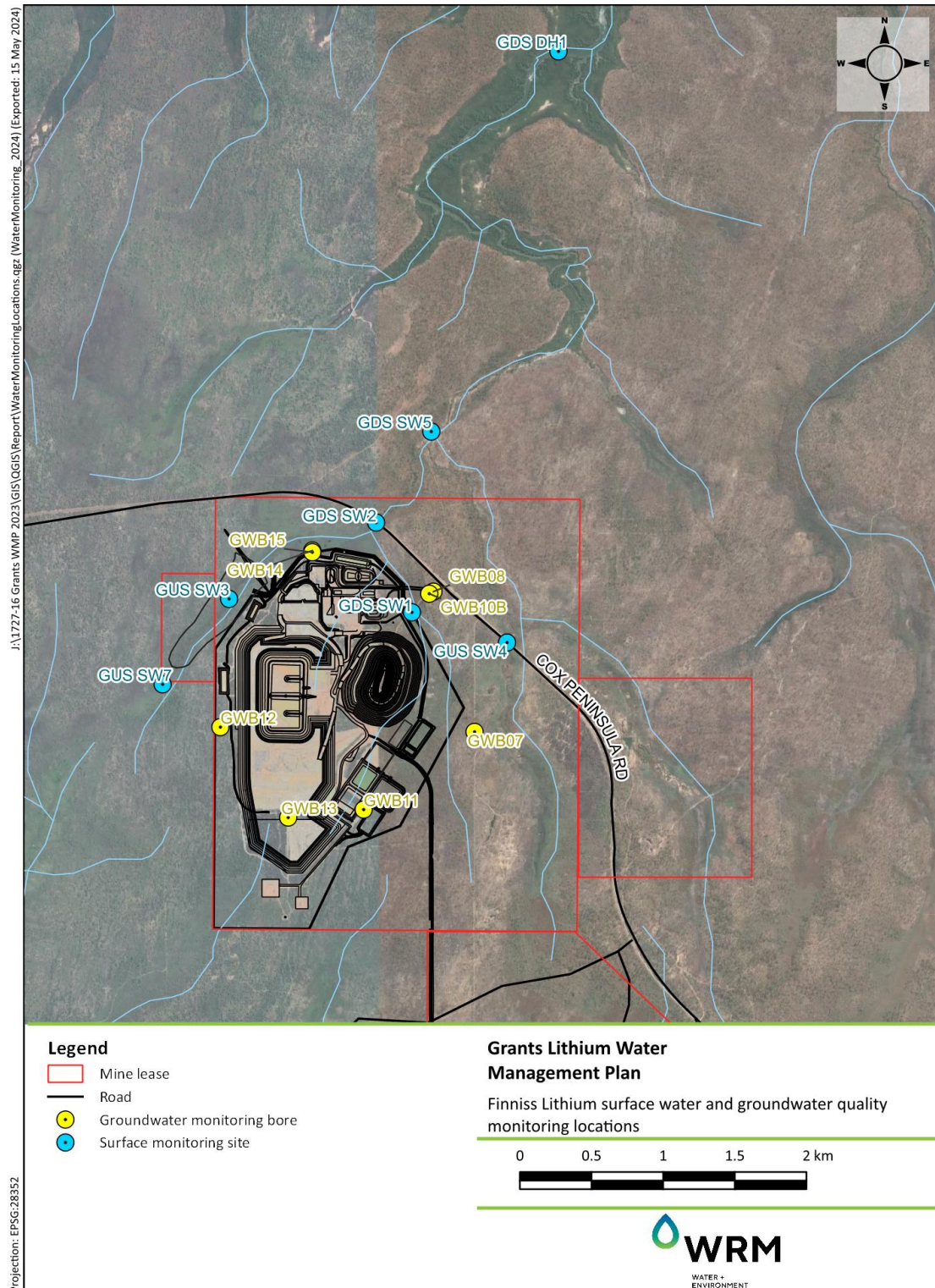


Figure 6.1 Surface water and groundwater quality monitoring sites

6.3.5 Assessment criteria

6.3.5.1 Downstream surface water SSTVs

Table 6.4 lists the SSTVs to apply to the compliance surface water site downstream the mine footprint (GDS SW5). These SSTVs are generally based on the current WDL.

Table 6.4 Downstream surface water trigger values

Parameter	Units	Analysis	Trigger value
<i>Environmental field data</i>			
pH	pH	In situ	5.2-6.6 ²
Electrical conductivity	μS/cm		250 ¹
Turbidity	NTU		12 ³
Dissolved oxygen	% sat.		50-100 ²
<i>Nutrients</i>			
Total Nitrogen	μg/L	Unfiltered	400 ³
Total Phosphorus			10 ³
<i>Metals and Metalloids</i> ⁵			
Aluminium	μg/L	Filtered (0.45 μm)	70 ³
Arsenic			13 ¹
Cadmium			0.2 ¹
Chromium			1.0 ¹
Copper			1.4 ¹
Iron			110 ³
Lead			3.4 ¹
Lithium			430 ⁴
Mercury			0.6 ¹
Nickel			11 ¹
Zinc			8 ¹

¹ ANZG (2018) 95% species protection, freshwater

² 20th percentile of background data for surface water quality

³ 80th percentile of background data for surface water quality

⁴ Ecotoxicology Assessment section 8.3 and 8.4 of the Water Management Plan

⁵ SSTVs for metals and metalloids apply to filtered samples only

6.3.5.2 MWD1 discharge water quality criteria

Discharge water quality from MWD1 will aim to meet the WDL248-02 criteria at the compliance point following dilution. Water treatment will be undertaken prior to release if initial water quality does not meet these criteria. Samples collected from MWD1 are used to define water quality parameters to enable dilution calculations to ensure safe discharge

6.3.5.3 Dust suppression / irrigation water quality criteria

The quality of water used from MWD1 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);
- noting the requirement for site-specific assessment as outlined in Volume 3, Section 9.2.6, ANZECC (2000c).

6.3.5.4 Sediment basin discharge water criteria

It is anticipated that turbidity in the sediment basins will be reduced as much as possible. Final discharge from the sediment basins is not always expected to achieve the very low turbidity levels in the receiving drainage lines. As such, the discharge standard recommended for sediment basins in IECA (2008) is adopted:

90th percentile NTU reading not exceeding 100, and 50th percentile NTU reading not exceeding 60

Once discharged, 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 growing within the drainage lines

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 discussed in the preceding sections of this WMP, such as AMD, or any other contaminants potentially in seepage from the WRD/FSF, including additives used in ore processing and fines thickening.

Continuous measurement of groundwater levels using Troll Loggers in all bores will allow detection of any groundwater mounding associated with the WRD/FSF or any other water storages on site; also any potential groundwater drawdown around the Open cut.

6.4.1 Groundwater Monitoring Sites

Proposed groundwater monitoring site locations are shown in Figure 6.1 and detailed in Table 6.5.

Table 6.5 Groundwater monitoring site details

Site ID	Purpose	Sampling frequency
GWB07	Deep bore in fresh BCF cross gradient of mine footprint (southeast side).	Quarterly: Field and lab parameters. Continuous: Standing water levels
GWB08	Deep bore in BCF down-gradient of mine footprint (north side); paired with shallow bore GWB10B.	
GWB11	Deep bore in fractured fresh BCF up-gradient of mine footprint (south side) to provide detail on regional groundwater flow direction and background groundwater quality.	
GWB12	Deep bore in fresh BCF up-gradient of mine footprint (west side) to provide detail on regional groundwater flow direction and background groundwater quality.	
GWB15	Deep bore in fractured fresh BCF down-gradient of mine footprint to monitor any water level declines adjacent to pit from dewatering and groundwater model validation. Monitoring point for potential water quality impacts from WRD on the regional aquifer.	
GWB10B	Shallow bore in alluvial aquifer/shallow groundwater system to monitor for water level impacts from Open cut de-watering; also, groundwater model validation.	
GWB13	Shallow bore in weathered BCF to monitor any groundwater mounding from the TFS/WRD. Also to monitor any changes in water quality due to TFS/WRD.	
GWB14	Shallow bore in weathered BCF down gradient of mine footprint to monitor any water quality impacts from WRD at ephemeral drainage line or any water level impacts in shallow groundwater from de-watering activities.	

6.4.2 Sampling frequency

Sampling frequency will be undertaken as per that outlined in Table 6.5.

6.4.3 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

6.4.4 Assessment criteria

Table 6.6 lists the SSTV's for assessing ongoing groundwater monitoring results and have been derived in accordance with ANZG (2018) guidance.

As there are two distinct groundwater units, separate SSTV's have been defined for:

- For the shallow aquifer (bores screened at depths less than 9 mBGL);
- and deeper BCF aquifer, given the differing water quality of these systems.

Table 6.6 Site specific trigger values for groundwater quality

Parameter	Units	Deep aquifer	Shallow aquifer
pH	pH Units	6.5 – 7.1	4.5 - 5.3
Electrical Conductivity	uS/cm	247	39
Total Nitrogen	mg/L	0.4	0.5
Total Phosphorus	mg/L	0.54	0.09
Aluminium	mg/L	0.01	0.10
Arsenic	mg/L	0.131	0.009
Cadmium	mg/L	<0.0001	<0.0001
Chromium	mg/L	<0.001	<0.001
Copper	mg/L	<0.001	0.007
Iron	mg/L	0.53	0.38
Lead	mg/L	<0.001	<0.001
Lithium	mg/L	0.209	0.073
Nickel	mg/L	<0.001	0.007
Zinc	mg/L	0.007	0.092
Hydrocarbons	mg/L	Below detection limit	Below detection limit

6.4.5 Additional groundwater monitoring

It is proposed to increase the reporting of volumes and/or water levels in the Open Cut across the dry season to record the daily groundwater inflows into the Open Cut to achieve a better dataset and understanding on 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:

- Open Cut storage volumes;
- Open Cut water levels;
- Open Cut surface bathymetry; and

- Pumped volumes from the Open Cut to other storages/demands.

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.

6.5 SURFACE WATER AND GROUNDWATER QUALITY AND HYDROLOGIC RECORDING AND REPORTING

All results from surface water and groundwater quality monitoring are automatically uploaded into the LD management program (ESdat). The database contains all baseline and operational field and laboratory data.

Reporting requirements will align with those required for routine compliance monitoring.

7 ACID ROCK AND SALINE DRAINAGE

7.1 OVERVIEW

A summary of the current understanding of acid rock and saline drainage at Grants is provided in the following section.

7.2 WASTE ROCK CHARACTERISTICS

Material characterisation studies indicates that the waste rock geochemistry would be considered material with no AMD potential, primarily due to the absence of sulfur which is typical of the sedimentary environment in which it was deposited.

EC in waste rock samples ranges between 0.004 dS/m and 0.280 dS/m and may be considered low saline waste.

Taking due cognisance of the results of surface and groundwater monitoring at the Grants Project, the waste characterisation is corroborated by water quality data:

- pH in groundwater varies between 6.3 and 7.5, indicative of a circumneutral pH environment with sulfate concentrations generally less than 1 mg/L;
- The BP historic Open Cut has a pH of 8.2 and TDS of 14.3 mg/L.

7.3 MONITORING AND MANAGEMENT

Continuation of ground and surface water monitoring programs will assist in the identification of potential acid or saline drainage from the WRD in the unlikely event of occurrence. The frequency and analytes are considered appropriate to provide early indicators of potential issues so that management actions, as detailed in the Grants WRD/AMD Management Plan (LD, 2019b), can be applied.

8 EMERGENCY AND CONTINGENCY PLANNING

8.1 OVERVIEW

The Grants 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 Health and Safety Management System. A summary of the emergency response, should a failure of the water management system occur, is provided below.

8.2 CONTINGENCY ACTIONS

Contingency actions for several specific WMS-related trigger events are provided in Table 8.1.

Table 8.1 Surface water management contingency actions

Trigger	Action
Raw water supply pipeline flow meters indicate abnormally low flow rate	• Check for pipeline damage and leakage
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 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 or storm event	• Pump water from any storage at risk of unlicensed or uncontrolled discharges.
Water demands or catchment yield depart from assumed values used in modelling	• Investigate reasons. • Revisit site water balance modelling if required.
Routine monitoring indicates siltation is causing loss of water storage capacity in water management dams	• Undertake desilting operation to reinstate design storage volume.

Trigger	Action
Short-term water demand forecast may approach the entitlement under high security water licences	• Further improvements in water use efficiency. • Investigate procurement of additional water licenses.
Water monitoring indicates an exceedance of the Mine Affected Water Release Limits (Item 9 of the 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 Adminstrating Agency and other relevant parties.
Receiving water quality monitoring indicates exceedance of Receiving Waters Contaminant Trigger Levels (Item 7/Appendix 2 of the WDL)	• Cease any controlled discharges which may be causing the non-compliance until further analysis is undertaken. • Undertake an investigation in accordance with Condition 43 of the WDL.
Community complaints received of impacts to stock and domestic water supply.	• Undertake an investigation in accordance with Condition 17 of 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.

8.3 OTHER RELEVANT CONTINGENCY ACTIONS

8.3.1 Open Cut dewatering

Pumping infrastructure installed in the Open cut will maintain water levels as low as reasonably practicable to enable safe mining conditions. During significant rainfall events, pit operations are limited and pumping infrastructure is temporarily relocated to higher levels to minimise the risk of inundation. Recommencement of operations in the pit following rain events includes reinstatement of pumping infrastructure as soon as practical.

8.3.2 Offsite discharge

Based on the water balance modelling undertaken, it is likely that during a significant rainfall event, water will be able to be discharged from the release dams (MWD1) to the receiving waters in compliance with the WDL Conditions. The release of water will only occur when it can be demonstrated that compliance with the WDL SSTVs can be achieved via treatment and/or calculated dilution.

8.3.3 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. 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 A shows recommended operational water management TARPs. The operational TARPs cover:

- Table B.1 – Operational TARP for sediment basin water quality which addresses the management of water quality within the sediment basins.
- Table B.2 – Operational TARP for mine water site inventory which addresses excess storage in MWD.
- Table B.3 – Operational TARP for surface water quality which addresses exceedances in water quality parameters at the receiving monitoring location.
- Table B.4 – Operational TARP for groundwater quality which addresses exceedances in groundwater quality parameters at the monitoring locations.

9 REPORTING AND REVIEW

9.1 REVIEW OF THE WMP

The water management plan will be updated/revised if there are any material changes to the operation of the Grants water management system.

9.2 ROLES AND RESPONSIBILITIES

Table 9.1 shows responsibilities for implementation of various aspects of the WMP.

Table 9.1 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 the Maintenance team and Planning team.
Environmental Superintendent	• Ensure that water is managed in compliance with the Water Management Plan. • Ensure all water pipelines and control structures at the Mill area 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;

Role	Responsibility/Accountability
	○ Maintain storage capacity in runoff capture dams; ○ Ensure efficient recycling and preferential use of mine water. ● Ensure water supply meets supply demands of the Mill. ● Ensure all storages are maintained and operated in accordance with the WDL. ● Ensure contingency plans for climatic extremes are adhered to. ● Communicate the WMP to Mill team.
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. ● 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	● Water quality sampling and data entry. ● Inform the Environmental Advisor on water quality samples. ● Communicate water quality outcomes to environmental department.

10 REFERENCES

ANZECC, 2000a	'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 4', Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000
ANZECC, 2000b	'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 7', Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000
ANZECC, 2000c	'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 4, Volume 3, Primary Industries – Rationale and Background Information', Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000
ANZG, 2018	'Australian and New Zealand Guidelines for Fresh and Marine Water Quality', Australian and New Zealand Governments and Australian state and territory governments, 2018
Boughton, 2003	Cooperative Research Centre for Catchment Hydrology (2003). Technical Report 03/15, Calibrations of the AWM for the use on ungauged catchments.
CloudGMS, 2018	'Development of a Groundwater Model for the Grants Lithium Project, Final Version 1.0', CloudGMS, September 2018
CloudGMS, 2021	'Finniss Lithium Project BP33 Groundwater Modelling Report', CloudGMS, June 2021
CloudGMS, 2021a	'Predictive uncertainty Finniss Lithium BP33 groundwater flow model (v1.0)', CloudGMS, July 2021
Core, 2024	'Grants Mining Management Plan', Core, 2024
DLRM, 2016	'Berry Springs Water Allocation Plan 2016-2026', Department of Land Resource Management (DLRM), 2016
DPIR, 2017	'Mining Management Plan Structure Guide for Mining Operations', Department of Primary Industry and Resources (DPIR), January 2017
LD, 2019	'Grants Lithium Project – Environmental Impact Statement - Supplement', LD, 2019
LD, 2019a	'Mining Management Plan – Grants Lithium Project Mining Operations', LD, June 2019
LD, 2019b	'Waste Rock/Acid Mine Drainage Management Plan', LD, June 2019
ECAust, 2019	'Grants Lithium Project, Preliminary Mine Site Water Balance - Supplementary Report', ECAust, March 2019
EcOz, 2018a	'Soil and Waste Characterisation Grants Lithium Project LD Exploration', EcOz, October 2018
EcOz, 2018b	'Stylidium ensatum survey report, Grants Lithium Project', EcOz, September 2018
EcOz, 2019	'Erosion and Sediment Control Plan', EcOz, March 2019
EcOz, 2022	'Grants Water Management Plan', EcOz, April 2022
EcOz, 2023	'Irrigation Management Plan Grants NT, Core Lithium Pty Ltd', EcOz, May 2023
Frater, 2005	'Tin-tantalum pegmatite mineralisation of the Northern Territory, Northern Territory Geological Survey, Report 16', Northern Territory Government, 2005
GHD, 2017a	'Finniss Lithium Project, Aquatic Ecology Baseline Monitoring', GHD, October 2017

GHD, 2017b	‘Finniss Lithium Project, Groundwater Investigation Report’, GHD, December 2021
GHD, 2019	“Grants Lithium Project, Preliminary Design of TSF and Water Storages - Design Report”, GHD, March 2019
IECA, 2008	International Erosion Control Association (IECA) (2008). Best Practice Erosion and Sediment Control Guideline.
NHMRC, 2018	‘Australian Drinking Water Guidelines Paper 6, National Water Quality Management Strategy.’, National Health and Medical Research Council (NHMRC), National Resource Management Ministerial Council (NRMMC), August 2018
NRETAS, 2009	“Darwin Harbour, Sites of Conservation Significance, Fact Sheet”, Department of Natural Resources, Environment, The Arts and Sport (NRETAS), 2009
NRETAS, 2010	“Water Quality Objectives for the Darwin Harbour Region -Background Document”, Department of Natural Resources, Environment, The Arts and Sport (NRETAS), February 2010
Richardson et al, 2011	‘Australian groundwater dependant ecosystems toolbox part 1: assessment framework’, Richardson, E.Irvine, E. Froend, R. Book, P.Barber, S. and Bonneville, B., 2011
Topo, 2023	‘SEDIMENT BASIN 1 & 5 COMBINED – CONCEPT’, Topo, 2023
WRM, 2022	“Finniss Lithium Project Grants Surface Water Infrastructure Assessment”, WRM, 2022
WRM, 2023	“Grants Lithium – Water Balance Modelling Report”, WRM, 2023
WRM, 2023a	“Review of the Grants Lithium Waste Discharge Licence”, WRM, 2023
WRM, 2024	“Water Balance Modelling Assessment in support of the Grants and BP33 Operational WMP update”, WRM, 2024

APPENDIX A WATER QUALITY RESULTS

Table A.1 Darwin Harbour catchment water quality results (baseline)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	57	5.18	5.67	6.54
Electrical Conductivity (field)*	µS/cm	57	12.1	15.1	17.5
Turbidity (field)*	NTU	57	1.616	3.7	11.78
Dissolved Oxygen (field)	% sat.	57	69.96	81.70	91.48
Nutrients					
Total Nitrogen	mg/L	52	0.1	0.2	0.2
Total Phosphorus	mg/L	52	<0.01	<0.01	<0.01
Ammonia	mg/L	52	<0.01	0.02	0.08
Metals and Metalloids					
Aluminium (total)	mg/L	37	0.08	0.15	0.32
Aluminium (filtered)	mg/L	52	0.02	0.05	0.07
Arsenic (total)	mg/L	37	<0.001	<0.001	<0.001
Arsenic (filtered)	mg/L	52	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	37	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	52	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	37	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	52	<0.001	<0.001	<0.001
Copper (total)	mg/L	37	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	52	<0.001	<0.001	<0.001
Iron (total)	mg/L	37	0.10	0.24	0.48
Iron (filtered)	mg/L	52	<0.05	0.06	0.118
Lead (total)	mg/L	37	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	52	<0.001	<0.001	<0.001
Lithium (total)	mg/L	37	<0.001	0.002	0.003
Lithium (filtered)	mg/L	50	<0.001	0.001	0.002
Mercury (total)	mg/L	37	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	52	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	37	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	52	<0.001	<0.001	<0.001
Zinc (total)	mg/L	37	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	52	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.2 Bynoe Harbour catchment water quality results (baseline)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	28	5.40	5.53	7.03
Electrical Conductivity (field)*	µS/cm	28	15.5	19.1	27.1
Turbidity (field)*	NTU	27	3.72	5.41	16.50
Dissolved Oxygen (field)	% sat.	28	58.34	75.05	82.26
Nutrients					
Total Nitrogen	mg/L	24	0.1	0.2	0.3
Total Phosphorus	mg/L	24	<0.01	<0.01	0.01
Ammonia	mg/L	24	<0.01	0.02	0.09
Metals and Metalloids					
Aluminium (total)	mg/L	14	0.12	0.31	0.59
Aluminium (filtered)	mg/L	24	0.03	0.06	0.10
Arsenic (total)	mg/L	14	0.0002	0.002	0.002
Arsenic (filtered)	mg/L	24	<0.001	0.001	0.002
Cadmium (total)	mg/L	14	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	24	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	14	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	24	<0.001	<0.001	<0.001
Copper (total)	mg/L	14	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	24	<0.001	<0.001	<0.001
Iron (total)	mg/L	14	0.54	0.67	0.85
Iron (filtered)	mg/L	24	0.132	0.175	0.308
Lead (total)	mg/L	14	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	24	<0.001	<0.001	<0.001
Lithium (total)	mg/L	14	0.002	0.004	0.004
Lithium (filtered)	mg/L	22	0.002	0.004	0.007
Mercury (total)	mg/L	14	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	24	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	14	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	24	<0.001	<0.001	<0.001
Zinc (total)	mg/L	14	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	24	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.3 Observation Hill Dam catchment water quality results (baseline)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	14	6.07	6.59	6.78
Electrical Conductivity (field)*	µS/cm	14	17.0	19.5	21.8
Turbidity (field)*	NTU	14	2.37	4.78	7.4
Dissolved Oxygen (field)	% sat.	14	59.34	79.60	89.74
Nutrients					
Total Nitrogen	mg/L	10	0.2	0.3	0.5
Total Phosphorus	mg/L	10	<0.01	<0.01	<0.01
Ammonia	mg/L	11	0.02	0.03	0.10
Metals and Metalloids					
Aluminium (total)	mg/L	8	0.01	0.04	0.05
Aluminium (filtered)	mg/L	10	<0.01	<0.01	<0.01
Arsenic (total)	mg/L	8	0.0034	0.005	0.0072
Arsenic (filtered)	mg/L	10	0.002	0.003	0.0042
Cadmium (total)	mg/L	8	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	10	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	8	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	10	<0.001	<0.001	<0.001
Copper (total)	mg/L	8	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	10	<0.001	<0.001	<0.001
Iron (total)	mg/L	8	0.30	0.59	1.30
Iron (filtered)	mg/L	10	<0.05	0.075	0.182
Lead (total)	mg/L	8	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	10	<0.001	<0.001	<0.001
Lithium (total)	mg/L	8	<0.001	0.001	0.002
Lithium (filtered)	mg/L	10	<0.001	0.002	0.002
Mercury (total)	mg/L	8	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	10	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	8	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	10	<0.001	<0.001	<0.001
Zinc (total)	mg/L	8	<0.005	<0.005	0.002
Zinc (filtered)	mg/L	10	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.4 Darwin Harbour catchment metal toxicant summary results (baseline)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic Acid, As (V) (filtered)	µg/L	0.5	-	8	<0.5	0.05	0.66
Arsenious Acid, As (III) (filtered)	µg/L	0.5	-	8	<0.5	0.05	0.66
Dimethylarsinic Acid (DMA) (filtered)	µg/L	1	-	3	<1	<1	<1
Methylarsonic acid (MMA) (filtered)	µg/L	1	-	3	<1	<1	<1
Arsenobetaine (ASB) (filtered)	µg/L	1	-	3	<1	<1	<1
Benzene	µg/L	1	-	20	<1	<1	<1
Toluene	µg/L	2	2	20	<2	<2	<2
Ethylbenzene	µg/L	2	2	20	<2	<2	<2
Xylene (m & p)	µg/L	2	-	20	<2	<2	<2
Xylene (o)	µg/L	2	2	20	<2	<2	<2
Xylene Total	µg/L	2	2	20	<2	<2	<2
Total BTEX	µg/L	1	1	20	<1	<1	<1
C6-C10 Fraction (F1)	µg/L	20	20	20	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	20	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	20	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	20	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	20	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	20	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	20	<100	<100	<100
Faecal Coliforms	CFU/100mL	1	-	8	124	330	608
E. Coli	CFU/100mL	1	-	30	21.6	115	1340
Enterococci	org/100mL	1	-	30	17.4	70.5	248
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	52	<0.01	<0.01	<0.01
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	-	52	<1	<1	<1
Nitrite + Nitrate as N	mg/L	0.01	-	52	<0.01	<0.01	0.02
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	-	52	<1	2	2.8
Alkalinity (Carbonate as CaCO3)	mg/L	1	-	52	<1	<1	<1
Alkalinity (Hydroxide) as CaCO3	mg/L	1	-	52	<1	<1	<1
Alkalinity (total) as CaCO3	mg/L	1	-	52	<1	2	2.8
Ammonia as N	mg/L	0.01	0.9	52	<0.01	0.02	0.08
Anions Total	meq/L	0.01	-	52	0.062	0.1	0.12
Cations Total	meq/L	0.01	-	52	0.09	0.09	0.09
Chloride	mg/L	1	-	52	2	2	3
Kjeldahl Nitrogen Total	mg/L	0.1	-	52	0.1	0.2	0.2
Nitrate (as N)	mg/L	0.01	-	52	<0.01	<0.01	0.02
Nitrite (as N)	mg/L	0.01	-	52	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	52	0.1	0.2	0.2
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	7	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	45	<0.001	0.002	0.004
Sodium (filtered)	mg/L	1	-	52	2	2	2
Hardness as CaCO3 (filtered)	mg/L	1	-	20	<1	<1	<1
Aluminium	mg/L	0.01	-	37	0.082	0.15	0.318
Aluminium (filtered)	mg/L	0.01	0.07	52	0.022	0.05	0.07
Arsenic	mg/L	0.001	-	37	<0.001	<0.001	<0.001
Arsenic (filtered)	mg/L	0.001	0.013	52	<0.001	<0.001	<0.001
Barium	mg/L	0.001	-	5	0.004	0.005	0.0072
Barium (filtered)	mg/L	0.001	-	5	0.0022	0.004	0.0054

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Beryllium	mg/L	0.001	-	5	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	5	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	5	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	5	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	-	37	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	52	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	52	<1	<1	<1
Cesium	µg/L	1	-	5	<1	<1	<1
Cesium (filtered)	µg/L	1	-	5	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	37	<0.001	<0.001	<0.001
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	52	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	5	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	5	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	37	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	0.001	0.0014	52	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	37	0.1	0.24	0.48
Iron (filtered)	mg/L	0.05	0.11	52	<0.05	0.06	0.118
Lead	mg/L	0.001	-	37	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	52	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	37	<0.001	0.002	0.0028
Lithium (filtered)	mg/L	0.001	0.43	50	<0.001	0.001	0.0022
Magnesium (filtered)	mg/L	1	-	52	<1	<1	<1
Mercury	mg/L	0.0001	-	37	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	52	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.001	-	37	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	52	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	52	<1	<1	<1
Selenium	mg/L	0.01	-	20	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	35	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	5	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	5	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	5	<0.001	0.001	0.0012
Strontium (filtered)	mg/L	0.001	-	5	<0.001	0.001	0.001
Thorium	µg/L	1	-	5	<1	<1	<1
Thorium (filtered)	µg/L	1	-	5	<1	<1	<1
Tin	mg/L	0.001	-	10	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	25	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	5	<0.01	<0.01	<0.01
Titanium (filtered)	mg/L	0.01	-	5	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	5	<1	<1	<1
Uranium (filtered)	mg/L	1	-	5	<1	<1	<1
Vanadium	mg/L	0.01	-	5	<0.01	<0.01	<0.01
Vanadium (filtered)	mg/L	0.01	-	5	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	37	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	52	<0.005	<0.005	<0.005
Naphthalene	µg/L	5	5	20	<5	<5	<5
C6-C9 Fraction	µg/L	20	20	20	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	20	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	20	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	12	<50	<50	<50
C10-C36 Fraction (Sum)	µg/L	50	50	12	<50	<50	<50

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.

Table A.5 Bynoe Harbour catchment toxicant summary results (baseline)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic Acid, As (V) (filtered)	µg/L	0.5	-	3	<0.5	<0.5	<0.5
Arsenious Acid, As (III) (filtered)	µg/L	0.5	-	3	1.3	1.3	1.66
Dimethylarsinic Acid (DMA) (filtered)	µg/L	1	-	1	<1	<1	<1
Methylarsonic acid (MMA) (filtered)	µg/L	1	-	1	<1	<1	<1
Arsenobetaine (ASB) (filtered)	µg/L	1	-	1	<1	<1	<1
Benzene	µg/L	1	-	12	<1	<1	<1
Toluene	µg/L	2	2	12	<2	<2	<2
Ethylbenzene	µg/L	2	2	12	<2	<2	<2
Xylene (m & p)	µg/L	2	-	12	<2	<2	<2
Xylene (o)	µg/L	2	2	12	<2	<2	<2
Xylene Total	µg/L	2	2	12	<2	<2	<2
Total BTEX	µg/L	1	1	12	<1	<1	<1
C6-C10 Fraction (F1)	µg/L	20	20	12	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	12	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	12	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	12	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	12	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	12	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	12	<100	<100	<100
Faecal Coliforms	CFU/100mL	1	-	3	1116	1800	4320
E. Coli	CFU/100mL	1	-	11	66	600	1800
Enterococci	org/100mL	1	-	11	75	300	700
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	24	<0.01	<0.01	0.01
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	-	24	<1	<1	<1
Nitrite + Nitrate as N	mg/L	0.01	-	24	<0.01	<0.01	0.03
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	-	24	2	3	5.4
Alkalinity (Carbonate as CaCO3)	mg/L	1	-	24	<1	<1	<1
Alkalinity (Hydroxide) as CaCO3	mg/L	1	-	24	<1	<1	<1
Alkalinity (total) as CaCO3	mg/L	1	-	24	2	3	5.4
Ammonia as N	mg/L	0.01	0.9	24	<0.01	0.02	0.09
Anions Total	meq/L	0.01	-	24	0.076	0.13	0.224
Cations Total	meq/L	0.01	-	24	0.09	0.09	0.106
Chloride	mg/L	1	-	24	1.6	2.5	4
Kjeldahl Nitrogen Total	mg/L	0.1	-	24	0.1	0.2	0.3
Nitrate (as N)	mg/L	0.01	-	24	<0.01	<0.01	0.03
Nitrite (as N)	mg/L	0.01	-	24	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	24	0.1	0.2	0.3
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	4	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	20	<0.001	0.003	0.0044
Sodium (filtered)	mg/L	1	-	24	2	2	2.4
Hardness as CaCO3 (filtered)	mg/L	1	-	12	<1	<1	<1
Aluminium	mg/L	0.01	-	14	0.12	0.31	0.586
Aluminium (filtered)	mg/L	0.01	0.07	24	0.03	0.055	0.096
Arsenic	mg/L	0.001	-	14	<0.001	0.002	0.002
Arsenic (filtered)	mg/L	0.001	0.013	24	<0.001	0.001	0.002
Barium	mg/L	0.001	-	2	0.008	0.008	0.008
Barium (filtered)	mg/L	0.001	-	2	0.003	0.003	0.003

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Beryllium	mg/L	0.001	-	2	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	2	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	2	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	2	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	-	14	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	24	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	24	<1	<1	<1
Cesium	µg/L	1	-	2	<1	<1	<1
Cesium (filtered)	µg/L	1	-	2	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	14	<0.001	<0.001	<0.001
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	24	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	2	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	2	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	14	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	0.001	0.0014	24	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	14	0.544	0.665	0.854
Iron (filtered)	mg/L	0.05	0.11	24	0.132	0.175	0.308
Lead	mg/L	0.001	-	14	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	24	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	14	0.002	0.004	0.0044
Lithium (filtered)	mg/L	0.001	0.43	22	0.0022	0.0035	0.0068
Magnesium (filtered)	mg/L	1	-	24	<1	<1	<1
Mercury	mg/L	0.0001	-	14	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	24	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.001	-	14	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	24	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	24	<1	<1	<1
Selenium	mg/L	0.01	-	8	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	18	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	2	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	2	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	2	<0.0001	<0.0001	0.0014
Strontium (filtered)	mg/L	0.001	-	2	<0.0001	<0.0001	0.0014
Thorium	µg/L	1	-	2	<1	<1	<1
Thorium (filtered)	µg/L	1	-	2	<1	<1	<1
Tin	mg/L	0.001	-	4	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	14	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Titanium (filtered)	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	2	<1	<1	<1
Uranium (filtered)	mg/L	1	-	2	<1	<1	<1
Vanadium	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Vanadium (filtered)	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	14	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	24	<0.005	<0.005	<0.005
Naphthalene	µg/L	5	5	12	<5	<5	<5
C6-C9 Fraction	µg/L	20	20	12	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	12	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	12	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	12	<50	<50	<50
C10-C36 Fraction (Sum)	µg/L	50	50	12	<50	<50	<50

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.

Table A.6 Observation Hill Dam toxicant summary results (baseline)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic Acid, As (V) (filtered)	µg/L	0.5	-	2	<0.5	<0.5	<0.5
Arsenious Acid, As (III) (filtered)	µg/L	0.5	-	2	5.08	5.65	6.22
Dimethylarsinic Acid (DMA) (filtered)	µg/L	1	-	1	<1	<1	<1
Methylarsonic acid (MMA) (filtered)	µg/L	1	-	1	<1	<1	<1
Arsenobetaine (ASB) (filtered)	µg/L	1	-	1	<1	<1	<1
Benzene	µg/L	1	-	2	<1	<1	<1
Toluene	µg/L	2	2	2	<2	<2	<2
Ethylbenzene	µg/L	2	2	2	<2	<2	<2
Xylene (m & p)	µg/L	2	-	2	<2	<2	<2
Xylene (o)	µg/L	2	2	2	<2	<2	<2
Xylene Total	µg/L	2	2	2	<2	<2	<2
Total BTEX	µg/L	1	1	2	<1	<1	<1
C6-C10 Fraction (F1)	µg/L	20	20	2	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	2	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	2	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	2	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	2	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	2	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	2	<100	<100	<100
Faecal Coliforms	CFU/100mL	1	-	3	54.6	84	153.6
E. Coli	CFU/100mL	1	-	8	24.2	69.5	96
Enterococci	org/100mL	1	-	8	11.2	36	59.2
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	10	<0.01	<0.01	<0.01
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	-	10	<1	<1	<1
Nitrite + Nitrate as N	mg/L	0.01	-	10	<0.01	0.02	0.04
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	-	10	1.4	4	4.6
Alkalinity (Carbonate as CaCO3)	mg/L	1	-	10	<1	<1	<1
Alkalinity (Hydroxide) as CaCO3	mg/L	1	-	10	<1	<1	<1
Alkalinity (total) as CaCO3	mg/L	1	-	10	1.4	4	4.6
Ammonia as N	mg/L	0.01	0.9	11	0.02	0.03	0.1
Anions Total	meq/L	0.01	-	10	0.108	0.155	0.168
Cations Total	meq/L	0.01	-	10	0.08	0.09	0.09
Chloride	mg/L	1	-	10	2	2.5	3.2
Kjeldahl Nitrogen Total	mg/L	0.1	-	10	0.2	0.25	0.5
Nitrate (as N)	mg/L	0.01	-	10	<0.01	0.02	0.04
Nitrite (as N)	mg/L	0.01	-	10	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	10	0.2	0.3	0.5
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	2	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	8	<0.001	<0.001	0.0026
Sodium (filtered)	mg/L	1	-	10	1.8	2	2
Hardness as CaCO3 (filtered)	mg/L	1	-	2	<1	<1	<1
Aluminium	mg/L	0.01	-	8	0.014	0.035	0.052
Aluminium (filtered)	mg/L	0.01	0.07	10	<0.01	<0.01	<0.01
Arsenic	mg/L	0.001	-	8	0.0034	0.005	0.0072

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic (filtered)	mg/L	0.001	0.013	10	0.002	0.003	0.0042
Barium	mg/L	0.001	-	2	0.0052	0.0055	0.0058
Barium (filtered)	mg/L	0.001	-	2	0.0016	0.0025	0.0034
Beryllium	mg/L	0.001	-	2	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	2	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	2	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	2	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	0.0002	8	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	10	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	10	<1	<1	<1
Cesium	µg/L	1	-	2	<1	<1	<1
Cesium (filtered)	µg/L	1	-	2	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	8	<0.001	<0.001	0.0002
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	10	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	2	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	2	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	8	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	0.001	0.0014	10	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	8	0.304	0.585	1.296
Iron (filtered)	mg/L	0.05	0.11	10	<0.05	0.075	0.182
Lead	mg/L	0.001	-	8	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	10	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	8	<0.001	0.001	0.0016
Lithium (filtered)	mg/L	0.001	0.43	10	<0.001	0.0015	0.0022
Magnesium (filtered)	mg/L	1	-	10	<1	<1	<1
Mercury	mg/L	0.0001	-	8	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	10	<0.0001	<0.0001	<0.0001
Nickel	mg/L	0.001	-	8	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	10	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	10	<1	<1	<1
Selenium	mg/L	0.01	-	5	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	6	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	2	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	2	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	2	0.0012	0.0015	0.0018
Strontium (filtered)	mg/L	0.001	-	2	0.002	0.002	0.002
Thorium	µg/L	1	-	2	<1	<1	<1
Thorium (filtered)	µg/L	1	-	2	<1	<1	<1
Tin	mg/L	0.001	-	3	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	4	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Titanium (filtered)	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	2	<1	<1	<1
Uranium (filtered)	mg/L	1	-	2	<1	<1	<1
Vanadium	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Vanadium (filtered)	mg/L	0.01	-	2	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	8	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	10	<0.005	<0.005	<0.005
Naphthalene	µg/L	5	5	2	<5	<5	<5
C6-C9 Fraction	µg/L	20	20	2	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	2	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	2	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	2	<50	<50	<50



Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
C10-C36 Fraction (Sum)	µg/L	50	50	2	<50	<50	<50

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.

Table A.7 Water quality sampling results - OHD

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	26	6.00	6.50	6.67
Electrical Conductivity (field)*	µS/cm	12	11.2	14.0	16.6
Turbidity (field)*	NTU	12	2.22	3.6	5.54
Dissolved Oxygen (field)	% sat.	25	76.28	90.11	97.46
Nutrients					
Total Nitrogen	mg/L	22	0.2	0.3	0.48
Total Phosphorus	mg/L	22	<0.01	0.015	0.02
Ammonia	mg/L	23	0.014	0.03	0.09
Metals and Metalloids					
Aluminium (total)	mg/L	20	0.02	0.04	0.06
Aluminium (filtered)	mg/L	22	<0.01	<0.01	<0.01
Arsenic (total)	mg/L	20	0.003	0.004	0.005
Arsenic (filtered)	mg/L	22	0.002	0.0025	0.0038
Cadmium (total)	mg/L	20	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	22	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	20	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	22	<0.001	<0.001	<0.001
Copper (total)	mg/L	20	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	22	<0.001	<0.001	<0.001
Iron (total)	mg/L	20	0.28	0.45	0.91
Iron (filtered)	mg/L	22	<0.05	0.1	0.196
Lead (total)	mg/L	20	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	22	<0.001	<0.001	<0.001
Lithium (total)	mg/L	20	<0.001	<0.001	0.002
Lithium (filtered)	mg/L	22	<0.001	0.001	0.002
Mercury (total)	mg/L	20	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	22	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	20	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	22	<0.001	<0.001	<0.001
Zinc (total)	mg/L	14	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	22	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.8 Water quality sampling results – Background water quality

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	85	5.19	5.61	6.68
Electrical Conductivity (field)*	µS/cm	85	13.1	15.7	20.4
Turbidity (field)*	NTU	84	2.1	4.61	13.17
Dissolved Oxygen (field)	% sat.	85	67.84	79.60	87.94
Nutrients					
Total Nitrogen	mg/L	76	0.1	0.2	0.3
Total Phosphorus	mg/L	76	<0.01	<0.01	0.01
Ammonia	mg/L	76	<0.01	0.02	0.08
Metals and Metalloids					
Aluminium (total)	mg/L	51	0.09	0.16	0.48
Aluminium (filtered)	mg/L	76	0.03	0.05	0.08
Arsenic (total)	mg/L	51	<0.001	<0.001	0.002
Arsenic (filtered)	mg/L	76	<0.001	<0.001	0.001
Cadmium (total)	mg/L	51	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	76	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	51	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	76	<0.001	<0.001	<0.001
Copper (total)	mg/L	51	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	76	<0.001	<0.001	<0.001
Iron (total)	mg/L	51	0.12	0.37	0.75
Iron (filtered)	mg/L	76	<0.05	0.09	0.21
Lead (total)	mg/L	51	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	76	<0.001	<0.001	<0.001
Lithium (total)	mg/L	51	<0.001	0.002	0.004
Lithium (filtered)	mg/L	72	<0.001	0.002	0.004
Mercury (total)	mg/L	51	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	76	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	51	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	76	<0.001	<0.001	<0.001
Zinc (total)	mg/L	51	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	76	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.9 Water quality sampling results – Sediment Dam 1

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	70	6.35	7.0	7.7
Electrical Conductivity (field)*	µS/cm	32	23.4	37.5	51.0
Turbidity (field)*	NTU	32	30.0	97.3	566.6
Dissolved Oxygen (field)	% sat.	64	97.4	99.5	103.0
Nutrients					
Total Nitrogen	mg/L	33	0.24	0.70	2.52
Total Phosphorus	mg/L	33	<0.01	0.03	0.27
Ammonia	mg/L	32	0.02	0.04	0.21
Metals and Metalloids					
Aluminium (total)	mg/L	14	32	0.74	1.90
Aluminium (filtered)	mg/L	14	32	<0.01	<0.01
Arsenic (total)	mg/L	14	32	<0.001	<0.001
Arsenic (filtered)	mg/L	14	32	<0.001	<0.001
Cadmium (total)	mg/L	14	32	<0.0001	<0.0001
Cadmium (filtered)	mg/L	14	32	<0.0001	<0.0001
Chromium (total)	mg/L	14	32	<0.001	0.002
Chromium (filtered)	mg/L	14	32	<0.001	<0.001
Copper (total)	mg/L	14	32	<0.001	0.002
Copper (filtered)	mg/L	14	32	<0.001	<0.001
Iron (total)	mg/L	14	32	0.75	2.66
Iron (filtered)	mg/L	14	32	<0.05	<0.05
Lead (total)	mg/L	14	32	<0.001	<0.001
Lead (filtered)	mg/L	14	32	<0.001	<0.001
Lithium (total)	mg/L	14	32	0.004	0.0115
Lithium (filtered)	mg/L	14	32	0.002	0.004
Mercury (total)	mg/L	14	32	<0.0001	<0.0001
Mercury (filtered)	mg/L	14	32	<0.0001	<0.0001
Nickel (total)	mg/L	14	32	<0.001	0.002
Nickel (filtered)	mg/L	14	32	<0.001	<0.001
Zinc (total)	mg/L	13	31	<0.005	0.009
Zinc (filtered)	mg/L	13	31	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.10 Water quality sampling results – Sediment Dam 2

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	92	6.1	6.85	7.5
Electrical Conductivity (field)*	µS/cm	53	22.8	41.0	73.0
Turbidity (field)*	NTU	53	83.4	204.0	690.8
Dissolved Oxygen (field)	% sat.	87	94.98	99.97	106.68
Nutrients					
Total Nitrogen	mg/L	53	0.20	0.70	1.96
Total Phosphorus	mg/L	53	0.01	0.05	0.15
Ammonia	mg/L	53	<0.01	0.05	0.13
Metals and Metalloids					
Aluminium (total)	mg/L	53	1.70	3.14	8.58
Aluminium (filtered)	mg/L	53	<0.01	0.04	0.14
Arsenic (total)	mg/L	53	<0.001	0.002	0.003
Arsenic (filtered)	mg/L	53	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	53	<0.0001	<0.0001	0.0001
Cadmium (filtered)	mg/L	53	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	53	0.001	0.003	0.008
Chromium (filtered)	mg/L	53	<0.001	<0.001	<0.001
Copper (total)	mg/L	53	<0.001	0.002	0.005
Copper (filtered)	mg/L	53	<0.001	<0.001	<0.001
Iron (total)	mg/L	53	1.32	2.48	5.79
Iron (filtered)	mg/L	53	<0.05	<0.05	<0.05
Lead (total)	mg/L	53	0.001	0.003	0.008
Lead (filtered)	mg/L	53	<0.001	<0.001	<0.001
Lithium (total)	mg/L	53	0.008	0.021	0.0816
Lithium (filtered)	mg/L	53	<0.001	0.008	0.0456
Mercury (total)	mg/L	53	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	53	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	53	0.001	0.002	0.006
Nickel (filtered)	mg/L	53	<0.001	<0.001	<0.001
Zinc (total)	mg/L	33	0.0064	0.016	0.040
Zinc (filtered)	mg/L	52	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.11 Water quality sampling results – Sediment Dam 3

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	59	5.62	6.69	7.24
Electrical Conductivity (field)*	µS/cm	21	24.0	34.0	65.0
Turbidity (field)*	NTU	21	25.8	110	562
Dissolved Oxygen (field)	% sat.	53	92.66	99.20	103.64
Nutrients					
Total Nitrogen	mg/L	21	0.2	0.5	1.1
Total Phosphorus	mg/L	21	<0.01	0.04	0.21
Ammonia	mg/L	21	<0.01	0.05	0.11
Metals and Metalloids					
Aluminium (total)	mg/L	21	0.61	1.90	6.01
Aluminium (filtered)	mg/L	21	<0.01	0.02	0.06
Arsenic (total)	mg/L	21	<0.001	<0.001	0.003
Arsenic (filtered)	mg/L	21	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	21	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	21	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	21	<0.001	0.002	0.008
Chromium (filtered)	mg/L	21	<0.001	<0.001	<0.001
Copper (total)	mg/L	21	<0.001	0.003	0.006
Copper (filtered)	mg/L	21	<0.001	<0.001	<0.001
Iron (total)	mg/L	21	0.47	2.56	7.04
Iron (filtered)	mg/L	21	<0.05	<0.05	<0.05
Lead (total)	mg/L	21	<0.001	<0.001	0.004
Lead (filtered)	mg/L	21	<0.001	<0.001	<0.001
Lithium (total)	mg/L	21	0.003	0.012	0.051
Lithium (filtered)	mg/L	21	0.001	0.003	0.008
Mercury (total)	mg/L	21	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	21	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	21	0.001	0.003	0.007
Nickel (filtered)	mg/L	21	<0.001	<0.001	<0.001
Zinc (total)	mg/L	20	0.004	0.011	0.025
Zinc (filtered)	mg/L	20	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.12 Water quality sampling results – Sediment Dam 4

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	61	6.10	6.60	7.20
Electrical Conductivity (field)*	µS/cm	20	16.0	19.5	28.0
Turbidity (field)*	NTU	20	23.4	60.4	161.2
Dissolved Oxygen (field)	% sat.	55	95.42	98.90	105.00
Nutrients					
Total Nitrogen	mg/L	20	0.18	0.45	0.76
Total Phosphorus	mg/L	20	<0.01	0.02	0.07
Ammonia	mg/L	20	0.006	0.02	0.21
Metals and Metalloids					
Aluminium (total)	mg/L	20	0.58	1.07	2.13
Aluminium (filtered)	mg/L	20	<0.01	<0.01	0.05
Arsenic (total)	mg/L	20	<0.001	<0.001	0.0012
Arsenic (filtered)	mg/L	20	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	20	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	20	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	20	<0.001	<0.001	0.003
Chromium (filtered)	mg/L	20	<0.001	<0.001	<0.001
Copper (total)	mg/L	20	<0.001	<0.001	0.003
Copper (filtered)	mg/L	20	<0.001	<0.001	<0.001
Iron (total)	mg/L	20	0.38	0.90	2.83
Iron (filtered)	mg/L	20	<0.05	<0.05	<0.05
Lead (total)	mg/L	20	<0.001	<0.001	0.0012
Lead (filtered)	mg/L	20	<0.001	<0.001	<0.001
Lithium (total)	mg/L	20	0.003	0.006	0.013
Lithium (filtered)	mg/L	20	0.001	0.002	0.003
Mercury (total)	mg/L	20	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	20	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	20	<0.001	0.000	0.003
Nickel (filtered)	mg/L	20	<0.001	<0.001	<0.001
Zinc (total)	mg/L	19	<0.005	0.007	0.011
Zinc (filtered)	mg/L	19	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.13 Water quality sampling results – Sediment Dam 5

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	65	5.80	6.50	7.44
Electrical Conductivity (field)*	µS/cm	27	18.0	21.0	24.0
Turbidity (field)*	NTU	27	86.4	160	319.4
Dissolved Oxygen (field)	% sat.	59	94.20	97.50	100.42
Nutrients					
Total Nitrogen	mg/L	28	<0.01	0.55	0.96
Total Phosphorus	mg/L	28	<0.01	0.03	0.1
Ammonia	mg/L	28	0.01	0.05	0.29
Metals and Metalloids					
Aluminium (total)	mg/L	27	1.53	2.81	6.25
Aluminium (filtered)	mg/L	27	0.02	0.04	0.14
Arsenic (total)	mg/L	27	<0.001	<0.001	0.002
Arsenic (filtered)	mg/L	27	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	27	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	27	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	27	<0.001	0.002	0.006
Chromium (filtered)	mg/L	27	<0.001	<0.001	<0.001
Copper (total)	mg/L	27	<0.001	0.001	0.004
Copper (filtered)	mg/L	27	<0.001	<0.001	<0.001
Iron (total)	mg/L	27	0.71	2.04	4.81
Iron (filtered)	mg/L	27	<0.05	<0.05	<0.05
Lead (total)	mg/L	27	<0.001	0.002	0.0038
Lead (filtered)	mg/L	27	<0.001	<0.001	<0.001
Lithium (total)	mg/L	27	0.004	0.006	0.020
Lithium (filtered)	mg/L	27	<0.001	0.001	0.003
Mercury (total)	mg/L	27	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	27	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	27	<0.001	0.002	0.006
Nickel (filtered)	mg/L	27	<0.001	<0.001	<0.001
Zinc (total)	mg/L	26	<0.005	0.006	0.011
Zinc (filtered)	mg/L	26	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.14 Water quality sampling results – Pit

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	18	6.60	7.62	8.16
Electrical Conductivity (field)*	µS/cm	24	64.6	91.0	201.0
Turbidity (field)*	NTU	24	27.28	74.1	209.8
Dissolved Oxygen (field)	% sat.	18	90.73	102.70	121.34
Nutrients					
Total Nitrogen	mg/L	24	3	7.9	10.06
Total Phosphorus	mg/L	24	0.03	0.08	0.224
Ammonia	mg/L	24	0.04	0.175	0.59
Metals and Metalloids					
Aluminium (total)	mg/L	24	0.40	1.33	4.81
Aluminium (filtered)	mg/L	24	<0.01	0.02	0.26
Arsenic (total)	mg/L	24	0.0008	0.003	0.029
Arsenic (filtered)	mg/L	24	<0.001	0.003	0.026
Cadmium (total)	mg/L	24	<0.0001	<0.0001	0.0003
Cadmium (filtered)	mg/L	24	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	24	<0.001	0.001	0.006
Chromium (filtered)	mg/L	24	<0.001	<0.001	<0.001
Copper (total)	mg/L	24	<0.001	0.001	0.005
Copper (filtered)	mg/L	24	<0.001	<0.001	0.002
Iron (total)	mg/L	24	0.96	2.31	6.79
Iron (filtered)	mg/L	24	<0.05	<0.05	0.15
Lead (total)	mg/L	24	<0.001	<0.001	0.002
Lead (filtered)	mg/L	24	<0.001	<0.001	<0.001
Lithium (total)	mg/L	24	0.094	0.141	0.969
Lithium (filtered)	mg/L	24	0.078	0.136	1.060
Mercury (total)	mg/L	24	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	24	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	24	0.001	0.002	0.005
Nickel (filtered)	mg/L	24	<0.001	<0.001	<0.001
Zinc (total)	mg/L	16	<0.005	0.007	0.018
Zinc (filtered)	mg/L	24	<0.005	<0.005	0.009

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.15 Water quality sampling results – Mine Water Dam 1 Cell 1

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	110	6.52	7.20	8.04
Electrical Conductivity (field)*	µS/cm	42	116.0	141.5	198.6
Turbidity (field)*	NTU	42	2	10.35	51.66
Dissolved Oxygen (field)	% sat.	105	97.86	100.80	104.84
Nutrients					
Total Nitrogen	mg/L	44	8.48	14.8	18.4
Total Phosphorus	mg/L	44	0.01	0.02	0.06
Ammonia	mg/L	44	0.122	0.31	0.69
Metals and Metalloids					
Aluminium (total)	mg/L	42	0.06	0.20	1.16
Aluminium (filtered)	mg/L	42	<0.01	<0.01	0.04
Arsenic (total)	mg/L	42	0.002	0.002	0.016
Arsenic (filtered)	mg/L	42	0.001	0.002	0.015
Cadmium (total)	mg/L	42	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	42	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	42	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	42	<0.001	<0.001	<0.001
Copper (total)	mg/L	42	<0.001	<0.001	0.002
Copper (filtered)	mg/L	42	<0.001	<0.001	<0.001
Iron (total)	mg/L	42	<0.05	0.16	0.93
Iron (filtered)	mg/L	42	<0.05	<0.05	<0.05
Lead (total)	mg/L	42	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	42	<0.001	<0.001	<0.001
Lithium (total)	mg/L	42	0.223	0.332	0.438
Lithium (filtered)	mg/L	42	0.215	0.316	0.383
Mercury (total)	mg/L	42	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	42	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	42	<0.001	0.001	0.002
Nickel (filtered)	mg/L	42	<0.001	<0.001	0.001
Zinc (total)	mg/L	41	<0.005	<0.005	0.007
Zinc (filtered)	mg/L	41	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.16 Water quality sampling results – Mine Water Dam 1 Cell 2

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	49	7.47	8.70	9.24
Electrical Conductivity (field)*	µS/cm	7	139.8	159.0	239.2
Turbidity (field)*	NTU	7	9.66	13.7	38.58
Dissolved Oxygen (field)	% sat.	48	91.50	104.11	114.00
Nutrients					
Total Nitrogen	mg/L	9	7.44	11.8	16.86
Total Phosphorus	mg/L	9	0.01	0.03	0.068
Ammonia	mg/L	9	0.188	0.28	0.44
Metals and Metalloids					
Aluminium (total)	mg/L	7	0.24	0.28	1.53
Aluminium (filtered)	mg/L	7	<0.01	0.02	0.08
Arsenic (total)	mg/L	7	0.0084	0.012	0.0148
Arsenic (filtered)	mg/L	7	0.0064	0.011	0.0144
Cadmium (total)	mg/L	7	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	7	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	7	<0.001	<0.001	0.001
Chromium (filtered)	mg/L	7	<0.001	<0.001	<0.001
Copper (total)	mg/L	7	<0.001	<0.001	0.002
Copper (filtered)	mg/L	7	<0.001	<0.001	<0.001
Iron (total)	mg/L	7	<0.05	0.12	0.69
Iron (filtered)	mg/L	7	<0.05	<0.05	<0.05
Lead (total)	mg/L	7	<0.001	<0.001	0.0014
Lead (filtered)	mg/L	7	<0.001	<0.001	<0.001
Lithium (total)	mg/L	7	0.450	0.738	0.947
Lithium (filtered)	mg/L	7	0.466	0.486	0.923
Mercury (total)	mg/L	7	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	7	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	7	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	7	<0.001	<0.001	<0.001
Zinc (total)	mg/L	7	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	7	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.17 Water quality sampling results – Mine Water Dam 1 Cell 3

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	49	7.52	8.30	8.90
Electrical Conductivity (field)*	µS/cm	9	83.8	158.0	190.4
Turbidity (field)*	NTU	9	3.7	6.6	301.6
Dissolved Oxygen (field)	% sat.	48	93.94	100.42	105.83
Nutrients					
Total Nitrogen	mg/L	11	4.2	9.2	11.6
Total Phosphorus	mg/L	11	0.01	0.02	0.03
Ammonia	mg/L	11	0.12	0.15	0.18
Metals and Metalloids					
Aluminium (total)	mg/L	9	0.11	0.21	2.92
Aluminium (filtered)	mg/L	9	<0.01	0.02	0.03
Arsenic (total)	mg/L	9	0.0046	0.008	0.0116
Arsenic (filtered)	mg/L	9	0.003	0.005	0.0112
Cadmium (total)	mg/L	9	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	9	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	9	<0.001	<0.001	0.003
Chromium (filtered)	mg/L	9	<0.001	<0.001	<0.001
Copper (total)	mg/L	9	<0.001	<0.001	0.001
Copper (filtered)	mg/L	9	<0.001	<0.001	<0.001
Iron (total)	mg/L	9	0.02	0.11	3.16
Iron (filtered)	mg/L	9	<0.05	<0.05	<0.05
Lead (total)	mg/L	9	<0.001	<0.001	0.0026
Lead (filtered)	mg/L	9	<0.001	<0.001	<0.001
Lithium (total)	mg/L	9	0.202	0.356	0.499
Lithium (filtered)	mg/L	9	0.156	0.382	0.482
Mercury (total)	mg/L	9	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	9	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	9	<0.001	0.001	0.002
Nickel (filtered)	mg/L	9	<0.001	<0.001	<0.001
Zinc (total)	mg/L	9	<0.005	<0.005	0.014
Zinc (filtered)	mg/L	9	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.18 Water quality sampling results – Mine Water Dam 2 Cell 1

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	2	9.32	9.39	9.45
Electrical Conductivity (field)*	µS/cm	2	129.8	140.0	150.2
Turbidity (field)*	NTU	2	10.62	24.3	37.98
Dissolved Oxygen (field)	% sat.	2	101.14	115.79	130.44
Nutrients					
Total Nitrogen	mg/L	2	3.18	3.6	4.02
Total Phosphorus	mg/L	2	0.03	0.03	0.03
Ammonia	mg/L	2	0.076	0.13	0.18
Metals and Metalloids					
Aluminium (total)	mg/L	2	0.19	0.40	0.60
Aluminium (filtered)	mg/L	2	<0.002	0.01	0.02
Arsenic (total)	mg/L	2	0.001	0.001	0.001
Arsenic (filtered)	mg/L	2	<0.0006	0	0.0006
Cadmium (total)	mg/L	2	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	2	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	2	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	2	<0.001	<0.001	<0.001
Copper (total)	mg/L	2	<0.0006	0	0.001
Copper (filtered)	mg/L	2	<0.001	<0.001	<0.001
Iron (total)	mg/L	2	0.11	0.35	0.59
Iron (filtered)	mg/L	2	<0.05	<0.05	<0.05
Lead (total)	mg/L	2	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	2	<0.001	<0.001	<0.001
Lithium (total)	mg/L	2	0.385	0.468	0.550
Lithium (filtered)	mg/L	2	0.422	0.497	0.572
Mercury (total)	mg/L	2	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	2	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	2	<0.0006	0.000	0.001
Nickel (filtered)	mg/L	2	<0.001	<0.001	<0.001
Zinc (total)	mg/L	2	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	2	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.19 Water quality sampling results – Mine Water Dam 2 Cell 2

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	9	7.26	7.69	8.34
Electrical Conductivity (field)*	µS/cm	8	45.4	109.0	199.8
Turbidity (field)*	NTU	8	24.5	228.5	535.2
Dissolved Oxygen (field)	% sat.	9	99.90	104.70	110.36
Nutrients					
Total Nitrogen	mg/L	8	1.08	5.8	12.6
Total Phosphorus	mg/L	8	0.132	0.595	1.308
Ammonia	mg/L	8	0.002	0.04	0.08
Metals and Metalloids					
Aluminium (total)	mg/L	8	0.33	6.26	12.46
Aluminium (filtered)	mg/L	8	0.01	0.04	0.15
Arsenic (total)	mg/L	8	0.0044	0.0085	0.0122
Arsenic (filtered)	mg/L	8	0.001	0.0025	0.0082
Cadmium (total)	mg/L	8	<0.0001	0.00045	0.00156
Cadmium (filtered)	mg/L	8	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	8	<0.001	0.0125	0.067
Chromium (filtered)	mg/L	8	<0.001	<0.001	0.0028
Copper (total)	mg/L	8	<0.001	0.0045	0.018
Copper (filtered)	mg/L	8	<0.001	<0.001	<0.001
Iron (total)	mg/L	8	0.17	7.15	28.31
Iron (filtered)	mg/L	8	<0.05	<0.05	0.344
Lead (total)	mg/L	8	<0.001	0.0095	0.0202
Lead (filtered)	mg/L	8	<0.001	<0.001	<0.001
Lithium (total)	mg/L	8	0.470	0.837	1.734
Lithium (filtered)	mg/L	8	0.229	0.755	1.488
Mercury (total)	mg/L	8	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	8	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	8	<0.001	0.004	0.013
Nickel (filtered)	mg/L	8	<0.001	<0.001	<0.001
Zinc (total)	mg/L	8	<0.005	0.038	0.087
Zinc (filtered)	mg/L	8	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.20 Water quality sampling results – FSF Cell 1

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	1	7.52	7.52	7.52
Electrical Conductivity (field)*	µS/cm	3	52.6	70.0	151.0
Turbidity (field)*	NTU	3	559.4	779	2303.6
Dissolved Oxygen (field)	% sat.	1	98.17	98.17	98.17
Nutrients					
Total Nitrogen	mg/L	3	0.86	2.9	9.74
Total Phosphorus	mg/L	3	1.552	2.14	3.718
Ammonia	mg/L	3	0.14	0.29	0.30
Metals and Metalloids					
Aluminium (total)	mg/L	3	8.61	10.30	12.70
Aluminium (filtered)	mg/L	3	0.22	0.38	0.39
Arsenic (total)	mg/L	3	0.0064	0.007	0.0136
Arsenic (filtered)	mg/L	3	0.0002	0.002	0.008
Cadmium (total)	mg/L	3	0.00154	0.0016	0.00256
Cadmium (filtered)	mg/L	3	0.00002	0.0002	0.0002
Chromium (total)	mg/L	3	0.02	0.026	0.034
Chromium (filtered)	mg/L	3	<0.001	<0.001	0.0014
Copper (total)	mg/L	3	0.0084	0.009	0.025
Copper (filtered)	mg/L	3	<0.001	<0.001	<0.001
Iron (total)	mg/L	3	8.92	9.16	13.74
Iron (filtered)	mg/L	3	0.062	0.23	0.65
Lead (total)	mg/L	3	0.0156	0.018	0.0252
Lead (filtered)	mg/L	3	<0.001	<0.001	<0.001
Lithium (total)	mg/L	3	0.391	0.491	1.672
Lithium (filtered)	mg/L	3	0.260	0.376	1.344
Mercury (total)	mg/L	3	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	3	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	3	0.006	0.006	0.007
Nickel (filtered)	mg/L	3	<0.001	<0.001	<0.001
Zinc (total)	mg/L	3	0.078	0.080	0.130
Zinc (filtered)	mg/L	3	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.21 Water quality sampling results – FSF Cell 2

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	3	7.35	7.57	7.61
Electrical Conductivity (field)*	µS/cm	3	117.6	189.0	198.6
Turbidity (field)*	NTU	3	832.2	1500	1704
Dissolved Oxygen (field)	% sat.	3	99.83	100.57	100.59
Nutrients					
Total Nitrogen	mg/L	3	5.56	11.8	13.18
Total Phosphorus	mg/L	3	1.652	2.3	2.918
Ammonia	mg/L	3	0.052	0.07	0.07
Metals and Metalloids					
Aluminium (total)	mg/L	3	6.33	9.53	16.17
Aluminium (filtered)	mg/L	3	0.06	0.09	0.12
Arsenic (total)	mg/L	3	0.0088	0.013	0.0172
Arsenic (filtered)	mg/L	3	0.005	0.011	0.0116
Cadmium (total)	mg/L	3	0.00092	0.0011	0.00146
Cadmium (filtered)	mg/L	3	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	3	0.013	0.025	0.032
Chromium (filtered)	mg/L	3	<0.001	<0.001	<0.001
Copper (total)	mg/L	3	0.0046	0.007	0.012
Copper (filtered)	mg/L	3	<0.001	<0.001	<0.001
Iron (total)	mg/L	3	7.75	15.60	18.12
Iron (filtered)	mg/L	3	<0.001	0.07	0.106
Lead (total)	mg/L	3	0.0138	0.015	0.0222
Lead (filtered)	mg/L	3	<0.001	<0.001	<0.001
Lithium (total)	mg/L	3	0.948	1.910	2.132
Lithium (filtered)	mg/L	3	0.832	1.820	2.216
Mercury (total)	mg/L	3	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	3	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	3	0.004	0.006	0.010
Nickel (filtered)	mg/L	3	<0.001	<0.001	<0.001
Zinc (total)	mg/L	3	0.048	0.075	0.085
Zinc (filtered)	mg/L	3	<0.005	<0.005	0.001

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.22 Darwin Harbour catchment water quality results (operations)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	471	6.00	6.48	7.20
Electrical Conductivity (field)*	µS/cm	146	12.0	17.0	27.0
Turbidity (field)*	NTU	146	2.5	7.8	34.7
Dissolved Oxygen (field)	% sat.	445	80.10	89.30	97.02
Nutrients					
Total Nitrogen	mg/L	155	0.2	0.3	0.6
Total Phosphorus	mg/L	155	<0.01	0.01	0.03
Ammonia	mg/L	155	0.006	0.04	0.22
Metals and Metalloids					
Aluminium (total)	mg/L	147	0.10	0.25	0.64
Aluminium (filtered)	mg/L	152	0.01	0.02	0.06
Arsenic (total)	mg/L	147	<0.001	<0.001	0.001
Arsenic (filtered)	mg/L	152	<0.001	<0.001	<0.001
Cadmium (total)	mg/L	147	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	152	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	147	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	152	<0.001	<0.001	<0.001
Copper (total)	mg/L	147	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	152	<0.001	<0.001	<0.001
Iron (total)	mg/L	147	0.14	0.42	0.89
Iron (filtered)	mg/L	152	<0.05	0.06	0.12
Lead (total)	mg/L	147	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	152	<0.001	<0.001	<0.001
Lithium (total)	mg/L	147	0.001	0.003	0.021
Lithium (filtered)	mg/L	152	<0.001	0.002	0.016
Mercury (total)	mg/L	147	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	152	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	147	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	152	<0.001	<0.001	<0.001
Zinc (total)	mg/L	134	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	150	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.23 Bynoe Harbour catchment water quality results (operations)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	14	5.73	6.00	6.27
Electrical Conductivity (field)*	µS/cm	24	18.6	20.0	26.2
Turbidity (field)*	NTU	21	2.7	4	7.8
Dissolved Oxygen (field)	% sat.	10	42.35	58.72	76.70
Nutrients					
Total Nitrogen	mg/L	42	0.2	0.2	0.4
Total Phosphorus	mg/L	42	<0.01	0.01	0.02
Ammonia	mg/L	42	<0.01	0.02	0.11
Metals and Metalloids					
Aluminium (total)	mg/L	27	0.08	0.16	0.29
Aluminium (filtered)	mg/L	42	0.01	0.02	0.05
Arsenic (total)	mg/L	31	0.002	0.002	0.004
Arsenic (filtered)	mg/L	42	<0.001	0.002	0.002
Cadmium (total)	mg/L	31	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	42	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	31	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	42	<0.001	<0.001	<0.001
Copper (total)	mg/L	31	<0.001	<0.001	0.002
Copper (filtered)	mg/L	42	<0.001	<0.001	<0.001
Iron (total)	mg/L	27	0.80	1.19	2.51
Iron (filtered)	mg/L	42	0.122	0.2	0.324
Lead (total)	mg/L	31	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	42	<0.001	<0.001	<0.001
Lithium (total)	mg/L	27	0.002	0.004	0.010
Lithium (filtered)	mg/L	42	<0.0001	0.003	0.004
Mercury (total)	mg/L	31	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	42	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	31	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	42	<0.001	<0.001	<0.001
Zinc (total)	mg/L	27	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	42	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.24 Observation Hill Dam catchment water quality results (operations)

Contaminant	Units	No. of samples	20%ile	Median	80%ile
Environmental Field Data					
pH (field)	pH	19	6.20	6.53	7.78
Electrical Conductivity (field)*	µS/cm	29	11.6	15.0	17.0
Turbidity (field)*	NTU	29	2.2	2.7	5.84
Dissolved Oxygen (field)	% sat.	18	93.50	99.15	105.89
Nutrients					
Total Nitrogen	mg/L	30	0.2	0.3	0.5
Total Phosphorus	mg/L	30	0.006	0.02	0.02
Ammonia	mg/L	30	0.01	0.03	0.11
Metals and Metalloids					
Aluminium (total)	mg/L	29	0.03	0.05	0.07
Aluminium (filtered)	mg/L	30	<0.01	<0.01	<0.01
Arsenic (total)	mg/L	29	0.003	0.003	0.0044
Arsenic (filtered)	mg/L	30	0.002	0.002	0.003
Cadmium (total)	mg/L	29	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	30	<0.0001	<0.0001	<0.0001
Chromium (total)	mg/L	29	<0.001	<0.001	<0.001
Chromium (filtered)	mg/L	30	<0.001	<0.001	<0.001
Copper (total)	mg/L	29	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	30	<0.001	<0.001	<0.001
Iron (total)	mg/L	29	0.30	0.43	0.76
Iron (filtered)	mg/L	30	<0.05	0.11	0.184
Lead (total)	mg/L	29	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	30	<0.001	<0.001	<0.001
Lithium (total)	mg/L	29	<0.001	0.001	0.003
Lithium (filtered)	mg/L	30	<0.001	0.001	0.003
Mercury (total)	mg/L	29	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	30	<0.0001	<0.0001	<0.0001
Nickel (total)	mg/L	29	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	30	<0.001	<0.001	<0.001
Zinc (total)	mg/L	17	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	30	<0.005	<0.005	<0.005

Key:

* Field samples were analysed for this dataset as there were no available lab samples during this period.

Note: Highlighted cells represent exceedances in comparison to the WDL trigger values.

Table A.25 Darwin Harbour catchment toxicant summary results (operations)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Naphthalene (VOC)	mg/L	0.005	-	78	<0.005	<0.005	<0.005
Benzene	µg/L	1	-	93	<1	<1	<1
Toluene	µg/L	2	2	93	<2	<2	<2
Ethylbenzene	µg/L	2	2	93	<2	<2	<2
Xylene (m & p)	µg/L	2	-	93	<2	<2	<2
Xylene (o)	µg/L	2	2	93	<2	<2	<2
Xylene Total	µg/L	2	2	93	<2	<2	<2
Total BTEX	µg/L	1	1	93	<1	<1	<1
Naphthalene	µg/L	5	5	15	<5	<5	<5
C6-C10 Fraction (F1)	µg/L	20	20	93	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	93	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	93	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	93	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	93	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	93	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	93	<100	<100	<100
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	155	<0.01	0.01	0.03
Sulfate as SO ₄ - Turbidimetric (filtered)	mg/L	1	-	152	<1	<1	2
Nitrite + Nitrate as N	mg/L	0.01	-	155	<0.01	<0.01	0.082
Alkalinity (Bicarbonate as CaCO ₃)	mg/L	1	-	152	2	3	5
Alkalinity (Carbonate as CaCO ₃)	mg/L	1	-	152	<1	<1	<1
Alkalinity (Hydroxide) as CaCO ₃	mg/L	1	-	152	<1	<1	<1
Alkalinity (total) as CaCO ₃	mg/L	1	-	152	2	3	5
Ammonia as N	mg/L	0.01	0.9	155	0.006	0.04	0.224
Anions Total	meq/L	0.01	-	151	0.1	0.15	0.23
Cations Total	meq/L	0.01	-	151	0.09	0.13	0.17
Chloride	mg/L	1	-	152	2	3	4
Dissolved Oxygen (Lab)	mg/L	0.1	-	146	8.8	9.25	9.7
Electrical Conductivity (Lab)	uS/cm	1	18	146	12	17	27
Ionic Balance	%	0.01	-	0	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.1	-	155	0.2	0.3	0.5
Nitrate (as N)	mg/L	0.01	-	154	<0.01	<0.01	0.084
Nitrite (as N)	mg/L	0.01	-	154	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	155	0.2	0.3	0.6
pH (Lab)	-	-	-	146	5.6	6.025	6.3
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	134	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	149	<0.001	0.001	0.003
Sodium (filtered)	mg/L	1	-	152	2	2	4
Total Dissolved Solids (Lab)	mg/L	10	-	117	16.2	28	39.8
Hardness as CaCO ₃ (filtered)	mg/L	1	-	15	<1	<1	<1
Total Suspended Solids (Lab)	mg/L	5	-	118	<5	<5	8.6
Turbidity (Lab)	mg/L	0.1	12	146	2.5	7.8	34.7
Aluminium	mg/L	0.01	-	147	0.1	0.25	0.644
Aluminium (filtered)	mg/L	0.01	0.07	152	0.01	0.02	0.06
Antimony	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Antimony (filtered)	mg/L	0.001	-	34	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	-	147	<0.001	<0.001	0.001

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic (filtered)	mg/L	0.001	0.013	152	<0.001	<0.001	<0.001
Barium	mg/L	0.001	-	38	0.0064	0.0115	0.017
Barium (filtered)	mg/L	0.001	-	49	0.003	0.005	0.008
Beryllium	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	49	<0.001	<0.001	<0.001
Bismuth	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Bismuth (filtered)	mg/L	0.001	-	34	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	38	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	49	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	-	147	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	152	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	152	<1	<1	<1
Cesium	µg/L	1	-	38	<1	<1	0.2
Cesium (filtered)	µg/L	1	-	49	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	147	<0.001	<0.001	<0.001
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	152	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	38	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	49	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	147	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	0.001	0.0014	152	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	147	0.142	0.42	0.888
Iron (filtered)	mg/L	0.05	0.11	152	<0.05	0.06	0.12
Lead	mg/L	0.001	-	147	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	152	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	147	0.001	0.003	0.0208
Lithium (filtered)	mg/L	0.001	0.43	152	<0.001	0.002	0.0156
Magnesium (filtered)	mg/L	1	-	152	<1	<1	<1
Manganese	mg/L	0.001	-	38	0.006	0.0115	0.0196
Manganese (filtered)	mg/L	0.001	-	34	0.004	0.006	0.0098
Mercury	mg/L	0.0001	-	147	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	152	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Molybdenum (filtered)	mg/L	0.001	-	34	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	-	147	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	152	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	152	<1	<1	<1
Selenium	mg/L	0.01	-	38	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	49	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	38	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	49	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	38	0.002	0.0055	0.0106
Strontium (filtered)	mg/L	0.001	-	49	0.001	0.003	0.0064
Thallium	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Thallium (filtered)	mg/L	0.001	-	34	<0.001	<0.001	<0.001
Thorium	µg/L	1	-	38	<1	<1	<1
Thorium (filtered)	µg/L	1	-	49	<1	<1	<1
Tin	mg/L	0.001	-	38	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	49	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	38	<0.01	<0.01	0.01
Titanium (filtered)	mg/L	0.01	-	49	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	38	<1	<1	<1
Uranium (filtered)	mg/L	1	-	49	<1	<1	<1
Vanadium	mg/L	0.01	-	38	<0.01	<0.01	<0.01

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Vanadium (filtered)	mg/L	0.01	-	49	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	134	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	150	<0.005	<0.005	<0.005
Rubidium	mg/L	0.001	-	38	<0.001	0.001	0.005
Rubidium (filtered)	mg/L	0.001	-	34	<0.001	<0.001	<0.001
C6-C9 Fraction	µg/L	20	20	93	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	93	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	93	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	93	<50	<50	<50
C10-C36 Fraction (Sum)	µg/L	50	50	93	<50	<50	<50
Acrylamide	µg/L	0.2	-	14	<0.2	<0.2	<0.2

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.

Table A.26 Bynoe Harbour catchment toxicant summary results (operations)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Naphthalene (VOC)	mg/L	0.005	-	13	<0.005	<0.005	<0.005
Benzene	µg/L	1	-	19	<1	<1	<1
Toluene	µg/L	2	2	19	<2	<2	<2
Ethylbenzene	µg/L	2	2	19	<2	<2	<2
Xylene (m & p)	µg/L	2	-	19	<2	<2	<2
Xylene (o)	µg/L	2	2	19	<2	<2	<2
Xylene Total	µg/L	2	2	19	<2	<2	<2
Total BTEX	µg/L	1	1	19	<1	<1	<1
Naphthalene	µg/L	5	5	6	<5	<5	<5
C6-C10 Fraction (F1)	µg/L	20	20	19	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	19	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	19	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	19	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	19	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	19	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	19	<100	<100	<100
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	42	<0.01	0.01	0.02
Sulfate as SO ₄ - Turbidimetric (filtered)	mg/L	1	-	42	<1	<1	<1
Nitrite + Nitrate as N	mg/L	0.01	-	42	<0.01	<0.01	<0.01
Alkalinity (Bicarbonate as CaCO ₃)	mg/L	1	-	42	2	4	8.8
Alkalinity (Carbonate as CaCO ₃)	mg/L	1	-	42	<1	<1	<1
Alkalinity (Hydroxide) as CaCO ₃	mg/L	1	-	42	<1	<1	<1
Alkalinity (total) as CaCO ₃	mg/L	1	-	42	2	4	8.8
Ammonia as N	mg/L	0.01	0.9	42	<0.01	0.02	0.11
Anions Total	meq/L	0.01	-	42	0.15	0.175	0.29
Cations Total	meq/L	0.01	-	42	0.13	0.13	0.17
Chloride	mg/L	1	-	42	3	4	4
Dissolved Oxygen (Lab)	mg/L	0.1	-	21	8.6	9.1	9.6
Electrical Conductivity (Lab)	uS/cm	1	18	24	18.6	20	26.2
Ionic Balance	%	0.01	-	0	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.1	-	42	0.2	0.2	0.4
Nitrate (as N)	mg/L	0.01	-	42	<0.01	<0.01	<0.01
Nitrite (as N)	mg/L	0.01	-	42	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	42	0.2	0.2	0.4
pH (Lab)	-			24	5.71	5.97	6.364
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	21	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	36	0.002	0.003	0.006
Sodium (filtered)	mg/L	1	-	42	3	3	3
Total Dissolved Solids (Lab)	mg/L	10	-	16	29	32.5	49
Hardness as CaCO ₃ (filtered)	mg/L	1	-	9	<1	<1	<1
Total Suspended Solids (Lab)	mg/L	5	-	19	<5	<5	17.8
Turbidity (Lab)	mg/L	0.1	12	21	2.7	4	7.8
Aluminium	mg/L	0.01	-	27	0.08	0.16	0.29
Aluminium (filtered)	mg/L	0.01	0.07	42	0.01	0.02	0.05
Antimony	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Antimony (filtered)	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	-	31	0.002	0.002	0.004

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic (filtered)	mg/L	0.001	0.013	42	<0.001	0.002	0.002
Barium	mg/L	0.001	-	11	0.018	0.022	0.028
Barium (filtered)	mg/L	0.001	-	19	0.007	0.01	0.015
Beryllium	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	19	<0.001	<0.001	<0.001
Bismuth	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Bismuth (filtered)	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	11	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	19	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	-	31	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	42	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	42	<1	<1	<1
Cesium	µg/L	1	-	11	<1	<1	<1
Cesium (filtered)	µg/L	1	-	19	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	31	<0.001	<0.001	<0.001
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	42	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	11	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	19	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	31	<0.001	<0.001	0.002
Copper (filtered)	mg/L	0.001	0.0014	42	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	27	0.798	1.19	2.508
Iron (filtered)	mg/L	0.05	0.11	42	0.12	0.2	0.32
Lead	mg/L	0.001	-	31	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	42	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	27	0.002	0.004	0.0096
Lithium (filtered)	mg/L	0.001	0.43	42	<0.001	0.003	0.004
Magnesium (filtered)	mg/L	1	-	42	<1	<1	<1
Manganese	mg/L	0.001	-	11	0.013	0.02	0.05
Manganese (filtered)	mg/L	0.001	-	9	0.0092	0.012	0.0184
Mercury	mg/L	0.0001	-	31	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	42	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Molybdenum (filtered)	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	-	31	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	42	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	42	<1	<1	<1
Selenium	mg/L	0.01	-	11	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	19	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	11	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	19	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	11	0.003	0.004	0.008
Strontium (filtered)	mg/L	0.001	-	19	0.0016	0.002	0.0034
Thallium	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Thallium (filtered)	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Thorium	µg/L	1	-	11	<1	<1	<1
Thorium (filtered)	µg/L	1	-	19	<1	<1	<1
Tin	mg/L	0.001	-	11	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	19	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	11	<0.01	<0.01	<0.01
Titanium (filtered)	mg/L	0.01	-	19	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	11	<1	<1	<1
Uranium (filtered)	mg/L	1	-	19	<1	<1	<1
Vanadium	mg/L	0.01	-	11	<0.01	<0.01	<0.01

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Vanadium (filtered)	mg/L	0.01	-	19	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	27	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	42	<0.005	<0.005	<0.005
Rubidium	mg/L	0.001	-	8	0.002	0.003	0.0046
Rubidium (filtered)	mg/L	0.001	-	6	0.001	0.002	0.005
C6-C9 Fraction	µg/L	20	20	19	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	19	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	19	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	19	<50	<50	<50
C10-C36 Fraction (Sum)	µg/L	50	50	19	<50	<50	<50
Acrylamide	µg/L	0.2	-	2	<0.2	<0.2	<0.2

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.

Table A.27 Observation Hill Dam toxicant summary results (operations)

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Naphthalene (VOC)	mg/L	0.005	-	20	<0.005	<0.005	<0.005
Benzene	µg/L	1	-	28	<1	<1	<1
Toluene	µg/L	2	2	28	<2	<2	<2
Ethylbenzene	µg/L	2	2	28	<2	<2	<2
Xylene (m & p)	µg/L	2	-	28	<2	<2	<2
Xylene (o)	µg/L	2	2	28	<2	<2	<2
Xylene Total	µg/L	2	2	28	<2	<2	<2
Total BTEX	µg/L	1	1	28	<1	<1	<1
Naphthalene	µg/L	5	5	8	<5	<5	<5
C6-C10 Fraction (F1)	µg/L	20	20	28	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20	20	28	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	100	100	28	<100	<100	<100
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	100	28	<100	<100	<100
>C16-C34 Fraction (F3)	µg/L	100	100	28	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100	100	28	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100	100	28	<100	<100	<100
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	0.01	30	0.006	0.02	0.02
Sulfate as SO ₄ - Turbidimetric (filtered)	mg/L	1	-	30	<1	<1	<1
Nitrite + Nitrate as N	mg/L	0.01	-	30	<0.01	<0.01	0.02
Alkalinity (Bicarbonate as CaCO ₃)	mg/L	1	-	30	2	3	4.2
Alkalinity (Carbonate as CaCO ₃)	mg/L	1	-	30	<1	<1	<1
Alkalinity (Hydroxide) as CaCO ₃	mg/L	1	-	30	<1	<1	<1
Alkalinity (total) as CaCO ₃	mg/L	1	-	30	2	3	4.2
Ammonia as N	mg/L	0.01	0.9	30	0.01	0.03	0.11
Anions Total	meq/L	0.01	-	30	0.1	0.12	0.184
Cations Total	meq/L	0.01	-	30	0.09	0.09	0.09
Chloride	mg/L	1	-	30	2	3	3
Dissolved Oxygen (Lab)	mg/L	0.1	-	29	9	10.1	10.72
Electrical Conductivity (Lab)	uS/cm	1	18	29	11.6	15	17
Ionic Balance	%	0.01	-	0	-	-	-
Kjeldahl Nitrogen Total	mg/L	0.1	-	30	0.2	0.3	0.4
Nitrate (as N)	mg/L	0.01	-	30	<0.01	<0.01	0.02
Nitrite (as N)	mg/L	0.01	-	30	<0.01	<0.01	<0.01
Nitrogen (Total)	mg/L	0.1	0.4	30	0.2	0.3	0.5
pH (Lab)	-			29	5.406	5.94	6.304
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.001	-	15	<0.01	<0.01	<0.01
Reactive Phosphorus as P (Orthophosphate as P) (filtered)	mg/L	0.001	-	30	<0.001	0.002	0.0032
Sodium (filtered)	mg/L	1	-	30	2	2	2
Total Dissolved Solids (Lab)	mg/L	10	-	9	17	22	37.2
Hardness as CaCO ₃ (filtered)	mg/L	1	-	14	<1	<1	<1
Total Suspended Solids (Lab)	mg/L	5	-	9	<5	<5	10.8
Turbidity (Lab)	mg/L	0.1	12	29	2.2	2.7	5.84
Aluminium	mg/L	0.01	-	29	0.026	0.05	0.07
Aluminium (filtered)	mg/L	0.01	0.07	30	<0.01	<0.01	<0.01
Antimony	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Antimony (filtered)	mg/L	0.001	-	7	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	-	29	0.003	0.003	0.0044

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Arsenic (filtered)	mg/L	0.001	0.013	30	0.002	0.002	0.003
Barium	mg/L	0.001	-	9	0.006	0.008	0.008
Barium (filtered)	mg/L	0.001	-	21	0.003	0.005	0.006
Beryllium	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Beryllium (filtered)	mg/L	0.001	-	21	<0.001	<0.001	<0.001
Bismuth	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Bismuth (filtered)	mg/L	0.001	-	7	<0.001	<0.001	<0.001
Boron	mg/L	0.05	-	9	<0.05	<0.05	<0.05
Boron (filtered)	mg/L	0.05	-	21	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	-	29	<0.0001	<0.0001	<0.0001
Cadmium (filtered)	mg/L	0.0001	0.0002	30	<0.0001	<0.0001	<0.0001
Calcium (filtered)	mg/L	1	-	30	<1	<1	<1
Cesium	µg/L	1	-	9	<1	<1	<1
Cesium (filtered)	µg/L	1	-	21	<1	<1	<1
Chromium (III+VI)	mg/L	0.001	-	29	<0.001	<0.001	<0.001
Chromium (III+VI) (filtered)	mg/L	0.001	0.001	30	<0.001	<0.001	<0.001
Cobalt	mg/L	1	-	9	<0.001	<0.001	<0.001
Cobalt (filtered)	mg/L	1	-	21	<0.001	<0.001	<0.001
Copper	mg/L	0.001	-	29	<0.001	<0.001	<0.001
Copper (filtered)	mg/L	0.001	0.0014	30	<0.001	<0.001	<0.001
Iron	mg/L	0.05	-	29	0.3	0.43	0.76
Iron (filtered)	mg/L	0.05	0.11	30	<0.05	0.11	0.184
Lead	mg/L	0.001	-	29	<0.001	<0.001	<0.001
Lead (filtered)	mg/L	0.001	0.0034	30	<0.001	<0.001	<0.001
Lithium	mg/L	0.001	-	29	<0.001	0.001	0.003
Lithium (filtered)	mg/L	0.001	0.43	30	<0.001	0.001	0.003
Magnesium (filtered)	mg/L	1	-	30	<1	<1	<1
Manganese	mg/L	0.001	-	9	0.0058	0.009	0.0104
Manganese (filtered)	mg/L	0.001	-	7	0.002	0.005	0.006
Mercury	mg/L	0.0001	-	29	<0.0001	<0.0001	<0.0001
Mercury (filtered)	mg/L	0.0001	0.0006	30	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Molybdenum (filtered)	mg/L	0.001	-	7	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	-	29	<0.001	<0.001	<0.001
Nickel (filtered)	mg/L	0.001	0.011	30	<0.001	<0.001	<0.001
Potassium (filtered)	mg/L	1	-	30	<1	<1	<1
Selenium	mg/L	0.01	-	9	<0.01	<0.01	<0.01
Selenium (filtered)	mg/L	0.01	-	21	<0.01	<0.01	<0.01
Silver	mg/L	0.01	-	9	<0.001	<0.001	<0.001
Silver (filtered)	mg/L	0.01	-	21	<0.001	<0.001	<0.001
Strontium	mg/L	0.001	-	9	0.002	0.002	0.002
Strontium (filtered)	mg/L	0.001	-	21	0.001	0.002	0.002
Thallium	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Thallium (filtered)	mg/L	0.001	-	7	<0.001	<0.001	<0.001
Thorium	µg/L	1	-	9	<1	<1	<1
Thorium (filtered)	µg/L	1	-	21	<1	<1	<1
Tin	mg/L	0.001	-	9	<0.001	<0.001	<0.001
Tin (filtered)	mg/L	0.001	-	21	<0.001	<0.001	<0.001
Titanium	mg/L	0.01	-	9	<0.01	<0.01	<0.01
Titanium (filtered)	mg/L	0.01	-	21	<0.01	<0.01	<0.01
Uranium	mg/L	1	-	9	<1	<1	<1
Uranium (filtered)	mg/L	1	-	21	<1	<1	<1
Vanadium	mg/L	0.01	-	9	<0.01	<0.01	<0.01

Contaminant	Units	WQL	SSTV	No. of samples	20%ile	Median	80%ile
Vanadium (filtered)	mg/L	0.01	-	21	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	-	17	<0.005	<0.005	<0.005
Zinc (filtered)	mg/L	0.005	0.008	30	<0.005	<0.005	<0.005
Rubidium	mg/L	0.001	-	9	0.002	0.002	0.003
Rubidium (filtered)	mg/L	0.001	-	7	0.002	0.002	0.002
C6-C9 Fraction	µg/L	20	20	28	<20	<20	<20
C10-C14 Fraction	µg/L	50	50	28	<50	<50	<50
C15-C28 Fraction	µg/L	100	100	28	<100	<100	<100
C29-C36 Fraction	µg/L	50	50	28	<50	<50	<50
C10-C36 Fraction (Sum)	µg/L	50	50	28	<50	<50	<50
Acrylamide	µg/L	0.2	-	0	-	-	-

Note: Highlighted cells represent exceedances in comparison to the WQL/SSTV.



APPENDIX B WATER MANAGEMENT TARPS

Table B.1 Sediment basin water quality TARP

Level	Triggers	Action/Response
Level 1	Sediment basin water quality is within than 90% of the SSTVs (Table 6.4 of the WMP).	No action/response required
Level 2	Sediment basin water quality is between 90% and 100% of the SSTVs (Table 6.4 of the WMP).	- 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. - Increase frequency of monitoring.
Level 3	Sediment basin water quality exceeds one or more of the SSTVs (Table 6.4 of the WMP).	- Investigate potential sources of contaminants in the catchment (e.g., WRD, box-cut stockpile, contractor area, box cut, etc.) that are contributing to poor water quality. - Inspect the WRD and, if necessary, sample seepage and or runoff to determine if WRD is affecting sediment basin water quality. - If WRD is found to be impacting on water quality, investigate geochemistry of the WRD. - 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. - Apply relevant mitigation, treatment and contingency measures in level 2 before discharging from sediment basins.
Level 4	Sediment basin water quality exceeds one or more of the SSTVs by more than for three consecutive samples or more than 50% for one sample (Table 6.4 of the WMP).	- Apply any treatment additives to achieve compliance with sediment water releases. - Cease discharging from the sediment basins. - Apply appropriate controls, measures and diversion/remediation options depending on outcomes of investigations in level 3. - Review current management plans and update if necessary. - Notify the regulator in accordance with approval and licence conditions.

Table B.2 Proposed mine water site storage inventory exceedances TARP

Level	Triggers	Action/Response
Level 1	MWD1 Cell 1 storage volume < 93 ML	No action/response required
Level 2	MWD1 Cell 1 storage volume exceeds 93 ML (80% of Cell 1 FSV) with current or forecast heavy rainfall (>50 mm)	- Continue environmental releases (from MWD1) where possible. - Monitor storage levels in accordance with the monitoring plan. - Maximise pumping capacity for dewatering of storage. - Pump from MWD1 Cell 1 to MWD1 Cell 2 and MWD1 Cell 3. - 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.
Level 3	MWD1 Cell 1 and Cell 2 combined storage volume exceeds 185 ML (80% of the combined Cell 1 and Cell 2 FSV) with inflows still occurring	- Continue environmental releases (including irrigation) where possible. - Apply management and contingency measures in Level 2. - Post-event review to confirm suitability of water transfer infrastructure and operational rules. - Update operational rules if required. - Prepare recommendations for modifications or upgrades to water transfer infrastructure.
Level 4	Uncontrolled discharge of mine water from MWD1 to the environment.	- Record start and finish times of the overflow. - Advise regulator of spill. - Collect water quality samples of spills at dam overflow points and in receiving waterways. - Remediate any environmental harm where possible. - Truck mine water from the underground mine to Grants. - Investigate structural risks of underground mine. - Initiate investigation into reasons for system failure. - Take actions recommended by investigation to prevent recurrence.

Table B.3 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 (GDS SW5).	No action/response required
Level 2	Exceedance in surface water quality parameter trigger values for one monitoring event	- Review laboratory QA/QC and look for potential quality control issue and request a review if a suspected lab error. - Implement 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. - Apply mitigation and contingency measures in level 2.
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. - Identify the potential source associated with the trigger exceedance by qualified personnel. - Review current management plans and update if necessary. - Initiate investigation for reasons of increase water quality concentrations. - Notify the regulator in accordance with approval and licence conditions.

Table B.4 Proposed groundwater bore water quality TARP

Level	Triggers	Action	Response
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 two consecutive quarterly samples for any analyte	- Investigate surrounding bores monitoring data. - Investigate any operational events which may affect groundwater quality. - Investigate source of contamination on contaminants of concern and bore location. - Review historical monitoring data to determine any trend.	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.	- 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.	- Initiate investigation for reasons of increased water quality concentrations. - Assessment of plume extent and fate by qualified hydrogeologist. - Notify the regulator in accordance with approval and licence conditions.





Level 1, 369 Ann Street Brisbane
PO Box 10703 Brisbane Adelaide Street Qld 4000
07 3225 0200

Level 5, 93 Mitchell Street Darwin
GPO Box 43348 Casuarina NT 0811
08 8911 0060

wrm@wrmwater.com.au
wrmwater.com.au

ABN 96 107 404 544