ENGENY

JELLINBAH MINE

Water Management Plan

BBNE00299_0027-REP-002-0

14 NOVEMBER 2024

DISCLAIMER

This Report has been prepared on behalf of and for the exclusive use of Jellinbah Mine and is subject to and issued in accordance with Jellinbah Mine instruction to Engeny Australia Pty Ltd (Engeny). The content of this Report was based on previous information and studies supplied by Jellinbah Mine.

Engeny accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this Report by any third party. Copying this Report without the permission of Jellinbah Mine or Engeny is not permitted.

Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	14/11/2024	Client Issue	Sumaiya Sifa	Aaron Baldwin	Sean Richardson	Aaron Baldwin
Signatures:						

CONTENTS

Appendices

Tables

Figures

1. INTRODUCTION

Jellinbah Mine (the Site) is an open-cut coal operation in the Bowen Basin with approval to produce up to 7.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) pulverised coal injection (PCI) and thermal coal. Mining activities at Jellinbah Coal Mine are approved under Environmental Authority EPML00516813 (DESI, 2024).

Conditions C30 to C34 of the Environmental Authority (EA) outline the requirements for the development and annual review of a Water Management Plan for the Site. Engeny was commissioned by Jellinbah Mine to do the annual review and update of the Water Management Plan (Engeny, 2024).

1.1 Water Management Plan Objectives

As prescribed in Condition 31 of the EA, the key objectives of the WMP are:

- Determine the source and nature of potential contaminants.
- Development of a site water balance model.
- Development of a site water management system.
- Identify potential impacts to receiving environments.
- Define management actions to minimise the risks of environmental harm to receiving environments.
- Outline contingency procedures for emergencies.

1.2 Legislative Requirements

Jellinbah Coal Mine is required to prepare a WMP as per conditions C30 and C31 of the Site's Environmental Authority (EPML00516813).

The over-arching legislation that applies to the management of water at Jellinbah Mine includes:

- Environmental Protection Act 1994 (Qld).
- Environmental Protection Regulation 2008 (Qld).
- Mineral Resources Act 1989 (Qld).
- Mineral Resources Regulation 2003 (Qld).
- Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld).
- Water Act 2000 (Qld).
- Environment Protection and Biodiversity Conservation Act 1999 (Cwlth).

1.3 Standards and Guidelines

Key standards and guidelines that have been used to inform the preparation and implementation of this WMP include:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Online Platform (ANZG 2018).
- Best Practice Erosion and Sediment Control (IECA 2018).
- Establishing draft environmental values, management goals and water quality objectives (DEHP 2013a).
- Guideline for Preparation of Water Management Plans for Mining Activities (DEHP 2012b).
- Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (DESI, 2024).

1.4 Supporting Documentation

The following documents should be read in parallel with this Water Management Plan:

- Environmental Authority EPML00516813 Jellinbah Mine (DESI, 2024).
- Erosion and Sediment Control Plan (AARC, 2020).

- Receiving Environment Monitoring Program (REMP) Jellinbah Coal Mining Project (Ison Environmental Planners, 2010) and the annual progress reports by AARC.

The Erosion and Sediment Control Plan (ESCP) is a requirement of Condition C38 of the EA. The goal of the plan is the minimisation of erosion, release of sediment to receiving waters and contamination of receiving waters. The ESCP addresses the management of runoff from undisturbed or rehabilitated land, while the Water Management Plan focuses on the management of mine-affected water. The Receiving Environment Monitoring Program (REMP) is a requirement of Condition C23 of the EA. The REMP is designed to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. Monitoring results and interpretations completed as part of the REMP are documented annually in a progress report.

1.5 Project Data

The following data was used for development of the updated WMP. All data was supplied by Jellinbah Mine unless otherwise specified.

- LiDAR survey of active and inactive mining areas dated July 2024.
- Aerial Imagery dated August 2024
- Disturbance and mine plan for 2024.
- Water quality monitoring data (August 2014 – June 2024).
- Vinces Pit design documentation and strings.
- Water use and production data (FY24).
- Details of planned water management and tailings infrastructure.
- Pump and pipeline capacities and arrangements (spatial GIS files).
- Climate data from the SILO climate database facility hosted by the Department of Science, Information Technology, and Innovation (DSITI).
- IQQM stream flow data for Mackenzie River until 2007 (DSITI).
- Management plans and regulated structure documentation.

2. SITE DESCRIPTION

2.1 Background and Current Operations

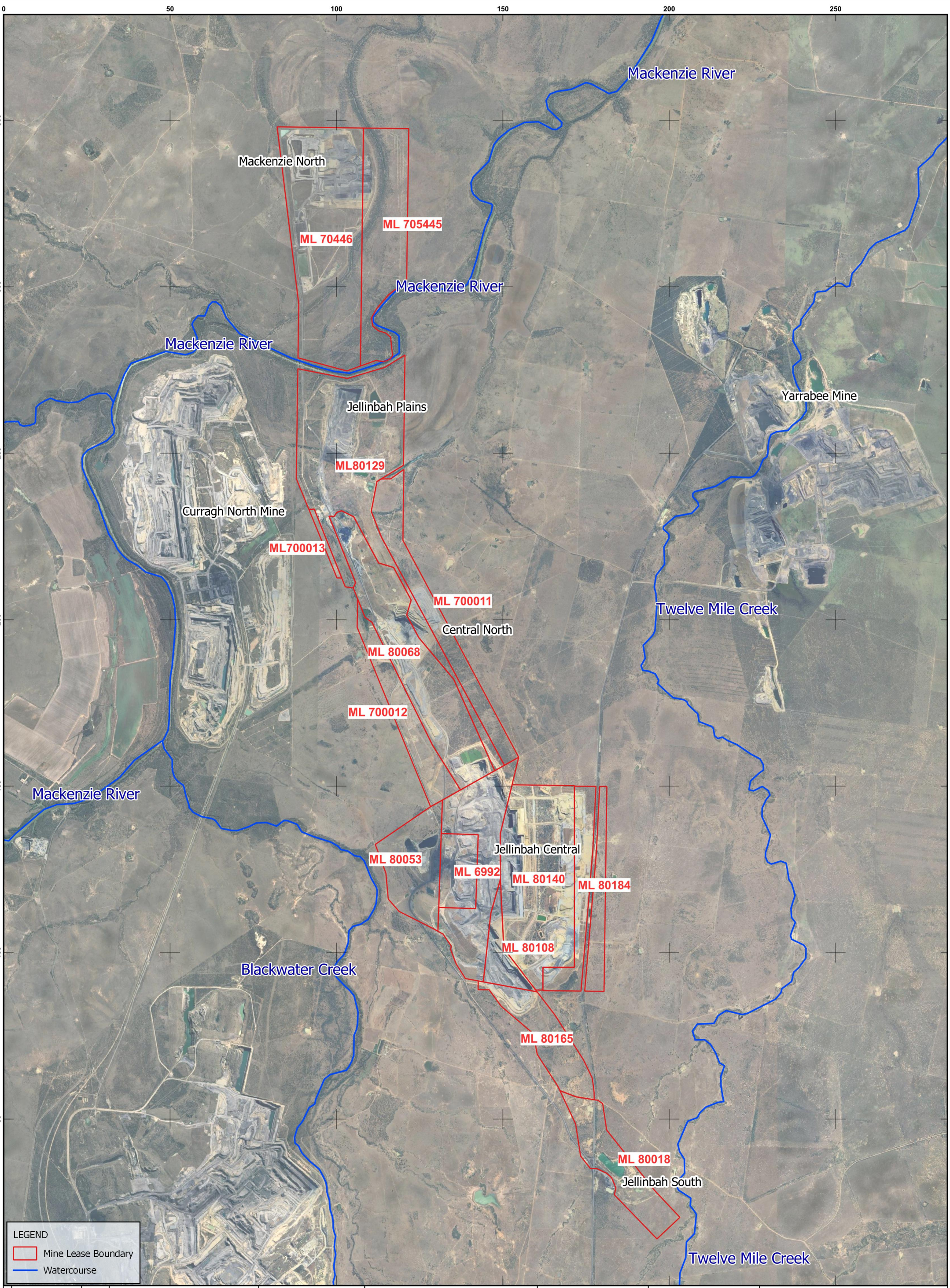
Jellinbah Coal Mine is located approximately 25 km north of the township of Blackwater in central Queensland. Refer to the site locality plan in Figure 2.1. The Jellinbah Coal Mine consist of five (5) distinct operating areas, referred to as South, Central, Central North, Plains, and Mackenzie North (listed north to south). Current operations involve open cut coal mining in the Central, Central North and Mackenzie North areas. The South pit was mined up until 2003 and since used for storage of excess mine affected water.

Current coal production is around 6.1 Mtpa; 2.9 Mtpa at Central/Central North and 3.2 Mtpa at Mackenzie North. Coal is hauled from mining areas along a dedicated haul road to the Boonal Loadout Facility on the Capricorn Highway, east of Blackwater.

The main operations are at the Central site, including workshops, offices, and the coal wash plant. The coal seam dips to the east and the pits are progressing to the east. Out of pit overburden emplacements have been developed to the east of the Central pits, while operational pits are being progressively backfilled from the west. The CPP, wash plant, ROM areas and workshops are located further west. Runoff containment dams and a tailings dam have been constructed around the processing area.

The Plains coal seam dips to the east and the pit progressed in a northerly direction towards Mackenzie River. Coal production of Plains Pit ceased in late 2020 with the southern end of the pit being backfilled. The Central North area restarted mining in July 2019 following dewatering of the Central North Pit (formerly 'Plains South') with overburden emplacements located to the west of the pit. The Plains area has a ROM area and a crusher, which ceased operations in November 2020 with Central North coal now being processed at the Central crusher and CPP. The coal is transported directly to the Boonal Loadout Facility from the CPP via road trains.

Mining operations in Mackenzie North include an open cut pit progressing to the south towards Mackenzie River and a crusher, from which coal is transported either to Central CPP for washing or directly to the Boonal Loadout Facility for sale. Overburden emplacements have been established to the north and west of the pit with sediment dams located around the edge of the overburden dump further north and east.



R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 2000 m

SCALE - 1:90,000
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure 2.1

Jellinbah Mine

Water Management Plan
Site Locality Plan

Job Number.
BBNE00299_0027

2.2 Receiving Waterways

2.2.1 Twelve Mile Creek

Twelve Mile Creek is located to the east of the mine lease area and flows in a northerly direction before discharging into the Mackenzie River, 60 km from Jellinbah South (downstream of the Bingegang Weir). Overflows from water storages in Jellinbah South discharge to a tributary of Twelve Mile Creek.

Twelve Mile Creek is an ephemeral waterway, and stock may have access to this waterway downstream of the mine lease. Twelve Mile Creek flows through the centre of the neighbouring Yarrabee Coal Mine approximately 20 km downstream of Jellinbah South.

2.2.2 Blackwater Creek

Blackwater Creek is located to the west of the mine lease area and flows in a north-westerly direction before discharging into the Mackenzie River 10 km north-west of Jellinbah Central (upstream of the Bingegang Weir). Overflows from water storages in Jellinbah Central will discharge to one of two unnamed tributaries of Blackwater Creek. Mine water releases to Blackwater Creek are only allowed in accordance with the conditions in the Jellinbah Mine EA.

Blackwater Creek is an ephemeral waterway, and stock may have access to this waterway downstream of the mine lease.

2.2.3 Mackenzie River

The Mackenzie River is the receiving waterway for Twelve Mile Creek and Blackwater Creek, and as such any water discharged from the Jellinbah Coal Mine site will enter the Mackenzie River. Water storages at Jellinbah Plains and Mackenzie North discharge directly to the Mackenzie River in extreme events. Mine water release to the Mackenzie River is only allowed in accordance with the conditions in the Jellinbah Mine EA.

The Mackenzie River has a significant number of water extraction points located both upstream and downstream of the confluences with the Blackwater Creek and Twelve Mile Creek. Water extracted from the Mackenzie River is primarily used for agricultural purposes, however the entitlements can also be used for riparian, stock and domestic uses.

The Nogoa-Mackenzie Water Supply Scheme releases water from Fairbairn Dam into the Mackenzie River via the Nogoa River for agricultural, urban and industrial use. There are major industrial and urban water supply off-takes downstream of the confluence of Blackwater Creek and Mackenzie River.

Bingegang Weir is located on Mackenzie River, downstream of Jellinbah Plains and the confluence with Blackwater Creek and upstream of the confluence with Twelve Mile Creek. As such the Bingegang weir may be impacted by the release of mine affected water from Jellinbah Central and Jellinbah Plains. The Bingegang Weir supplies water to the towns of Middlemount and Dysart along with a number of mines in the region. The Bingegang Weir is located 60 km downstream of the confluence with Blackwater Creek and 30 km downstream from Jellinbah Plains.

2.3 Climate

Jellinbah Mine has a sub-tropical climate, dominated by a wet humid summer and dry winter. Long-term climate data for Jellinbah Mine was obtained from the SILO climate database facility hosted by the Department of Science, Information Technology, and Innovation (DSITI). A SILO Patched Point Data climate series was obtained for the New Caledonia Station (35132) and combined with point data for a location at Jellinbah Mine, which is located about 5 km from Jellinbah Mine. Table 2.1 presents average climate statistics for the New Caledonia Station (35132).

Average annual rainfall at the mine is 589 mm with a clearly defined wet season occurring between November and May. Average pan evaporation at Jellinbah Mine is 170 mm/month, varying from 94 mm/month in June to 238 mm/month in December.

TABLE 2.1: AVERAGE CLIMATE DATA STATISTICS

Month	Rainfall (mm)	Minimum Temperature (°C)	Maximum Temperature (°C)	Pan Evaporation (mm)
January	101	22	34	226
February	88	21	33	182
March	63	20	32	189
April	31	17	30	149
May	31	13	26	117
June	31	10	23	94
July	26	8	23	103
August	18	9	25	132
September	22	13	28	173
October	41	16	31	213
November	56	19	33	225
December	83	21	34	238
Annual	**589**	-	-	**2,040**

2.4 Geology

Jellinbah Mine falls on the eastern flank of the Comet Ridge of the Bowen Basin, at the north-western end of the Jellinbah Zone. The coal seams at Jellinbah Mine dip to the east. The coal is at least 10 m deep at its shallowest location and increases as the seam dips by between 2 degrees and 20 degrees.

The initial overburden layers are made up of clays and sands before reaching siltstones and mudstones that are above the coal layers. Removal of most material is by blasting then loading and hauling with truck and excavator equipment. The overburden material has been classified as non-acid forming.

2.5 Groundwater

Minimal groundwater has been encountered at the majority of the Jellinbah mining areas, however significant groundwater inflows have been experienced at Plains Pit, when mining activities reached the quaternary alluvium in the Mackenzie River floodplain. Plains Pit current location is close to the Mackenzie River channel and situated within the alluvials located in the southern floodplain.

Prior to the 2011 flood event, the alluvium around Jellinbah Plains was largely unsaturated. Based on these conditions, analytical estimation of potential groundwater inflows predicted that less than 0.2 ML/day could enter the Jellinbah Plains mine area (AGE 2006). Following the 2011 flood event, the alluvial groundwater system was recharged from floodplain inundation and conditions along the riverbed likely changed (i.e. scouring of clay in areas and deposition of clay in others).

A groundwater assessment was conducted by AGE following the 2011 flood event (AGE, 2013). This predicted groundwater inflows of 5.4 to 7.6 ML/day in 2019. Review of recorded pumping data from Plains Pit to Environmental Dam for FY18/19 (Thiess Mining), determined an estimated pumpable groundwater inflow rate to Plains Pit of 4.6 ML/day. This value was based on data recorded during the dry season and considered recorded seepage data from Environmental Dam.

Conversations with Jellinbah Mine confirmed very little to no groundwater inflow in Central, Central North and Mackenzie North Pits due to groundwater being present in only small pockets which quickly dry out after exposure.

3. CONTAMINANT SOURCES

Surface water runoff from mine landforms and disturbed areas can potentially contain a variety of contaminants including sediment, heavy metals, hydrocarbons and soluble salts. Potential contaminant sources identified across Jellinbah Mine include:

- Coal Processing Plant (CPP).
- Tailings and rejects storage facilities.
- Overburden dumps.
- ROM and stockpile areas.
- Haul roads and access roads.
- Pit voids.
- Water containment and sediment dams.
- Pre-strip areas.

A summary of the potential contaminant sources, flow paths and destinations are summarised in Table 3.1.

This Water Management Plan addresses the overarching management of water across the Plains, Central, Central North, South and Mackenzie North mining areas, focussing on managing water in distinct categories including:

- Mine Affected Water – Water that contains contaminants which have been generated as a result of the interaction with groundwater as well as extraction and processing of coal, such as soluble salts, dissolved metals and hydrocarbons.
- Sediment Water – Rainfall runoff in which the only contaminants are dissolved or suspended sediments.
- Clean Water – Rainfall runoff generated from areas not impacted by activities associated with the approved mining.

TABLE 3.1: CONTAMINANT SOURCES SUMMARY

Source	Transport Mechanisms	Site Containment	Receiving Waterway	Potential Contaminants
Coal Processing Plant	Surface runoff.	Water containment dams.	Blackwater Creek.	Sediment, heavy metals, coal fines, soluble salts, processing reagents (i.e., flocculent / magnetite), fuels, oils and grease.
Overburden Dumps	Surface runoff.	Pit voids Water containment dams.	Blackwater Creek, Mackenzie River.	pH raising materials. Sediment, dissolved metals present in weathered sediments and soluble salts.
ROM and Stockpile Areas	Surface runoff.	Pit voids Water containment dams.	Blackwater Creek, Mackenzie River.	Sediment, coal fines, soluble salts and acid forming material.
Haul Roads and Access Roads	Surface runoff.	Water containment dams.	Blackwater Creek, Mackenzie River, Twelve Mile Creek.	Sediment, soluble salts, fuels, oils, grease (total petroleum hydrocarbons) and coal (coarse or fines).
Pit Void	Pumping of pit runoff to water containment dams.	Pit voids Water containment dams.	Groundwater.	Alkaline or sodic soils and heavy metals, coal fines and pH altering materials.

Source	Transport Mechanisms	Site Containment	Receiving Waterway	Potential Contaminants
Water Containment Dams and Tailings Storage Facilities	Seepage through floor of dams. Pumping within mine water system. Overflows during heavy rainfall. Loss of containment (failure).	Pit voids, if containment dam capacity is limited.	Blackwater Creek, Mackenzie River, Twelve Mile Creek.	Elevated pH, sediment, dissolved metals, coal fines, soluble salts and hydrocarbons.

The Erosion and Sediment Control Plan (AARC, 2020) details the management of sediment water. The Jellinbah Coal Mine area is dominated by highly dispersive soils of strongly structured alluvial clays and soils of sandy texture. These soils are easily erodible with high fines content. Runoff from areas disturbed by mining activities is expected to have high suspended solids content. Sediment dams assist in allowing sediment to settle out of the water prior to discharging to natural water courses. Jellinbah undertake progressive rehabilitation of disturbance to reduce sediment generation and utilise sediment dams to treat disturbed catchment runoff in accordance with the Erosion and Sediment Control Plan.

The Jellinbah Mine Site Wide Consequence Category Assessments (Engeny, 2017) in addition to subsequent Consequence Category Assessments by WSP 2018 and Engeny in 2020 for new structures, identify water management infrastructure which are classified as regulated structures. These structures have been identified as posing a risk to environmental values within the receiving waterways and as such are required to be designed and operated in specific manner. Regulated structures are managed under specific conditions within the EA and include requirements for annual inspection, operational plans and water storage limitations.

The Jellinbah Mine Receiving Environment and Monitoring Program (REMP) was developed to assess and document the condition of the surface waters in the receiving environment. Annual REMP reviews undertaken to date have not identified any adverse impacts to the receiving surface water environment, suggesting the current water management system is adequately managing contaminant sources associated with Jellinbah Mine.

3.1 Saline Drainage

Water that has been in contact with coal or interburden at Jellinbah Mine has a tendency to have elevated levels of salinity. This includes runoff from processing areas and open cut pits and is considered mine affected water. These waters are managed via separation from clean catchment runoff and sediment drainage through the use of diversion drains and dedicated mine water storage dams. This water is predominantly recycled for operational water demands, evaporated or released in accordance with the mine affected water release conditions in the Environmental Authority (DESI, 2024). The average water quality of stored contents in mine affected water dams ranges from 1,300 to 16,500 µS/cm over the last seven years (Section 6).

3.2 Acid Rock Drainage

As outlined in Section 2.4, the mining area geology is predominantly made up of layers of mudstone, siltstone, sandstone and coal. Overburden is generally between 10 m to 150 m thick. These materials are generally not acid forming and there has been no indication of acid drainage from any dump areas or within pits at Jellinbah Mine to date. As such no specific strategies have been developed to manage acid drainage. Water monitoring programs as well as the REMP identify trends in the sites water quality that may require attention. Water quality monitoring results to-date indicate no presence of acid generation with water stored in the mine affected water dams being slightly alkaline (see Section 6).

4. WATER MANAGEMENT SYSTEM

The water management system at Jellinbah Mine comprises of storages which serve the following purposes:

- Pit dewatering.
- Containment of tailings.
- Storage of mine affected water.
- Collection of spoil and rehabilitated runoff.
- Controlled release of mine affected water.
- Water truck filling points.
- Active and inactive mine pits.
- Sediment control.

A water management system schematic was developed for Jellinbah Mine and is presented as Figure 4.1. The site water management infrastructure maps, including MAW storages, sediment dams, pipelines, drains and levees, are presented in Figure 4.2 to Figure 4.6.

The majority of mine affected water at the Jellinbah Mine is stored in Jellinbah South Void, Plains Pit and large dams constructed within the mine lease area (i.e. Environmental Dam, Russell's Dam, 108 Dam, Mackenzie North Mine Water Dam).

The water management system also includes an interconnecting pipe network with associated pumps which allow mine affected water to be transferred between water storages and mining areas.

Under the current mining operations coal tailings from the CPP are contained in Russell's Dam with the tailings decant recycled from Russell's Dam for the site water consumption at the Central CPP. Vinces Pit is a new pit being excavated for coal production and will be converted into a tailings storage facility at the end of 2026 to replace Russell's Dam as it approaches end of life. Vinces Pit is located in the Central mining area and be used for tailings disposal for the remaining Jellinbah mine life.

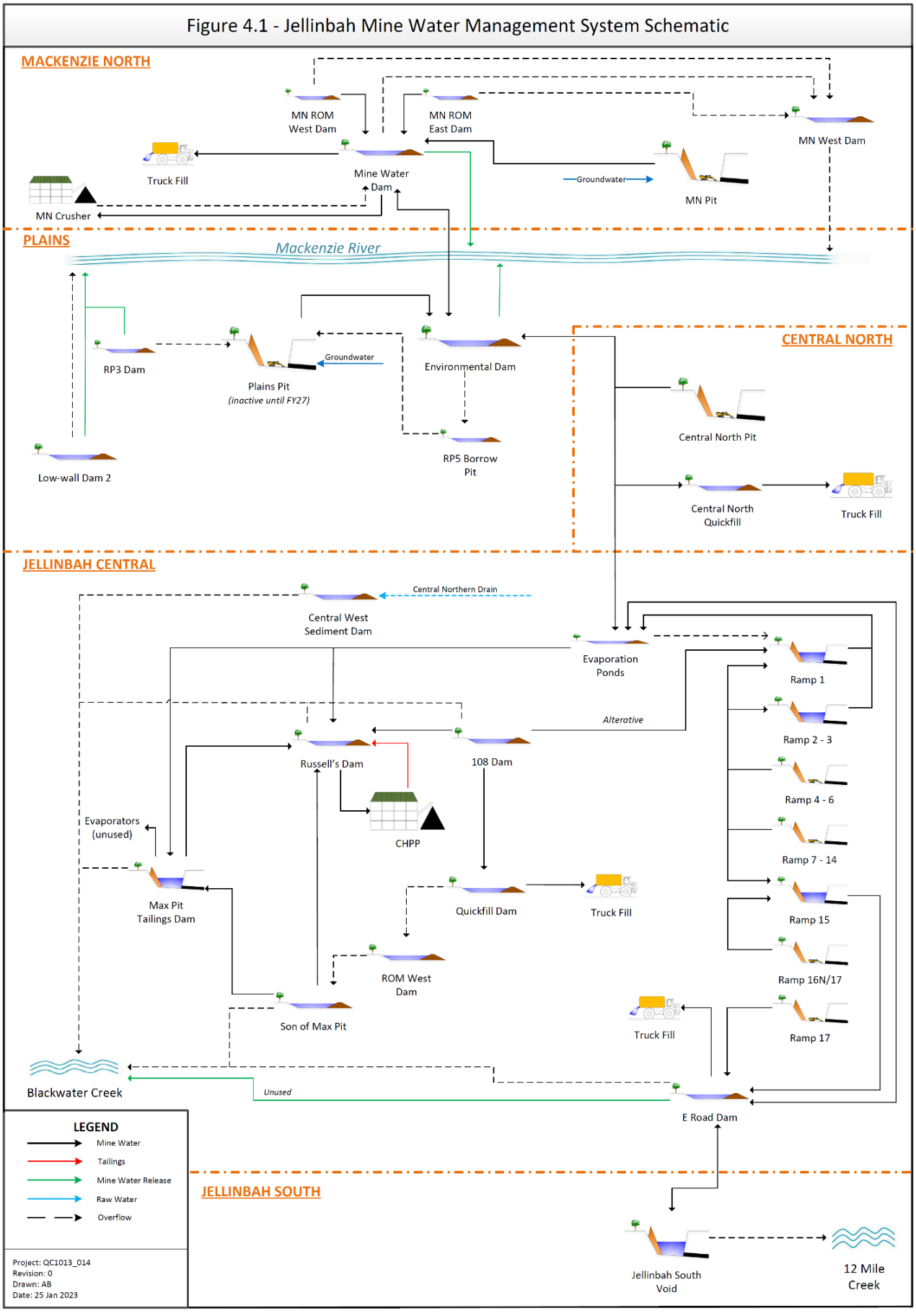
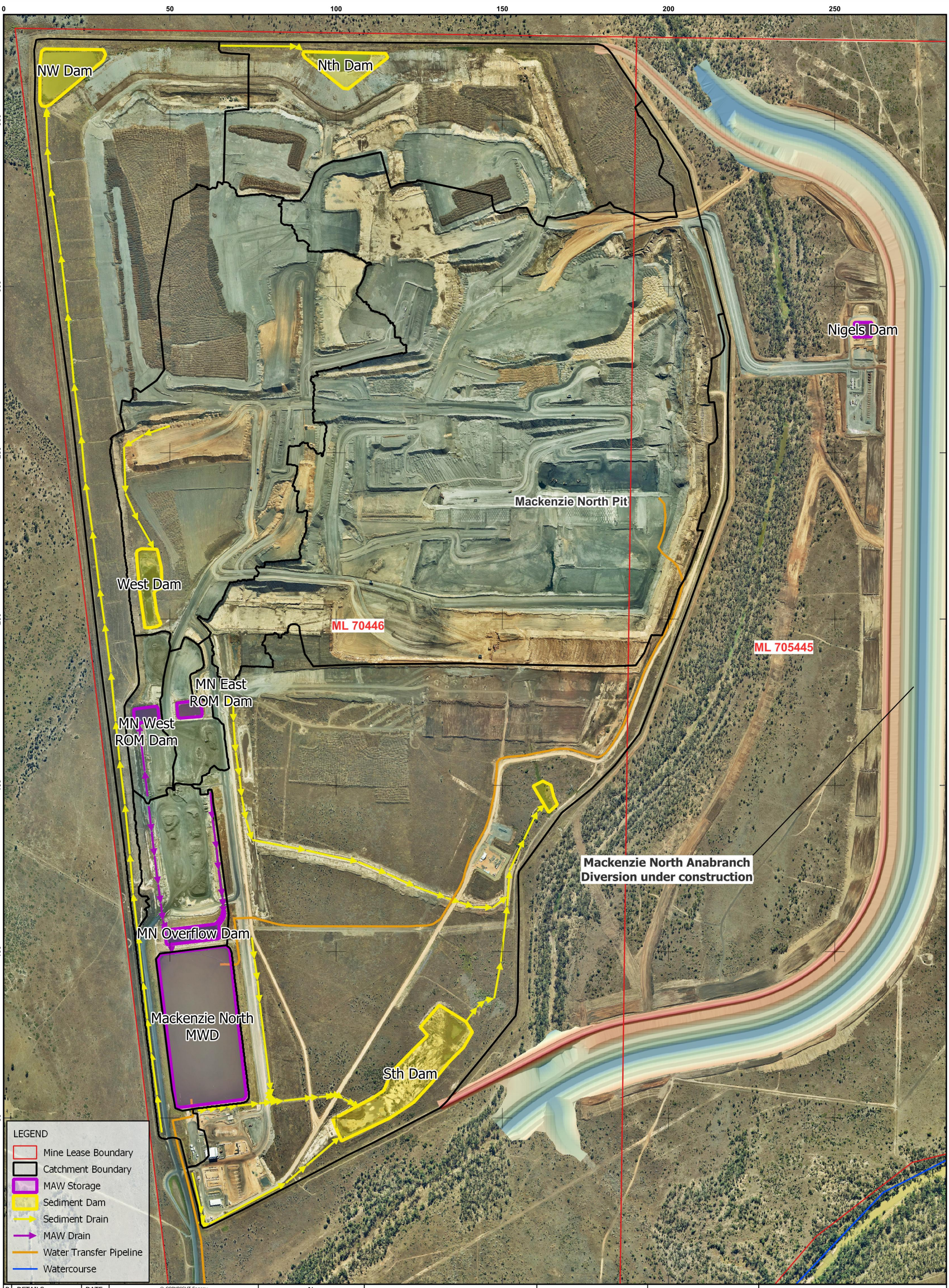


Figure 4.1: Water Management System Schematic



R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 100 200 m

SCALE - 1:12,500
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

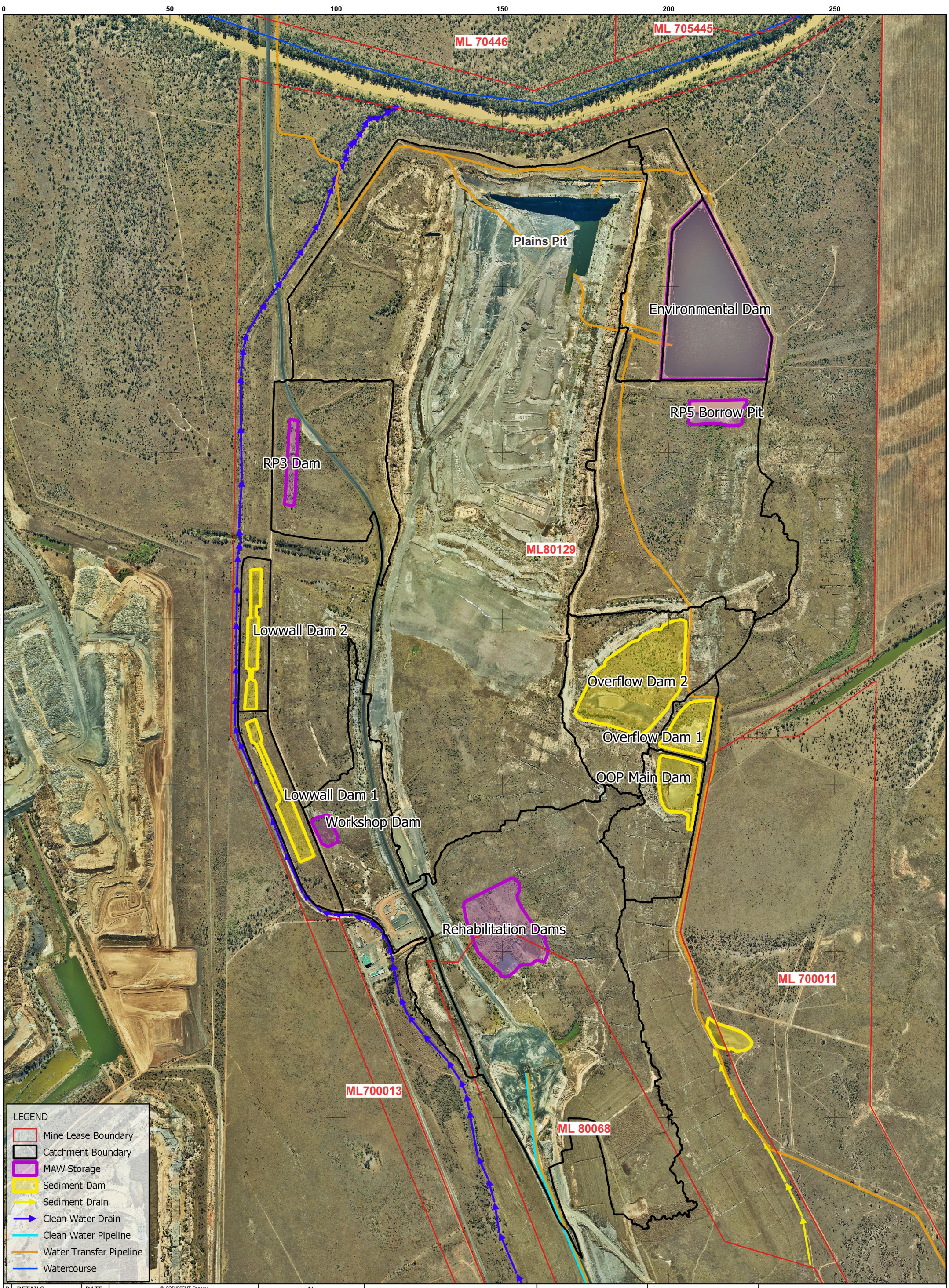
Jellinbah

Figure 4.2

Jellinbah Mine

Water Management Infrastructure
Mackenzie North

Job Number.
BBNE00299_0027



R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 100 200 m

SCALE - 1:15,000
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure 4.3

Jellinbah Mine

Water Management Infrastructure Plains

Job Number.
BBNE00299_0027

R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 100 200 m

SCALE - 1:15,000
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

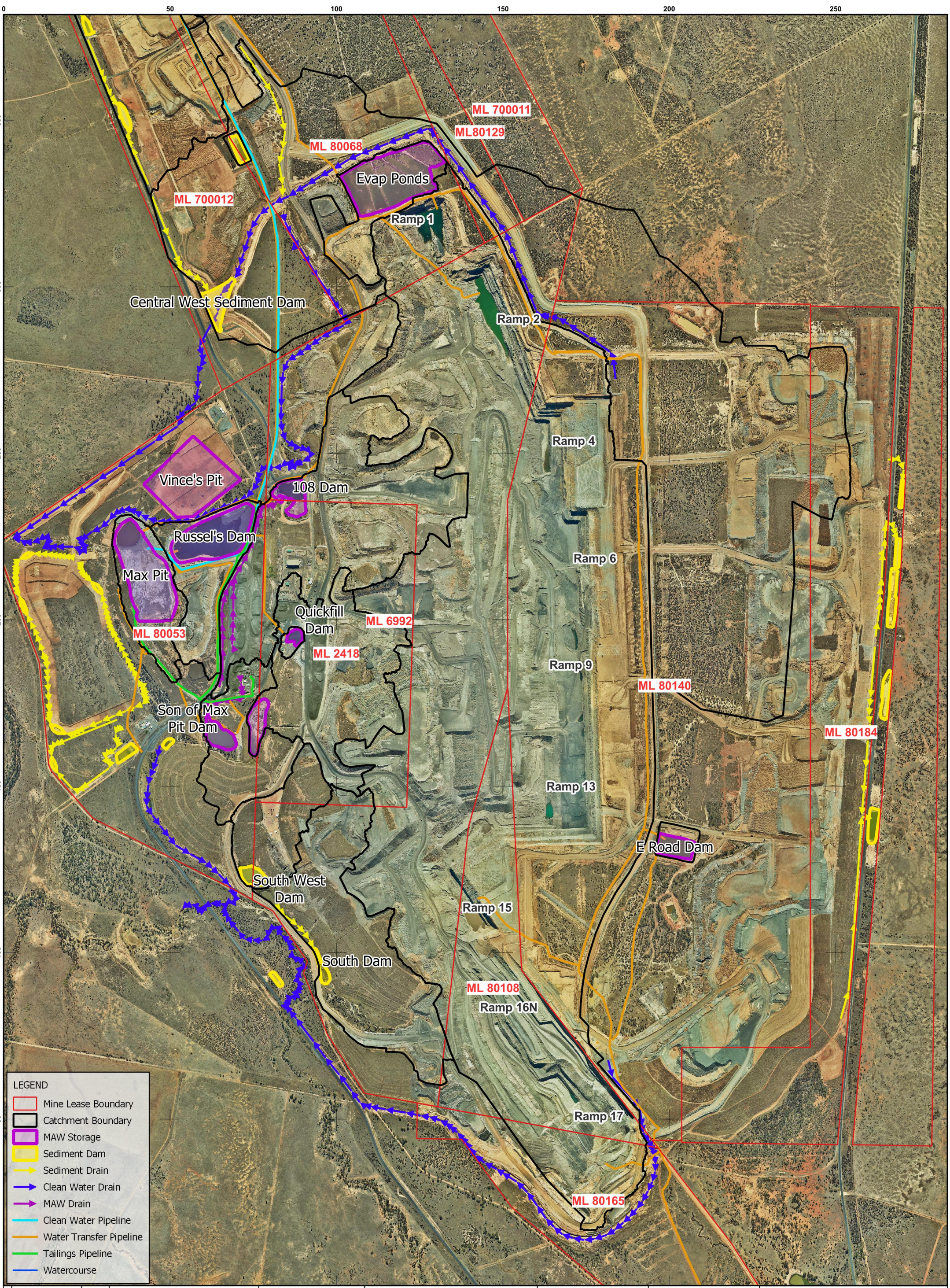
Jellinbah

Figure 4.4

Jellinbah Mine

Water Management Infrastructure
Central North

Job Number.
BBNE00299_0027



R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 100 200 m

SCALE - 1:22,000
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure 4.5

Jellinbah Mine

Water Management Infrastructure Central

Job Number.
BBNE00299_0027

ML 80018

Jellinbah South Void

Jellinbah South Dam

LCR Dam

LEGEND

- Mine Lease Boundary
- Catchment Boundary
- MAW Storage
- Sediment Dam
- Sediment Drain
- Clean Water Drain
- Water Transfer Pipeline

R	DETAILS	DATE
1	Final Issue	31-10-2024

DRAWN	SS	CHECKED	NG
APPROVED	AB	DATE	31-10-2024

NOTES:

N

0 100 200 m

SCALE - 1:7,500
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure 4.6

Jellinbah Mine

Water Management Infrastructure South

Job Number.
BBNE00299_0027

4.1 Water Management Objectives

Table 4.1 summarises the types of water on site and the management strategy employed for each type.

TABLE 4.1: OVERALL WATER MANAGEMENT STRATEGIES

Type of Water	Definition	Management Strategy
Clean Runoff	Runoff from all areas that are not affected by coal or operational facilities.	Drains and dams are used to keep clean water separate and ultimately divert clean catchment runoff to receiving waterways.
Sediment Runoff	Runoff in which the only contaminants are dissolved or suspended sediments.	Runoff with a sediment load is directed through sediment dams to minimise solid content prior to exiting the site.
Mine Affected Water	Includes any water that comes into contact with coal stockpiles, coal pads, plant areas, pit areas and coal seam groundwater. Typically, elevated salinity.	Objective is to keep this water separate from the other water types, recycle and evaporate as much as possible and discharge as per EA release conditions.
Raw Water	The site has a license to supplement water supply by pumping from Mackenzie River. This water is untreated and mainly used for vehicle wash down.	Minimise consumption where possible – Annual licenced allocation of 300 ML/year.
Potable Water	Water for drinking and sanitation purposes.	Water is trucked to site as required.

The design and details of the clean water runoff and sediment runoff systems is outlined in the Sediment and Erosion Control Plan (AARC, 2020).

4.2 Water Management Infrastructure

4.2.1 Mine Water Storages

Table 4.2 presents the summary of all mine water management storages and pits.

TABLE 4.2: MINE WATER MANAGEMENT STORAGES

Mining Area	Storage/Pit	Capacity (ML)	30 June 2024 Inventory (ML)	Catchment Area (ha)	Water Management Details
Mackenzie North	MN Mine Water Dam	608	354	42	Supply for demands at Mackenzie North and receives dewatering from MN Pit. Release point for the site.
	MN Pit	0	0	265	Current active mining Pit, dewatered to MN MWD.
	MN ROM West Dam	11	5	8	Receives runoff from MN ROM coal pad extension. Pumps to MN MWD.
	MN ROM East Dam	12	5	8	Receives runoff from MN ROM coal pad extension. Pumps to MN MWD.
Plains	Plains Pit	1,061	254	328	Receives runoff from spoil and groundwater ingress at the base of the pit and up the northern wall. Dewatered to Environmental Dam and RP3 Dam. Inactive pit in late 2020.
	Environmental Dam	1,673	803	28	Turkey's nest dam which receives pit water. Authorised EA release point to Mackenzie River.
	RP5 Borrow Pit	55	-	86	Receives overflows from RP5 Environmental Dam.
	RP3 Dam	32	0	39	Receives alluvial water from Plains Pit. Potential to release via authorised EA point through the levee to Mackenzie River.
Central North	Central North Void	0 *(active pit)*	0	199	Current active mining Pit, dewatered to Environmental Dam and Central. Formerly known as 'Plains South Void'.
	Central North Quickfill	39	35	5	Receives water from Environmental Dam and supplies demands for truckfill at Central.
Central	Central Pits (Ramps 1 to 17)	1817[1]	532	894	Central Pits are receiving minimal groundwater inflows and are dewatered to E Road Dam or the Evaporation Ponds. Ramp 1, 2 and 15 are used as intermediate water storage through existing in-pit sumps.
	Evaporation Ponds	130	97	38	Receives mostly Pit water which is stored in ponds with large surface area to maximise evaporation loss. Where required, the dam

Mining Area	Storage/Pit	Capacity (ML)	30 June 2024 Inventory (ML)	Catchment Area (ha)	Water Management Details
					dewaters to Max Pit Tailings Dam, Russell's Dam, Environmental Dam and E Road Dam.
	E Road Dam	126	126	6	Receives pumping from South Pit, Evaporation Ponds and Ramp 17. Supplies truckfill demand on site.
	Russell's Dam	1488	321	40	Used for tailings storage and supply demands to Quickfill Dam and Central CPP via decant return.
	Vinces Pit (New TSF)	6,944	-	29.4	Proposed tailings storage starting construction during 2024 for completion during 2025. Storage capacity includes available tailings and water storage. Dam will operate as per Russell's Dam following commissioning.
	Max Pit Tailings Dam	527	12	31	Historically used for tailings storage up to October 2021. 29ML storage capacity below natural ground level.
	Quickfill Dam	13	11	2	Supplies truckfill demands at Central.
	ROM West Dam	53	0	85	Captures runoff from Stockpile areas and overflow from Quickfill Dam.
	Son of Max Dam	125	117	40	Pumps to Russell's to meet CHPP demands. Receives overflows from ROM West Dam.
	108 Dam	292	64	140	Dewatering to Russell's Dam to meet demands and alternatively dewatered to Central Pits, if necessary.
South	South Pit	3462	2354	38	Utilised mainly as water storage and to supply demands across entire site. Pumps directly to E Road Dam. Raw water supply to Boonal loadout facility.
Total		**11,524**[2]	**5,090**	**2304**	

[1] Combined storage capacity of Ramp 1, 2, 6, 9, 15 and 17 as reported in the Jellinbah Mine monthly dam volumes spreadsheet.

[2] Excludes future Vinces Pit storage capacity.

4.2.2 Pumps and Pipelines

The overall pumping strategy and transfer options are illustrated in the Mine Water Management Schematic (Figure 4.1). All key water transfer pipelines at Mackenzie North, Plains, Central North, Central and South are shown in Figure 4.2, Figure 4.3, Figure 4.4, Figure 4.5. and Figure 4.6 respectively.

The Central active mining pits are dewatered by relocatable pumps to the dedicated water storage pits at Ramps 1, 6 and 15. Ramps 1, 6 and 15 are ultimately pumped to 108 Dam, E Road Dam and Evaporation Ponds to supply site water demands or evaporation. There are submersible pumps at Russell's Dam, which supply water to Quickfill Dam and the Central CPP. Tailings from the CPP are then returned to Russell's Dam. There are two evaporation canons at Max Pit used to reduce site water inventory which have been unused due to ongoing dry weather conditions.

Central is connected to Jellinbah South via E Road Dam and the Plains site via the Evaporation Ponds. The Mackenzie North and Plains mining areas are also connected via Mackenzie North (MN) Mine Water Dam and Environmental Dam, with the objective to maximise release from Environmental Dam. MN Pit dewaters to MN Mine Water Dam which is the main fill point for water trucks at MN.

4.2.3 Flood Mitigation Measures

The Jellinbah Mine site has Blackwater Creek to the west, Mackenzie River to the North (Between Mackenzie North and Plains) and twelve Mile Creek to the East. The South and Central sites are elevated above any potential flooding from these three watercourses. The Plains and Mackenzie North mining areas encroach on the Mackenzie River floodplain.

During extreme flood events of the Mackenzie River, flood waters break the banks and extend over the floodplain to the north and south of the main river channel. This area includes the proximity of the Plains Pit and Mackenzie Pit. Levees have been constructed around the north of Plains Pit and around the south and east of the Mackenzie North mining area to provide operations with 1:1000 AEP flood protection. The Jellinbah Plains levee is approximately 8,130 m in length and the Mackenzie North levee is approximately 12,100 m in length. The Mackenzie North levee is currently being extended to the east to provide flood protection for the future Mackenzie North pit extension.

4.2.4 Clean Water Diversions

Drains have been designed and constructed to divert clean catchment runoff away from operational areas to reduce the volume of mine-affected water generated on the site. These drains direct non-mine affected water (clean and sediment water) away from the site, through sediment dams (where necessary) and into natural waterways. The major clean water diversions across Jellinbah Mine are illustrated in Figure 4.2 to Figure 4.6.

4.2.5 Mine Water Release Infrastructure

Jellinbah Mine has nominated mine water release points (RPs) specified within the site Environmental Authority (EPML00516813) from which mine water can be discharged to either Blackwater Creek or Mackenzie River. The EA specifies monitoring points (MPs) where water quality must be monitored, and mine water can only be released during natural flow events in accordance with receiving waterway flow triggers. Receiving waterway flows are measured at the gauging stations at MP1 and MP5.

Figure 4.7 presents the locations of all relevant RPs and MPs and Table 4.3 summarises the EA conditions under which mine affected water can be released into receiving waterways.

TABLE 4.3: MINE WATER RELEASE CONDITIONS (TABLE C4 OF THE EA)

Receiving Waterway	Release Point	Gauging Station	Condition	Receiving Water Flow Criteria (m^3/s)	Max Release Rate (m^3/s)	Release Point EC Limit (µS/cm)	Release Point Sulphate Limit (mg SO_4^{2-} /L)
Blackwater Creek	RP1 RP2	MP1	Low	< 2[1]	0.50	700	250
			Medium 1	> 2	0.16	3,500	350
			Medium 2	> 5	0.40	3,500	350
			High	> 10	0.44	6,000	500
Mackenzie River	RP3 RP4 RP5	MP5	Low 1	> 1	0.43	310	250
			Low 2	> 10	0.11	3,000	500
			Medium 1	> 50	0.32	2,500	500
			Medium 2	> 50	0.26	3,500	600
			High 1	> 120	0.37	10,000	750
			High 2	> 250	0.51	15,000	1,000

Note 1: Discharge allowed for up to 28 days after natural flow events that exceed 2 m^3/s.

Jellinbah Mine EA also includes enhanced release conditions from nominated RPs as summarised in Table 4.4. The enhanced release conditions allow mine affected water to be released at a maximum combined RP (RP3 and RP5) flowrate of 2,700 L/s to the Mackenzie River. The EA specifies continuous monitoring of Electrical Conductivity (EC) at MP5 under enhanced conditions and that mine water releases must be capable of immediately ceasing or reducing discharge. Enhanced mine water releases must cease when EC at MP5 exceeds 400 µS/cm, as specified in condition C51 of the EA.

TABLE 4.4: ENHANCED MINE WATER RELEASE CONDITIONS (TABLE C9 OF THE EA)

Receiving Waterway	Release Point	Gauging Station	Receiving Water Flow Criteria (m^3/s)	Max Release Rate (m^3/s)	Release Point EC Limit (µS/cm)	Release Point Sulphate Limit (mg SO_4^{2-} /L)
Mackenzie River	RP3 RP5	MP4 MP5	> 10	2.7	8,000	286[1]

Note 1: Sulphate limit determined from site specific relationship between EC and Sulphate for 8,000 µS/cm.

The dominant water release infrastructure at Jellinbah Mine are located on Environmental Dam and Mackenzie North Mine Water Dam (MN MWD), which are summarised in Table 4.5. For enhanced release conditions, the maximum release rate from Environmental Dam is limited to 2,700 L/s, however the current pipeline capacity is restricted to a maximum discharge rate of 1,800 L/s. Under normal release conditions the maximum release rate is 510 L/s under the high flow conditions documented in Table C4 of the EA.

A mine water release in accordance with the EA conditions was recently undertaken from RP5 (Environmental Dam), with 202 ML discharged between 30 January 2024 and 5 February 2024. telemetry flow and EC monitoring at MP5 (Mackenzie River Downstream) During the release event showed streamflow remained above 260 m^3/s with a peak of 610 m^3/s, and EC generally remained below 200 µS/cm with a peak of 370 µS/cm.

TABLE 4.5: CONTROLLED MINE WATER RELEASE INFRASTRUCTURE

Storage	Release Point	Receiving Waterway	Storage Capacity (ML)	Release Infrastructure	Release Capacity (L/s)
Environmental Dam	RP5	Mackenzie River.	1,578	3xDN450 HDPE pipes with valve (upstream IL of 124.22 mAHD).	1,800[1]
Mackenzie North MWD	RP4	Mackenzie River.	683	Release Valve in Pipeline to Environmental Dam.	200

Note 1: The outlet structure elevation restricts the release of stored water below 725 ML. Mine water release rates vary dependant on the stored water level. The rate of 1,800 L/s is reached at the spillway level of 127.6 m AHD.

Mackenzie North
MP5
RP4
Mackenzie River
MP7
MP4
RP5
RP3
Jellinbah Plains
Central North
Twelve Mile Creek
Blackwater Creek
MP1
RP1
Jellinbah Central
RP2
MP2

LEGEND
- Release Point
- Monitoring Point
- Mine Lease Boundary
- Watercourse

R	DETAILS	DATE
1	Final Issue	25-10-2022

DRAWN	AH	CHECKED	NG
APPROVED	AB	DATE	25-10-2022

NOTES:

N

0 600 1,200 m

SCALE @ A3 - 1:53,000
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to sure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure 4.7

Jellinbah Mining Pty Ltd
Jellinbah Mine Water Management Plan
EA Release and Monitoring Points

Job Number.
BBNE00299_0027

5. SITE WATER BALANCE

5.1 Overview

A water balance model of the Jellinbah Mine water management system has been developed to assess the systems performance for a range of potential future climate scenarios. Key environmental and operational performance indicators include mine water accumulation, containment and impact to mining operations (e.g., restrictions in pit dewatering).

5.2 Water Inflows

5.2.1 Rainfall

Long-term climate for Jellinbah Mine was obtained from the SILO climate database facility hosted by the Department of Science, Information Technology, and Innovation (DSITI). The climate series is comprised of SILO Patched Point Data for the New Caledonia Station (35132) up to 2021 and data drill climate data for Jellinbah Mine up to 2024. The variation in annual rainfall totals (based on the water year defined in the EA; 1st July to 30th June) is presented in Figure 5.1 and indicates a median annual rainfall of 555 mm.

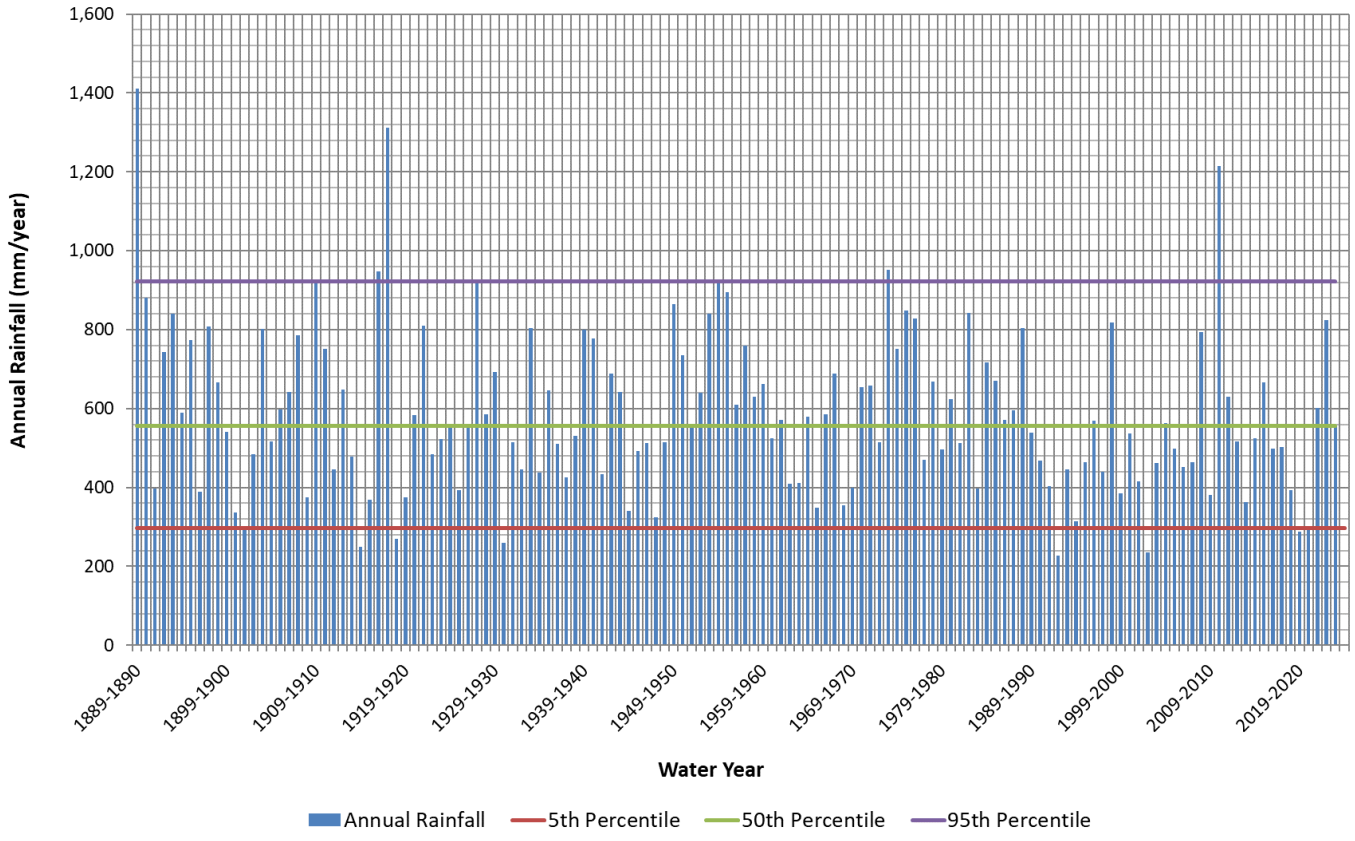


Figure 5.1: Annual Rainfall Totals

5.2.2 Catchment Runoff

Catchment runoff has been simulated using the Australian Water Balance Model (AWBM). A schematic representation of the AWBM model is provided in Figure 5.2. The model represents the catchment using three surface stores to simulate partial areas of runoff. The water balance of each surface store is calculated independently of the others. The model calculates the water balance of each partial area at daily time steps. At each time step, rainfall is added to each of the three surface stores and evapotranspiration is subtracted from each store. If the value of water in the store exceeds the capacity of the store, the excess water becomes runoff. Part of this runoff becomes recharge of the baseflow store if there is a baseflow component to the stream flow.

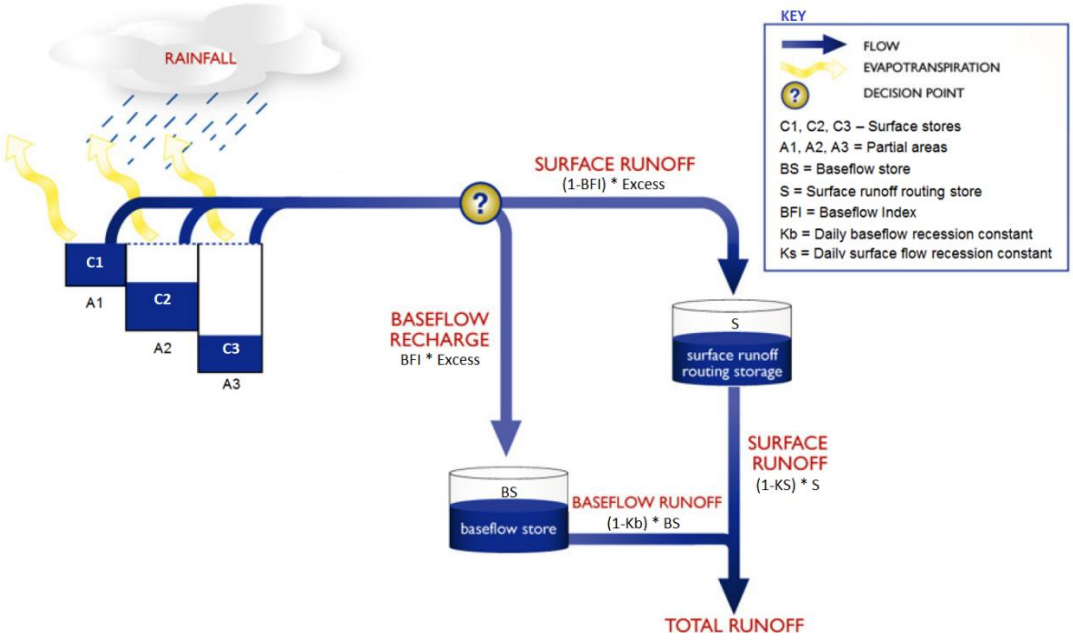


Figure 5.2: AWBM Schematic

AWBM natural land use catchment runoff parameters have been adopted from parameters calibrated to the Blackwater Streamflow Gauging Station operated by DRDMW (formerly DNRM) at Curragh (station number: 130108). The gauging station commenced in August 1972 and closed in May 2009.

Daily rainfall data for the Blackwater Creek AWBM calibration was determined as a catchment average of rainfall data (SILO Patched Point Data) from the BoM rainfall stations at Blackwater Water Treatment Plant (035290), Blackwater Post Office (035009), Ardurad (035003) and Tannyfoil (035111). Morton potential evapotranspiration data was obtained from SILO Patched Point Data at Blackwater Post Office (035009).

The calibration of the AWBM model involved comparing predicted stream flows against the stream gauging data and adjusting AWBM model parameters were to provide a reasonable comparison between the gauged and modelled stream flow characteristics. The final calibrated AWBM model parameters are summarised in Table 5.1.

TABLE 5.1: CALIBRATED AWBM PARAMETERS FOR BLACKWATER CREEK CATCHMENT

Parameters	Values		
Partial Area Fractions	A1 = 0.134	A2 = 0.433	A3 = 0.433
Surface Store Capacities	C1 = 25 mm	C2 = 95 mm	C3 = 230 mm
Flow Recession Coefficients	BFI = 0.03	Kb = 0.98	Ks = 0.50

The gauged and modelled daily flow duration curves for Blackwater Creek at Curragh are shown in Figure 5.3. The figure shows that Blackwater Creek has a significant baseflow component with flows exceeding 0.1 ML/d approximately 75% of the time. The calibrated parameters produce a curve that matches the gauged curve well for flows above 0.1 ML/d. The discrepancy at the tail end of the curve was

unable to be corrected and is considered insignificant due to the very small volume of flow that this represents (modelled flows below 0.1 ML/day represent approximately 0.02% of the total volume over the twenty-year period of simulation). The modelled cumulative stream flow volume during the period 1 June 1972 to 30 September 2008 is displayed in Figure 5.4. The modelled and gauged stream flows appear to show similar runoff volumes for single events as well as total stream flow volume during over the calibration period.

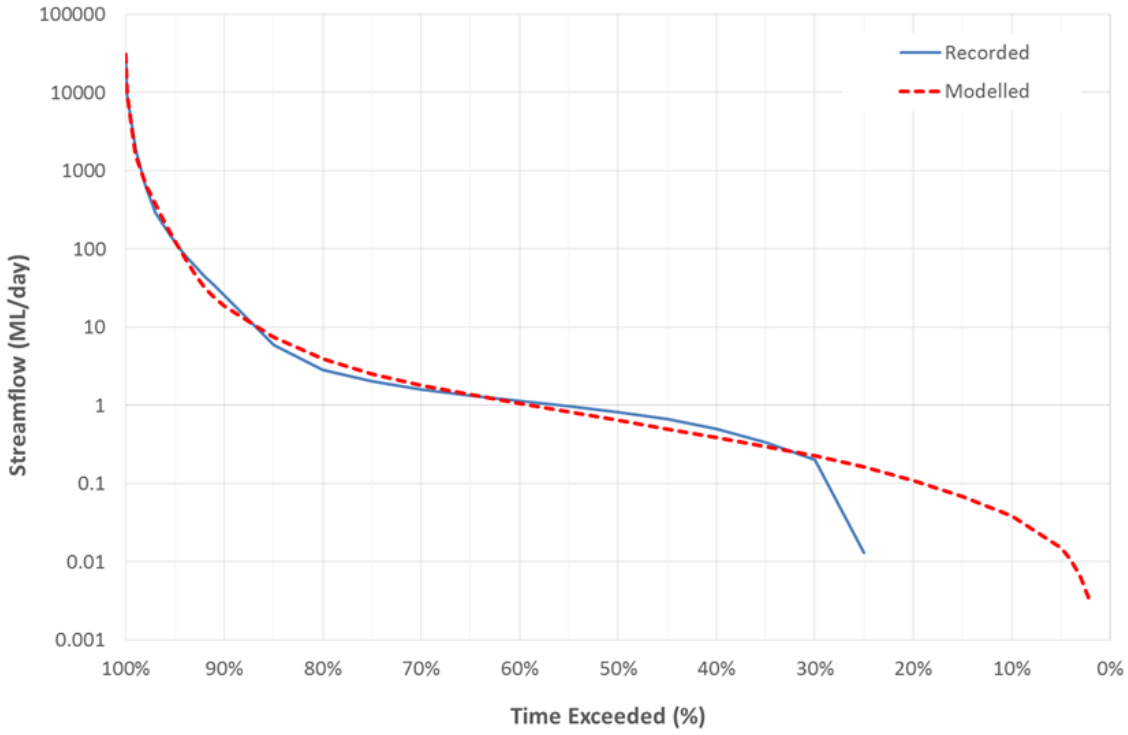


Figure 5.3: Modelled Flow Duration Curve for Blackwater Creek at Curragh (130108)

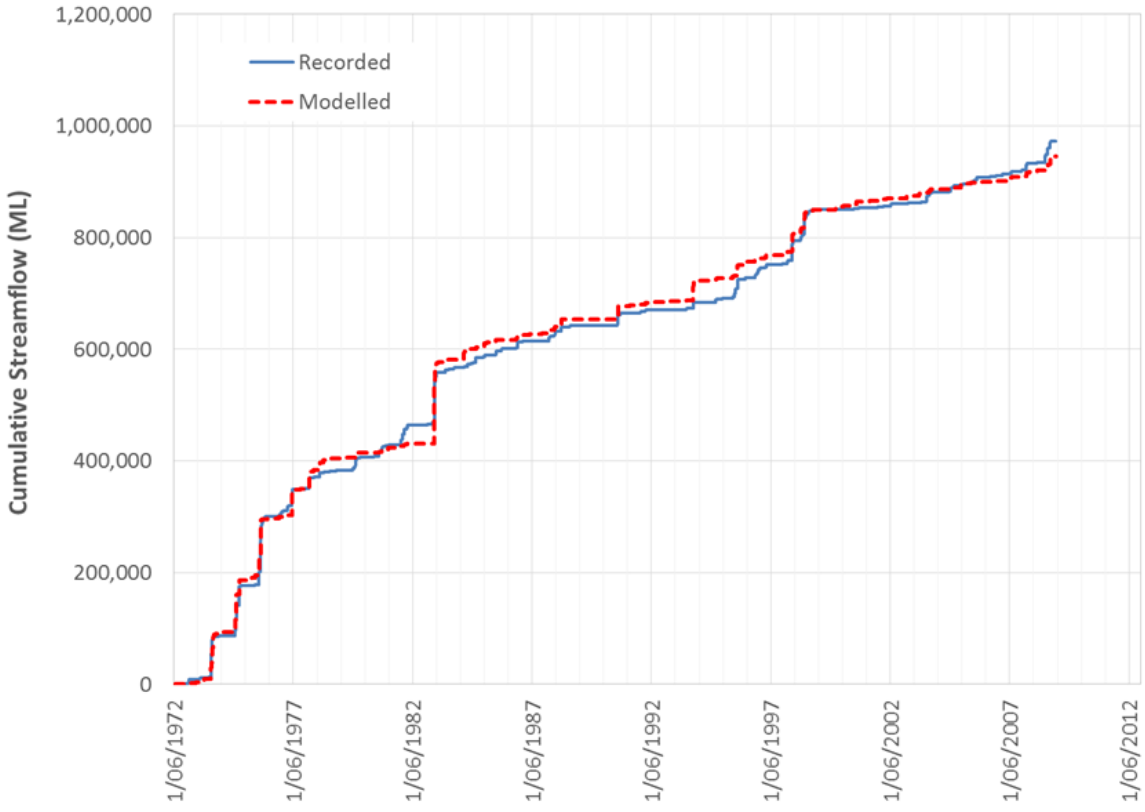


Figure 5.4: Modelled Cumulative Stream Flows for Blackwater Creek at Curragh (130108)

The AWBM calibration parameters for the Blackwater Creek catchment were adopted for the simulation of flows in Blackwater Creek, and runoff from natural land use areas on site. All other AWBM land use catchment runoff parameters were adopted from parameters developed for nearby mine sites. The Jellinbah Mine AWBM runoff parameters are shown in Table 5.2 along with the average annual runoff coefficient.

Table 5.3 presents a summary of the catchment landuse breakdown for the total site catchment. Based on this breakdown the site has an overall average annual runoff coefficient of 12.2%.

TABLE 5.2: JELLINBAH MINE AWBM RUNOFF PARAMETERS

Parameter	Natural	Spoil	Hardstand & Pits	Rehabilitated Spoil	Coal Stockpile
C1 (mm)	25	20	10	11	1
C2 (mm)	95	80	25	60	5
C3 (mm)	230	160	50	130	0
A1	0.134	0.134	0.134	0.134	0.134
A2	0.433	0.433	0.433	0.433	0.433
A3	0.433	0.433	0.433	0.433	0.433
BFI	0.03	0.7	0.1	0	0.35
Kb	0.98	0.8	0.6	0.6	0.6
Ks	0.5	0.1	0.1	0	0.1

TABLE 5.3: MINE WATER STORAGE CATCHMENT LANDUSE BREAKDOWN

	Natural	Spoil	Hardstand & Pits	Rehabilitated Spoil	Coal Stockpile
Total Area (ha)	124	1,031	969	133	40
Proportion	5%	45%	42%	6%	2%

5.2.3 Groundwater Inflows

Current site estimates for the groundwater ingress rate to Plains Pit are 4.18 ML/day based on predicted inflows from the Alluvium and Permian coal measures by the latest regional groundwater model (JBT Consulting Pty Ltd, 2021). Theis aligns with recorded pumping data from Plains Pit to Environmental Dam between July 2018 to July 2019 (4.6 ML/day). Groundwater was set to remain constant at 4.18 ML/day until the cessation of Plains Pit mining.

Groundwater inflows for the remaining mining pits are relatively low with only small groundwater pockets being encountered which deplete rapidly. Estimated groundwater inflow rates for the other pits are as follows (JBT Consulting Pty Ltd, 2021):

- Mackenzie north – 0.1 ML/day.
- Central North – 0.3 ML/day.
- Central (Ramps 1 to 16) – 0.3 ML/day.
- Central South (Ramp 17) – 0.13 ML/day.
- Jellinbah South – 0.13 ML/day.

5.2.4 Raw Water Supply

Jellinbah Mine has an annual permit for water extraction from the Mackenzie River. This water is used at both the Central and the Mackenzie North workshops, primarily for machine and vehicle wash down. The total water extraction over the last four quarters FY23/24 was primarily allocated to vehicle washdown, and no additional raw water was taken into the mine water system.

5.3 Water Demands and Losses

5.3.1 Evaporation

Lake evaporation rates for Jellinbah Mine have been extracted from the SILO Patched Point Data described above and are summarised in Figure 5.5. Average daily lake evaporation varies from 2.6 mm/day in June to 6.9 mm/day in December.

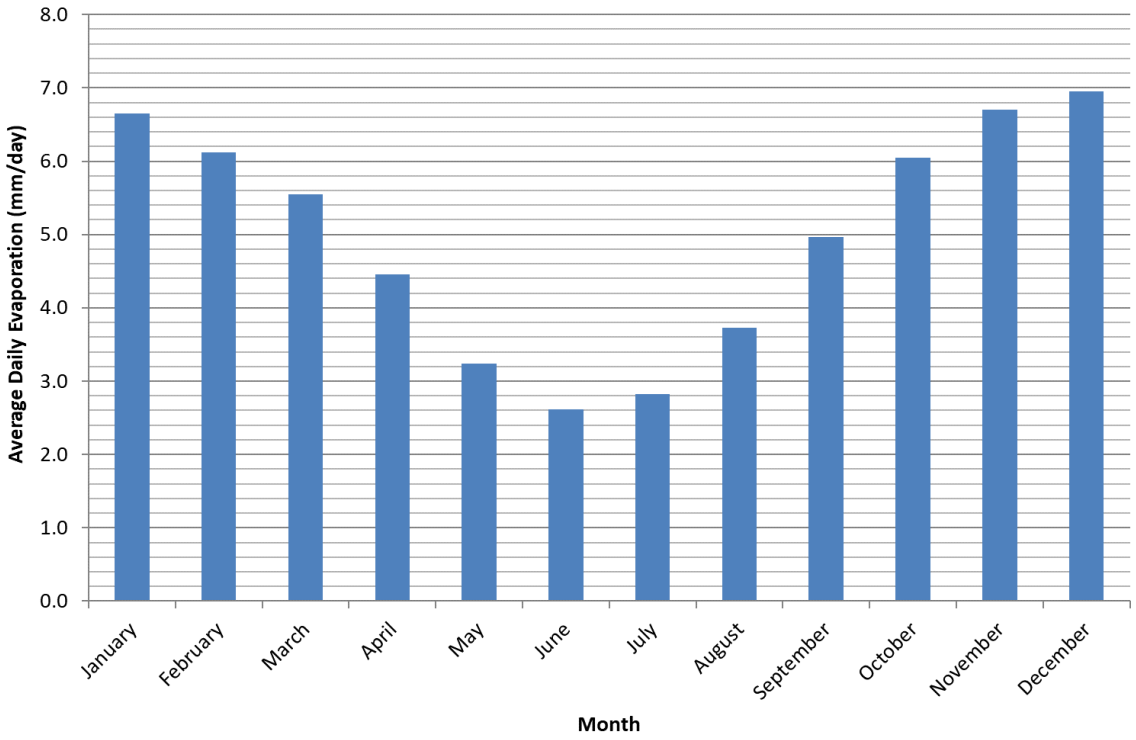


Figure 5.5: Average Daily Lake Evaporation

5.3.2 Operational Water Consumption

Water consumption rates for mine operation (i.e., dust suppression, plant use, etc.) are summarised in Table 5.4. As indicated by the table, operational water consumption currently accounts for a total site demand from the mine water system of approximately 2 GL/year.

All values are based on site pumping records and estimates. Evaporators are still functional however currently not in use due to ongoing dry weather conditions.

Water is consumed primarily through dust suppression, at a total rate of 248 L/t of coal production. Dust suppression rates reported at other mine sites in the Bowen Basin range from 75L/t to 275L/t, with an average of 150 L/t.

TABLE 5.4: JELLINBAH MINE WATER CONSUMPTION SUMMARY (JULY 2023 TO JUNE 2024)

Consumption	Water Source	Net Consumption (ML/yr)
CPP	Max Pit, then Russell's Dam.	816[1]
Crusher	Max Pit, then Russell's Dam.	116
Dust Suppression	Quickfill Dam, E Road Dam, Mackenzie North MWD, Central North Quickfill.	1,506[1]
Washdown & Other Losses	Mackenzie River.	59[2]

[1]Based on FY24 production of 6.1Mt

[2]Based on 2023 WMP

5.3.3 Water Release Capacity

The release constraints outlined in the Environmental Authority and the site water release infrastructure are detailed in Section 4.2.5. The water balance model incorporates enhanced release conditions as per EA (DESI, 2024) Table C9 from Environmental Dam.

A long-term daily stream flow data series for the Mackenzie River at Bedford Weir stream flow gauge (130111A), which is located approximately 20 km upstream of Jellinbah Plains, was obtained from the calibrated IQQM model developed for the Water Plan (Fitzroy Basin) 2011 (provided by DSITI). The data set provides a daily flow series for a period of 119 years (1889 – 2007 inclusive) and has been used to assess potential for controlled discharge of mine affected water from Environmental Dam.

Since construction in March 2017, water stored in Environmental Dam has had an average EC of 6,675 µS/cm (ranging from 4,790 to 9,120 µS/cm) and an average EC of 7,240 µS/cm in the last 12 months. Based on observed salinity levels, it is expected that Environmental Dam will be able to release via the enhanced release conditions.

Mackenzie North Mine Water Dam (MWD) also has the capacity to release to the Mackenzie River via a valve in the main transfer pipeline to Environmental Dam.

5.4 Water Balance Model Development

Jellinbah Mine water balance model is developed using the GoldSim software. GoldSim is an industry standard computer program for carrying out dynamic, probabilistic simulations of systems and processes (e.g. hydrological assessments of mine site water balances).

5.4.1 Purpose

The model aims to provide a basis for:

- Assessment of the risk of excess mine water accumulation and water supply shortfalls impacting upon mine operations.
- Estimation of overflow risk from water storages and flows in receiving waterways.
- Estimation of controlled releases at EA release points of mine-affected water.
- Assessment of operational strategies for effective mine water management across the life of the mine.

5.4.2 Description

The water balance model operates on a daily time step and simulates the quantity and quality of water within water storages and operational pits, as well as waterways that have the potential to receive discharges of mine-impacted surface water during large rainfall events.

Key aspects of the model include:

- The model can be used to simulate 134 years of historical data (i.e., full period of available climate and stream flow data).
- The water balance model includes a coupled salt balance to estimate TDS within each storage and receiving waterway.
- TDS is converted to EC within the model based on an assumed conversion factor of 1 mg/L TDS = 1.49 µS/cm EC in accordance with the Australian Drinking Water Guidelines (NHMRC, 2013).
- The various mine water inflows and outflows described in Section 5.2 and 5.3 respectively are simulated in the model.
- The model simulates current mine water infrastructure including storages, pumps and pipelines and water releases as described in Section 4.
- Water storage characteristics are simulated using the latest storage curves representing volume-area and volume-level relationships.
- The potential for mine water release is estimated based upon the simulated flow of receiving waterways at the nominated gauging stations in accordance with current EA conditions. Limits and capacity of the water release infrastructure described in Section 4.2.5 were incorporated into this release logic.

5.5 Water Balance Model Results

The water balance model for the Jellinbah Mine has been used to assess the performance of the water management system. The water balance model was simulated for 1 water year using 118 realisations of historical climate data to assess the system performance under a range of climate conditions (dry and wet). The following sections summarise key system performance indicators over a water year.

5.5.1 Overview

Figure 5.6 shows the total mine water inventory forecast from 1 July 2024 to 31 June 2025. The initial mine water inventory is 5.1 GL (as per Table 4.2). On average the site inventory is predicted decrease of 1 GL over the 12 months. Under 5th and 95th percentile dry and wet climatic conditions, the model results show a total site inventory decrease of 2 GL and increase of 1.1 GL respectively.

In the 95th percentile wet climate scenario, the site is predicted to accumulate approximately 1.1 GL over the next 12 months and reach a peak total site inventory of 7.1 GL during the wet season (equal to 62% of the total site mine water capacity of 11.5 GL). This shows the water management system capacity has a low risk of being exceeded in the near future.

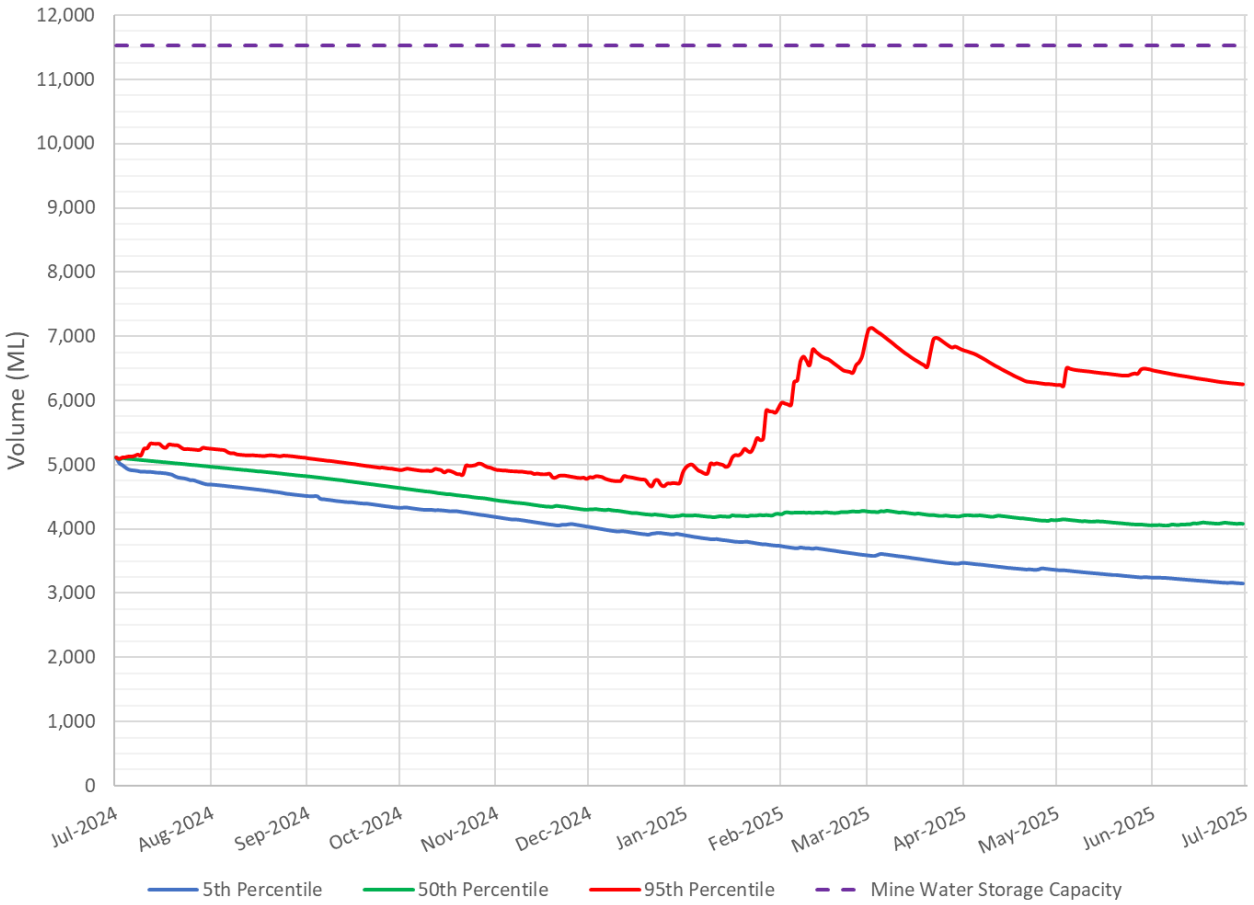


Figure 5.6: Mine Water System Inventory Forecast Result

5.5.2 System Inflow and Outflows

Figure 5.7 presents the mean annual inflows and outflows of water to the mine water management system under the average climate scenario. Rainfall runoff makes up 61% of the total mine water system inflows on average while groundwater ingress at Plains Pit makes up the remaining 45%. Jellinbah South Void is providing water to the loading facility at Boonal at 120 ML/year. Overall, the site model indicates a mean net water decrease of 886 ML over the next 12 months.

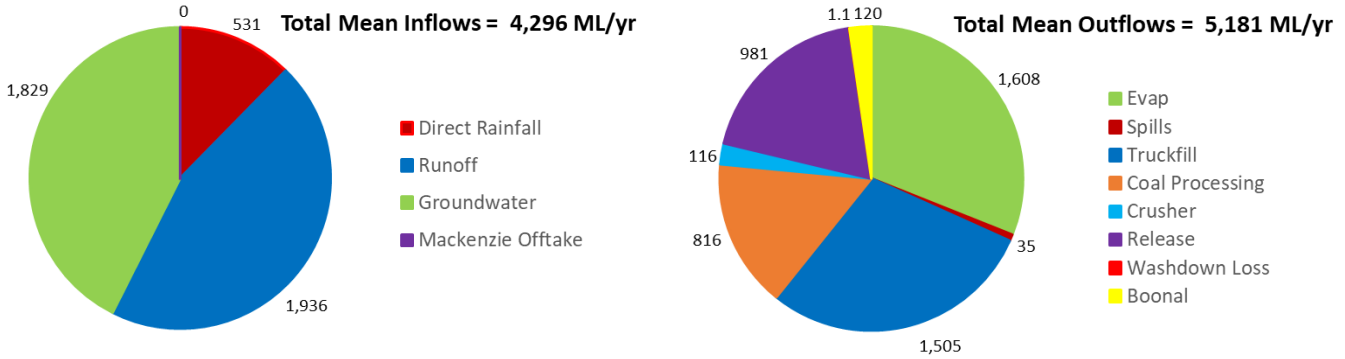


Figure 5.7: Mean forecast water management system Inflows and outflows (ML/yr)

5.5.3 Mine Water Uncontrolled Release Risks

Modelling results indicate that Dam 108 has a 7% annual overflow risk, with an approximate EC of 2,500 µS/cm or less when the spill occurs. Son of Max Dam has a 16% annual overflow risk, with an approximate EC of 3,200 µS/cm or less. E Road Dam has a 4% annual overflow risk, with an approximate EC of 5,400 µS/cm or less. The remainder of mine affected water storages did not spill under any of the climate realisations.

5.5.4 Controlled Release Potential

Table 5.5 presents the results for total controlled release of mine-affected water from Jellinbah Mine. The model results demonstrate mine water releases in accordance with the EA are likely to occur. The enhanced release conditions allow for combined releases from both Environmental Dam and Mackenzie North MWD to occur. The storage capacity of the Environmental Dam is kept at an optimum level to allow for maximised releases. Overall, releases are likely to occur in the next year if significant rainfall occurs in the 2024/25 wet season, due to increased dam inventories.

TABLE 5.5: CONTROLLED MINE WATER RELEASE POTENTIAL (ML/YR)

Storage	10th Percentile	Median (50th Percentile)	80th Percentile	90th Percentile	95th Percentile
Environmental Dam	0	470	1,312	1,602	1,683
Mackenzie North Mine Water Dam	0	111	553	912	1,189

6. WATER MONITORING AND RELEASE PLANS

Ongoing water quality monitoring is undertaken so data can be collected and analysed to assist in the management of water on the mine site. On-site storage water quality is tested on a quarterly basis. Conductivity, pH, sulphate, fluoride and a range of dissolved metals are all measured. Table 6.1 summarises the key water quality results over the last three years of water quality testing for all mine-affected storages and various clean or sediment water storages.

In summary, water that is exposed to coal for a substantial period of time is generally high in salinity and sulphates. The large mine water storages on-site, Jellinbah South Void, Plains Environmental Dam, 108 Dam and Mackenzie North MWD, typically have average ECs in the range of 6,500 to 10,000 µS/cm (in recent years). The highest contaminant levels occur in the dams at Central, which receive runoff from coal stockpile and processing areas. There are no significant levels of other contaminants such as heavy metals, except in LCR Dam and Jellinbah South Dam, where high concentrations of aluminium have been observed. This is likely a result of low water levels (concentration) as these storages are inactive. All other dams have metal concentrations consistently below the EA trigger levels.

Receiving waterway quality is also routinely monitored. Requirements and trigger levels at the designated monitoring points are outlined in the site EA. Results from downstream water monitoring is presented in the annual REMP progress reports by AARC, and procedures were outlined in the original REMP report produced by Ison Environmental Planners (2010).

Release requirements are outlined in Conditions C1 to 16 in the EA, and downstream flow requirements and release contaminant trigger levels. Appendix A presents the Mine Water Release Procedure developed by Jellinbah Mine, including DES notification procedures for controlled and uncontrolled release.

TABLE 6.1: KEY SITE WATER QUALITY MONITORING RESULTS (AUGUST 2014 TO JUNE 2024)

Site	Storage Name	Sample ID	EC (µS/cm)			Sulphate (mg/L)			pH		
			Min	Average	Max	Min	Average	Max	Min	Average	Max
Plains	Plains Clean Water Dam[2]	KW32	530	1,721	3,900	7	53	134	7.3	8.4	9.4
	OOP Main (HW Dam)[2]	KW40	6,000	12,956	25,000	36	104	200	6.8	8.6	9.3
	Overflow Dam[2]	KW41	3,200	13,265	36,000	23	280	2,000	8.4	8.7	9.3
	Plains Environmental Dam	RP5 Dam	4,790	6,675	9,120	128	262	592	8.1	8.9	10.1
	Lowwall 2	Plains LW 2	530	1,316	2,510	14	51	118	8.2	8.6	9.7
Central	108 Dam	KW02	907	6,720	24,000	44	412	1,220	7.8	8.6	9.2
	Workshop Dam[1]	KW05	1,300	1,300	1,300	41	41	41	7.1	7.1	7.1
	South West Dam	KW08	815	1,518	2,450	23	90	173	7.6	8.6	9.2
	South of Workshop Dam	KW11	7,500	11,645	16,600	210	661	1,100	8.2	8.7	9.1
	ROM West Dam	KW12	1,700	5,090	14,300	91	431	1,360	7.7	8.5	9.0
	Son of Max Pit Dam	KW13	2,300	4,505	8,600	88	324	550	8.1	8.6	9.6
	Max Pit	KW14	6,540	12,394	16,400	210	756	1,660	6.4	8.5	8.8
	Russell's Dam	KW21	2,500	11,233	20,600	81	600	1,420	7.8	8.5	9.0
	E Road Dam	E RD Dam	11,800	14,632	20,500	616	831	1,200	8.4	8.8	9.3
South	Jellinbah South Dam	KW23	94	1,471	5,560	2	35	131	7.3	8.0	9.1
	Jellinbah South Void	KW25	4,520	7,666	12,100	63	405	775	8.0	8.8	9.1
Mackenzie North	MN Mine Water Dam	MN01	300	9,087	12,200	9	376	576	8.2	9.0	9.5

Note 1: One (1) measurement only, in June 2016. Dam has otherwise been kept empty.

Note 2: Values unchanged since 2021.

7. EMERGENCY AND CONTINGENCY PLANNING

7.1 Emergency Response

The Jellinbah 'Emergency Response Plan' (HMP-003) outlines the roles and responsibilities upon activation, responding to and recovering from crisis and emergency situations that occur on the Jellinbah site. The purpose of the Emergency Response Plan is to reduce the risk of human life loss and injury, infrastructure damage and environmental harm during an unplanned or emergency event. Jellinbah Mine must notify the administering authority within forty-eight (48) hours of an emergency. The notification shall include a brief description of the event and the time of activation of the Emergency Response.

Emergency contact details are also contained in the Jellinbah Emergency Response Plan' (HMP-003).

It should be clearly noted that this section does not override broader emergency planning protocols for the Jellinbah Mine but is included only to provide specific guidance in response to water related emergencies.

The key mine water release contingency measure adopted at Jellinbah Mine is the pumping of high-risk storages to available mine water storages, Jellinbah South Void or open pits, in preferential order. This should be implemented when:

- The mine operator anticipates an uncontrolled release that is not likely to meet the release conditions; or,
- At any point during a release, monitoring determines that the release conditions are not being achieved and the release strategy cannot be quickly adjusted to achieve compliance.

7.2 Trigger Action Response Plans (TARPs)

Operational plans have been developed for each regulated structure on site. Refer to the Operations Plans developed by Engeny (2017 and 2021) for Max Pit Tailings Dam, Russell's Dam, Jellinbah Plains Levee and Mackenzie North Levee, and the Plains Environmental Dam Operational Plan produced by UDP (2017). These operational plans outline operating levels, monitoring procedures and emergency procedures for each structure.

The Trigger Action Response Plans (TARPs) presented in Appendices B to E prescribe action plans and responsibilities for responding to identified structure defects or deficiencies which could be early warning signs of an elevated or imminent risk of failure. TARPs for Max Pit Tailings Dam are presented in Appendix B, and Russell's Dam in Appendix C. Plains Levee TARP is presented in Appendix D and Appendix E presents TARPS for all other mine water storages.

The TARPS represent a structure failure risk continuum defined as follows:

- Green: Normal operating conditions (no action required).
- Yellow: Alert (Operational response actions defined in TARP).
- Orange: Elevated risk of failure (Operational response actions defined in TARP).
- Red: Imminent risk of failure (Emergency Response actions defined in TARP).
- Black: Dam failure (Emergency Response actions defined in TARP).

8. WATER MANAGEMENT PLAN REVIEW

Review of the WMP is to occur annually or sooner if relevant changes to operations, planned operations or the EA occur. In accordance with EA Condition C32, the WMP must be reviewed each calendar year and a report prepared by an appropriately qualified person. The report must:

- Assess the plan against the requirements under EA condition C31.
- Include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year.
- Identify any amendments made to the WMP following the review.

9. QUALIFICATIONS

(a) In preparing this document, including all relevant calculation and modelling, Engeny Water Management (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

(b) Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

(c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

  (i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

  (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

(d) Engeny does not give any warranty nor accept any liability in relation to the completeness or accuracy of the works, which may be inherently reliant upon the completeness and accuracy of the input data and the agreed scope of works. All limitations of liability shall apply for the benefit of the employees, agents and representatives of Engeny to the same extent that they apply for the benefit of Engeny.

(e) This document is for the use of the party to whom it is addressed and for no other persons. No responsibility is accepted to any third party for the whole or part of the contents of this Report.

(f) If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the Report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

(g) This Report does not provide legal advice.

10. REFERENCES

AARC. (2016). Jellinbah Coal Mine: Receiving Environment Monitoring Program - Progress Report.

AARC. (2020). Jellinbah Coal Mine Erosion and Sediment Control Plan.

AGE. (2013). Mackenzie North Groundwater Assessment.

Australiasian Groundwater and Environmental Consultants Pty Ltd. (2013). Mackenzie North Groundwater Assessment.

DESI. (2024). Environmental Authority. EPML005116813. Effective 8 October 2024.

DESI. (2024). Manual for Assessing Consequence Categories and Hydraulic Performance of Structures, Version 5.03. *Version 5*.

Engeny. (2017). Central Release Dam - Operations Plan. *Revision 1*.

Engeny. (2017). Jellinbah Mine Site Wide Consequence Category Assessment. *Revision 1*.

Engeny. (2017). Jellinbah Plains Levee - Operations Plan. *Revision 1*.

Engeny. (2017). Max Pit Tailings Dam - Operations Plan. *Revision 1*.

Engeny. (2020). Jellinbah 108 Dam Operating Levels. *Revision 0*.

Engeny. (2020). Russell's Dam Design Plan. *Revision 2*.

Engeny. (2021). *Jellinbah Mine Water Management Plan.*

Engeny. (2021). Operations Plan - Russell's Dam TSF. *Revision 2*.

Engeny. (2022). Central North Quickfill Dam - Consequence Category Assessment.

Engeny. (2022). Central West Sediment Dam Consequence Category Assessment.

Engeny. (2024). *Jellinbah Mine Water Management Plan.*

Ison Environmental Planners. (2010). Receiving Environment Monitoring Program (REMP). Jellinbah Coal Mining Project.

JBT Consulting Pty Ltd. (2021). *Jellinbah PRCP Final Void Groundwater Assessment. Report no. JBT01-061-008.*

NHMRC. (2013). National Water Quality Management Strategy. *Australian Water Guidelines 6*.

UDP. (2017). Plains Environmental Dam - Operational Plan. *Revision A*.

APPENDIX A: WATER RELEASE PROCEDURE

Jellinbah Mine Site: Water Release Procedure

This procedure is applicable to the release of mine-affected water from the Jellinbah Mine site to Blackwater Creek or the Mackenzie River.

Scope

The procedure refers only to the release of water from Jellinbah's mine-affected water system, as defined in the current Site Water Management Plan.

The following events constitute a release of mine-affected water and should be managed in accordance with this procedure:

- Pumping from any water storage on the Jellinbah Mine to a designated release point for release to Blackwater Creek or the Mackenzie River; and
- Runoff from the mine-affected system leaving the site through Max Dam Bypass, South Dam Bypass, or Plains Bypass (RP1, RP2, RP3, RP4 or RP5).

Release from the clean water system is managed by sediment retention ponds and is not subject to the requirements of this procedure.

Requirements for Release

The Environmental Authority (EPML00516813) provides for release of water from the Jellinbah Mine site in accordance with the following requirements:

Authorised Release Points

Release of mine affected water, controlled or otherwise, should only occur at one or more of the release points listed in **Table 1** below.

Upstream and downstream monitoring locations, which must be monitored during a release event, are provided in **Table 2**.

The locations of release and monitoring points for the Mackenzie River and Blackwater Creek are shown in maps in Attachment A.

Table 1 Release Points

Release Point (RP)	Easting (MGA GDA94, Zone 55	Northing (MGA GDA94, Zone 55)	Mine Affected Water Source and Location	Monitoring Point	Receiving Waters Description
RP 1	697440	7413330	Max Dam Bypass	Bluff / Jellinbah Road	Blackwater Creek
RP 2	697985	7410730	South Dam Bypass	Bluff /Jellinbah Road	Blackwater Creek
RP 3	694940	7425570	Plains Bypass	Plains Bypass Channel	Mackenzie River
RP 4	696360	7428060	Mackenzie North WMS	End-of-pipe at RP 4	Mackenzie River
RP 5	696387	7425862	Plains MAW dams	Plains Bypass Channel	Mackenzie River

Table 2 Receiving Water Monitoring Points

Monitoring Points	Receiving Waters Location Description	Easting (GDA94)	Northing (GDA94)
Upstream Background Monitoring Points			
MP2	Blackwater Creek (1,360 m upstream of RP2)	695630	7410000
MP4	Upstream Mackenzie River	694535	7426000
Downstream Monitoring Points			
MP1	Blackwater Creek (1,500 m downstream of RP1)	694760	7413420
MP3	Downstream Mackenzie River	696930	7425950
MP5	Downstream Mackenzie River	697450	7428244

Release Water Quality and Flow Conditions

The release of mine-affected water, controlled or otherwise, should only occur where the water quality meets the following contaminant limits listed in **Table 3**. In addition to these limits, variable release limits for sulphate and electrical conductivity (EC) also apply. Sulphate and EC release limits are detailed in **Table 4**.

Table 3 Mine Affected Water Release

Quality Characteristic	Release Limits	Monitoring Frequency	Comment
Electrical Conductivity (uS/cm)	Release limits specified in Table C4 for variable flow criteria.	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)		
Turbidity (NTU)	Blackwater Creek Low flow (<2 m^3/s): 1,885 High flow (>2 m^3/s): 2,900		Turbidity is required to assess ecosystems impacts and can provide instantaneous results
	Mackenzie River All flows: 1,000		
Suspended Solids (mg/L)	N/A		Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO_4^{2-}) (mg/L)	Release limits specified in Table C4 for variable flow criteria		Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC

The release of mine-affected water, controlled or otherwise, should only occur during natural flow events (in the receiving waterway) in accordance with the criteria in **Table 4**.

Table 4 Rules for Releases during Flow Events (Table C4)

Receiving Waters	Release Point	Gauging Station	EAST (GDA94)	North (GDA94)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for Discharge (m^3/s)		Maximum Release Rate [1]	EC Release Limits µS/cm	Sulphate Release Limits SO_4^{2-} mg/L
Blackwater Creek	RP1 RP2	MP1	694760	7413420	Continuous (minimum daily)	Low Flow*	<2 m^3/s for a period of 28 days after natural flow events that exceed 2 m^3/s	0.5 m^3/s	<700 µS/cm*	250 mg/L
						Medium Flow	>2 m^3/s	0.16 m^3/s	<3,500 µS/cm	350 mg/L
							>5 m^3/s	0.40 m^3/s	<3,500 µS/cm	350 mg/L
						High Flow	>10 m^3/s	0.44 m^3/s	<6,000 µS/cm	500 mg/L
Mackenzie River	RP3 RP4 RP5	MP3	696930	7425950	Continuous (minimum daily)	Low Flow	>1 m^3/s	0.43 m^3/s	<310 µS/cm	250 mg/L
							>10 m^3/s	0.11 m^3/s	<3,000 µS/cm	500 mg/L
						Medium Flow	>50 m^3/s	0.32 m^3/s	<2,500 µS/cm	<500 mg/L
								0.26 m^3/s	<3,500 µS/cm	<600 mg/L
						High Flow	>120 m^3/s	0.37 m3/s	<10,000 µS/cm	<750 mg/L
							>250 m^3/s	0.51m3/s	<15,000 µS/cm	<1,000 mg/L

Notes: 1. For all combined RP flows. Concurrent release from multiple release points should not exceed the maximum release rate for the Mackenzie River. 2. Plains Environmental Dam has 3 outlet pipes, each releasing 0.66m3/sec when the dam is full (0.5m3/sec when water is just above the pipes). The valve(s) will have to be partly opened to comply with the maximum combined release rate as approved in the EA

Table 5 Release Contaminant Trigger Levels

Quality Characteristic	Trigger Level (µg/L)	Monitoring Frequency
Aluminium	55	Commencement of release and thereafter weekly during release
Arsenic	13	
Cadmium	0.2	
Chromium	1	
Copper	2	
Iron	300	
Lead	4	
Mercury	0.2	
Nickel	11	
Zinc	8	
Boron	370	
Cobalt	90	
Manganese	1,900	
Molybdenum	34	
Selenium	10	
Silver	1	
Uranium	1	
Vanadium	10	
Ammonia	900	
Nitrate	1,100	
Petroleum hydrocarbons (C6-C9)	20	
Petroleum hydrocarbons (C10-C36)	100	
Fluoride (total)	2,000	
Sodium	180,000	

Receiving Water Quality

Table 6 Receiving Waters Trigger Levels ***(Aust. Drinking water guidelines, 2004)***

Quality Characteristic	Trigger Level		Monitoring Frequency
	Mackenzie River	Blackwater Creek	
pH	6.5 – 8.5	6.5 – 9	Daily during releases
EC (µS/cm)	>400	>1,000	
Turbidity (NTU)	n/a	Low flow (<2 m^3/s): 1,885 High flow (>2 m^3/s): 2,991	
Suspended Solids (mg/L)	690		
Sulphate (mg/L)	250		
Sodium (mg/L)	180*		

Procedure for Release

The following procedure should be implemented when:

- The mine operator intends to make a controlled release by pumping water through the release points; or
- In the event that an uncontrolled release is anticipated (e.g. when the site is at capacity and heavy rainfall is predicted).

Prior to Release

1. Real time (10 minute) flow conditions in the receiving environment should be checked prior to release to determine flow (m^3/s) in the receiving environment. Flow data can be checked for Blackwater Creek and the Mackenzie River at the following website:

   https://hydportal.alsglobal.com/web.htm

   Username: [redacted]

   Password: [redacted]

   Note where automated gauging indicates water level is below 10 m, insufficient flow is available for a reading and data are invalid.

   The rate of authorised release is dependent on the flow in the receiving environment. This is presented as Discharge (cumecs) on the above website**. Table 4** describes the authorised release rates under different flow conditions in the waterway.

2. Prior to release, the quality of the water intended for discharge should be tested for pH, EC and Turbidity using the hand held meter. Results should be compared to the release limits in **Table 3** and **Table 4**. Note: release limits will apply at the release point.

3. If existing water quality data is available for the intended release, suspended solids and sulphate levels should be compared to the release limits in **Table 3** and **Table 4**. Note: release limits will apply at the release point.

4. The authorised rate of release is determined by both the flow in receiving environment and the EC and sulphate concentration (if available) of the intended release water, as described in **Table 3**.

   a. Controlled release of mine affected water should be pumped at less than the maximum determined rate of release (based flow in the waterway, EC of the release water and sulphate concentration in the release water if available).

   b. When uncontrolled discharge of mine affected water is anticipated, an assessment of the likely discharge rate should be made and compared to the maximum determined rate of release (determined from flow in the waterway, EC of the release water and sulphate concentration in the release water if available).

5. Where water quality of the expected release does not comply with **Table 3** or **Table 4**, options for blending with clean water prior to release should be implemented. In the event that blending is not possible or release limits are not achievable by blending, contingency measures should be implemented.

6. Following determination of authorised discharge volumes, release can occur through the authorised release points. The following 'procedure during release' should be followed from this point.

During Release – At Release Point

The following section details the requirements for monitoring of release water at the release point.

1. On commencement of release (within 2 hours) and daily during release, release water quality should be tested in situ for the following parameters using a hand-held meter at the release point:

Within 2 hours / daily	• pH • Turbidity	• EC	Table 3 Table 4

Results should be compared to the release limits in **Table 3** and **Table 4**.

2. On commencement of release (within 2 hours) and routinely during release, release water samples should be collected and sent to an authorised laboratory for testing of the following parameters:

Within 2 hours / daily	• Suspended solids	• Sulphate	Table 3 Table 4
Within 2 hours / weekly	• Aluminium • Arsenic • Cadmium • Chromium • Copper • Iron • Lead • Mercury • Nickel • Zinc • Boron • Cobalt • Manganese	• Molybdenum • Selenium • Silver • Uranium • Vanadium • Ammonia • Nitrate • Petroleum hydrocarbons (C6-C9) • Petroleum hydrocarbons (C10-C36) • Fluoride (total) • Sodium	Table 5

Note: Both filtered and unfiltered metals samples should be collected for analysis

Suspended solids and sulphate samples should be collected daily. Filtered and unfiltered metals samples should be collected weekly. Results should be compared to the release limits in **Table 3** and **Table 4** and the release trigger levels in **Table 5**.

3. The rate and quality of the discharge should be reviewed based on all available monitoring and flow data regularly during release event. If possible, flow rate and quality of the release should be adjusted to ensure compliance with **Table 4** at all times. If at any point in time release limits cannot be achieved contingency measures should be implemented.

4. Release water quality data should be compared to the trigger levels in **Table 5** as soon as results are received from the laboratory.

a. If release water trigger levels are exceeded, mine operators should compare the downstream water data to both the release trigger levels and upstream water data.

b. If downstream water quality is exceeds both the trigger levels and upstream data, an investigation should be initiated.

5. If at any time environmental harm is observed as a result of the release, contingency measures should be implemented.

During Release – At Upstream / Downstream Monitoring Points

The following section details the requirements for monitoring of upstream and downstream water at the locations in **Table 2**.

1. Daily during release, receiving water quality should be tested in situ for the following parameters using a hand-held meter at the monitoring point:

Daily	• pH • Turbidity	• EC	Table 6

In situ measurements should be recorded at the upstream and downstream monitoring points. Note that continuous pH and EC data are collected at the gauging stations (accessible via the ALS portal).

2. On commencement of release (within 2 hours) and / or routinely during release, receiving water samples should be collected and sent to an authorised laboratory for testing of the following parameters:

Daily	• Suspended solids • Sulphate	• Sodium	Table 6
Within 2 hours / weekly	• Aluminium • Arsenic • Cadmium • Chromium • Copper • Iron • Lead • Mercury • Nickel • Zinc • Boron • Cobalt • Manganese	• Molybdenum • Selenium • Silver • Uranium • Vanadium • Ammonia • Nitrate • Petroleum hydrocarbons (C6-C9) • Petroleum hydrocarbons (C10-C36) • Fluoride (total) • Sodium	Table 5

In situ measurements of pH, EC and turbidity should be collected daily. Daily samples must also be sent for laboratory analysis of suspended solids, sulphate and sodium. Results should be compared to the release trigger levels in **Table 6**.

Weekly samples must be sent for laboratory analysis of dissolved and total metals, listed above. Results should be compared to the release trigger levels in **Table 5**.

Note: In the event that an upstream monitoring site in inaccessible, pH and EC data may be obtained from Curragh North gauging stations. The following contact details should be used in order to access to upstream data:

Organisation: Coronado Global Resources
Blackwater Coopoorah Road
Blackwater QLD 4717

Position: Environmental Advisor

Phone: (07) 4986 9211

Email: environment@curragh.com.au (checked daily)

Request should include continuous (15 min) flow and quality data from Curragh site MP11 (upstream Mackenzie River) and/or MP1 (upstream Blackwater Creek).

3. Receiving water quality data should be compared to the receiving water trigger levels in **Table 6** as soon as results are received from the laboratory.

    a. If receiving water trigger levels are exceeded, mine operators should compare the downstream water data to the upstream receiving water data.

    b. If downstream water quality is exceeds the upstream data, an investigation should be initiated.

4. If at any time environmental harm is observed as a result of the release, contingency measures should be implemented.

Notification and Reporting Requirements

The Environmental Authority sets out notification and reporting requirements for the following circumstances:

- Commencing a release;
- Ceasing a release;
- Exceeding release limits (refer to **Table 3** and **Table 4**); and
- Exceeding release trigger levels (refer to **Table 5**).

These notification requirements apply to all releases, controlled or otherwise, from the Jellinbah Mine site.

Other reporting requirements, including investigations into environmental harm, must be provided with Jellinbah's Annual Return (submitted annually in June).

Authorised Release Notification – Commencement

DES must be notified as soon as practicable, and no later than **24 hours**, after commencing release. Notification must include the submission of written advice including:

a) release commencement date / time;

b) expected release cessation date / time;

c) release point(s);

d) release volume (estimated);

e) receiving water(s) including the natural flow rate; and

f) any details (including available data) regarding likely impacts on the receiving water(s).

Authorised Release Notification – Cessation

DES must be notified as soon as practicable, and no later than **24 hours**, after cessation of the release. In addition, within **28 days** of the release, the following written information must be provided:

a) release cessation date / time;

b) natural flow volume in receiving water;

c) volume of water released;

d) details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);

e) all in-situ water quality monitoring results; and

f) any other matters pertinent to the water release event.

Note: pausing a release for less than 24 hours is not considered cessation of release.

Exceedance Notification – Release Limits

If any of the contaminant limits in **Table 3** or **Table 4** are exceeded during a release, written notice must be provided to DES within **24 hours** of receiving the results.

In addition, within a further **28 days**, the following information should be provided to DES:

a) the reason for the release;

b) the location of the release;

c) all water quality monitoring results;

d) any general observations;

e) all calculations; and

f) any other matters pertinent to the water release event.

Exceedance Notification – Release Trigger Levels

Written notice must be provided to DES within **14 days** of receiving the results, where:

- A result exceeds the release trigger levels (**Table 5**); and
- The downstream results (collected from the monitoring points in **Table 2**) exceed both the release trigger levels and the upstream results.

Emergency or Incident Notification

As soon as practicable after becoming aware of any emergency or incident which results in the unauthorised release of contaminants the administering authority must be notified of the release by telephone or in writing.

The notification should include the following information:

a) the holder of the environmental authority;

b) the location of the emergency or incident;

c) the number of the environmental authority;

d) the name and telephone number of the designated contact person;

e) the time of the release;

f) the time the holder of the environmental authority became aware of the release;

g) the suspected cause of the release;

h) the environmental harm caused, threatened, or suspected to be caused by the release; and

i) actions taken to prevent any further release and mitigate any environmental harm caused by the release.

Contingency Measures

The contingency measures should be implemented when:

- The mine operator anticipates an uncontrolled release that is not likely to meet the release conditions; or
- At any point during a release, monitoring determines that the release conditions are not being achieved and the release strategy cannot be quickly adjusted to achieve compliance.

Jellinbah Plains Contingency

The following contingency measures apply at the Jellinbah Plains site:

- Pumping of at risk mine-affected water storages to one or more of the open pits at Plains.

Jellinbah Central Contingency

The following contingency measures apply at the Jellinbah Central site:

- Pumping of at risk mine-affected water storages to one or more of: Plains South Void, the Max Pit (Tailings Dam), Marks Dam, or another mine-affected water storage with available capacity.

Attachment A: Maps of Water Monitoring Sites and Release Points

R	DETAILS	DATE
1	Final Issue	10-11-2022

DRAWN	AH	CHECKED	NG
APPROVED	AB	DATE	10-11-2022

NOTES:

N

0 225 450 m

SCALE @ A3 - 1:17,500
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to sure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure A.1

Jellinbah Mining Pty Ltd
Jellinbah Mine Water Management Plan
EA Release and Monitoring Points
Mackenzie River

Drg Ref.

Q:\Projects\QC1013 Jellinbah\QC1013_003 Jellinbah 2022 WMP & OWMPA\05 Design\QGIS\Workspaces\QC1013_003-WOR-003-A-2022 WMPUpdate_Figures.qgz

694,000 695,000 696,000 697,000 698,000 699,000 700,000

7,414,000 7,413,000 7,412,000 7,411,000 7,410,000

MP1

Blackwater Creek

RP1

RP2

MP2

LEGEND

- Release Point
- Monitoring Point
- Mine Lease Boundary
- Watercourse

R	DETAILS	DATE
1	Final Issue	10-11-2022

DRAWN	AH	CHECKED	NG
APPROVED	AB	DATE	10-11-2022

NOTES:

N

0 400 800 m

SCALE @ A3 - 1:17,500
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to sure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

Jellinbah

Figure A.2

Jellinbah Mining Pty Ltd
Jellinbah Mine Water Management Plan
EA Release and Monitoring Points
Blackwater Creek

Drg Ref.

Q:\Projects\QC1013 Jellinbah\QC1013_003 Jellinbah 2022 WMP & OWMP\05 Design\QGIS\Workspaces\QC1013_003-WOR-003-A-2022 WMPUpdate_Figures.qgz

APPENDIX B: TARPS – MAX PIT TAILINGS DAM

TARP 1 – EMBANKMENT SEEPAGE

Triggers	Operations Plan			EAP	
	Green: Normal Operating	Yellow: Alert	Orange: Elevated Risk of Failure	Red: Imminent Risk of Failure (Sunny Day Failure – Static)	Black: Dam Failure
	No significant change to monitored Seepage Flow Rates and Seepage Areas	New Seepage Area Identified at the embankment toe Previously Identified Seepage Area / Extent increases by >25% Previous Seepage Flow Rate increases by > 25%	New seepage area identified elevated above the embankment toe Increase in cloudy appearance of seepage water Previous seepage area / flow rate increases by > 50%	Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer site inspection and geotechnical assessment, or: Rapid increase in rate or cloudy appearance of seepage (piping failure has started)	Dam Failure
Electrical Engineering Manager	• Ensure TSF dewatering pumps are operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Pump down decant pond as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
CHPP Superintendent	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Cease tailings deposition into TSF.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • In consultation with Manager Mine Services and Dams Engineer develop a short term tailings and water storage contingency plan.
Mine Services Supervisor	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Cease all water transfers into TSF. • Pump down decant pond as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections and audits of TSF.	• Notify CHPP Superintendent. • Increase frequency of dam monitoring inspections from monthly to weekly. • Determine when conditions have sufficiently stabilised to return to normal operating conditions. • Establish contact with RPEQ dam engineer and notify them of the situation.	• Immediately notify CHPP Superintendent & General Manager. • Immediately arrange for Dam Engineer to inspect site. • Communicate hazard to all departments with personnel downstream of the dam. • Increase frequency of dam monitoring inspections from weekly to daily. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Determine, in consultation with Dam Engineer, need to change dam operational plan / reduce water level. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimise risk of failure. • Notify DES of imminent dam failure risk. • Instruct decant pond to be pumped down as low as possible. • Instruct cessation of tailings deposition into TSF.	• Immediately notify DES in event of dam failure. • Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect embankment once conditions have stabilised. • In consultation with Dams Engineer develop an embankment stabilisation and remediation plan. • In consultation with Dams Engineer and CHPP Superintendent develop a short term tailings and water storage contingency plan. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety inspection.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short term tailings and water storage contingency plan. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 2 – EMBANKMENT EROSION AND INSTABILITY

Triggers	Operations Plan			EAP	
	Green: Normal Operating	Yellow: Alert	Orange: Elevated Risk of Failure	Red: Imminent Risk of Failure (Sunny Day Failure – Static)	Black: Dam Failure
	No visible cracks No visible bulges / slumping Rill erosion < 0.5 m Surveyed embankment movement <15 mm since previous survey or <50 mm since initial benchmark survey	Visible cracks Rill erosion 0.5 m to 1.5 m embankment movement >15 mm since previous survey or >50 mm since initial benchmark survey	Local scale (bench downstream slope) bulges / slumping Major crack/s Rill erosion > 1.5 m deep Surveyed embankment movement > 50 mm since previous survey or > 100 mm since initial benchmark survey	Global scale (entire downstream slope) bulges / slumping or Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and geotechnical assessment.	Dam Failure
Electrical Engineering Manager	• Ensure TSF dewatering pumps are operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Pump down decant pond as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
CHPP Superintendent	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Cease tailings deposition into TSF.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • In consultation with Manager Mine Services and Dams Engineer develop a short term tailings and water storage contingency plan.
Mine Services Supervisor	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Cease all water transfers into TSF. • Pump down decant pond as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections and audits of TSF.	• Notify CHPP Superintendent. • Increase frequency of dam monitoring inspections from monthly to weekly. • Establish contact with RPEQ dam engineer and notify them of the situation. • Raise work order for repair of rill erosion if no engineered design is considered necessary.	• Immediately notify CHPP Superintendent & General Manager. • Immediately arrange for Dam Engineer to inspect site. • Communicate hazard to all departments with personnel downstream of the dam. • Increase frequency of dam monitoring inspections from weekly to daily. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Determine, in consultation with Dam Engineer, need to change dam operational plan / reduce water level. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimise risk of failure. • Notify DES of imminent dam failure risk. • Instruct decant pond to be pumped down as low as possible. • Instruct cessation of tailings deposition into TSF.	• Immediately notify DES in event of dam failure. • Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect embankment once conditions have stabilised. • In consultation with Dams Engineer develop an embankment stabilisation and remediation plan. • In consultation with Dams Engineer and CHPP Superintendent develop a short term tailings and water storage contingency plan. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety inspection.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short term tailings and water storage contingency plan. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 3 – HIGH WATER LEVEL

Triggers	Operations Plan			EAP		
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Flood Failure – Overtopping)**	**Return to Normal**	**Black: Dam Failure**
	Water Level < MRL	**Water Level > MRL & water level is static.**	**Water level > MRL, water level is rising and further rainfall forecast**	**Flow over spillway Embankment toe or embankment adjacent to spillway severely eroded due to spillway discharge.**	**Overflows have ceased Water level is receding**	**Dam Failure**
Electrical Engineering Manager	• N/A	• Ensure decant pumps are operating. If pumps are inoperable, raise notification to repair - follow up on maintenance schedule. • Organise maintenance to repair decant pumps (if inoperable).	• Pump down decant pond as low as possible.	• Pump down decant pond as low as possible.	• Pump down decant pond as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
CHPP Superintendent	• N/A	• Cease tailings deposition into TSF. • In consultation with the Manager Mine Services determine when conditions have sufficiently stabilised.	• Ensure tailings deposition into TSF remains ceased.	• Ensure tailings deposition into TSF remains ceased.	• Ensure tailings deposition into TSF remains ceased until advised otherwise by Manager Mine Services.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • In consultation with Manager Mine Services and Dams Engineer develop a short term tailings & water storage contingency plan.
Mine Services Supervisor	• N/A	• Cease water transfers into TSF. • Ensure spillway is clear of debris.	• Ensure water transfers into TSF remain ceased.	• Ensure water transfers into TSF remain ceased.	• Ensure water transfers into TSF remain ceased until advised otherwise by Manager Mine Services.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections and audits of Tailings Storage Facility. • Ensure TSF operated in accordance with this Operations Plan.	• Notify DES as soon as practicable, but within **forty-eight (48)** hours of becoming aware, when the level of contents of the regulated dam reaches or exceeds the MRL level, as per EA conditions. • Notify General Manager. • Instruct cessation of tailings deposition and water transfer into TSF. • Communicate hazard to all Departments with personnel downstream of the dam. • Increase monitoring frequency from monthly to weekly. • Establish contact with RPEQ dam engineer and notify them of the situation. • Monitor weather forecast for large rainfall events.	• Notify DES as soon as practicable, but within **forty-eight (48)** hours of becoming aware, when the level of contents of the regulated dam reaches or exceeds the MRL level, as per EA conditions. • Notify General Manager. • Ensure tailings and water transfers to TSF remain ceased. • Increase monitoring frequency from weekly to daily.	• Ensure affected area downstream is evacuated. • Raise emergency call – notify General Manager. • Immediately notify DES in event of uncontrolled dam discharge as per EA conditions.	• Compile Release Report. • Notify DES as per EA conditions. • Immediately arrange for Dams Engineer to inspect site following a release event. • Raise Emergency Call – notify General Manager, if advised of imminent risk by Dams Engineer. • Advise General Manager of evacuation zone (downstream of Tailings Dam). • Conduct post spillway overflow dam inspection. • Determine in consultation with Dams Engineer, the need to isolate the embankment from vehicle and pedestrian access. • Implement remedial works if advised by Dams Engineer. • Determine in consultation with Dams Engineer, when/if conditions have sufficiently stabilised to return to normal operating conditions.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop a dam stabilisation and remediation plan. • In consultation with Dam Engineer and CHPP Superintendent develop a short-term tailings & water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety inspection.	• N/A	• N/A	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works etc.).	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short term tailings & water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 4 – SEISMIC EMBANKMENT INSTABILITY (SUNNY DAY FAILURE)

Trigger	Operations Response Plan	Emergency Response Plan	
	Orange: Elevated Risk of Failure	**Red: Imminent Risk of Failure (Sunny Day Failure – Seismic)**	**Black: TSF Failure**
	Earthquake with magnitude > 5 within region and felt at site.	**TSF Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and assessment following Seismic Event.**	**TSF Failure.**
Electrical Engineering Manager	• N/A	• N/A	• Refer to Jellinbah Emergency Response Plan (HMP-003).
CHPP Superintendent	• N/A	• Cease tailings deposition into TSF.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Mine Services Supervisor	• N/A	• Cease water transfers into TSF.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Immediately arrange for Dam Engineer to inspect site. • Communicate hazard to all departments with personnel within the TSF area. • Monitor weather forecast, increase inspection frequency during rainfall events. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, if conditions are sufficiently stable to return to normal operating conditions.	• Notify DES of imminent dam failure risk. • Raise emergency call – notify General Manager. • Advise General Manager of evacuation zone (downstream of Tailings Dam). • Instruct cessation of tailings deposition and water transfer into TSF. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimize risk of failure.	• Immediately notify DES in event of TSF failure. • Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect TSF once conditions have stabilised. • In consultation with Dams Engineer develop an embankment stabilisation and remediation plan. • In consultation with Dam Engineer and CHPP Superintendent develop a short-term tailings & water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short term tailings & water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

APPENDIX C: TARPS – RUSSELL'S DAM

TARP 1 - HIGH WATER LEVEL

Triggers	Operations Plan			EAP		
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Flood Failure – Overtopping)**	**Return to Normal**	**Black: Dam Failure – Below ground storage so not considered possible from typical overtopping scenario.**
	Water Level < MRL	Water Level > MRL & water level is static.	Water level > MRL, water level is rising and further rainfall forecast	Flow over pit crest	Overflows have ceased Water level is receding	Dam Failure – Sudden loss of level in dam
Electrical Engineering Manager	• N/A	• Ensure decant pumps are operating. • Organise maintenance to repair decant pumps (if inoperable).	• Ensure decant pumps are operating. • Organise maintenance to repair decant pumps (if inoperable).	• Ensure decant pumps are operating. • Organise maintenance to repair decant pumps (if inoperable).	• N/A	• N/A
CHPP Superintendent	• N/A	• In consultation with the Manager Mine Services determine when conditions have sufficiently stabilised.	• Stop tailings deposition into TSF.	• Ensure tailings deposition into TSF remains ceased.	• Ensure tailings deposition into TSF remains ceased until advised otherwise by Manager Mine Services.	• In consultation with Manager Mine Services and Dams Engineer develop a short-term tailings & water storage contingency plan.
Mine Services Supervisor	• N/A	• Install temporary transfer pump to pump down the decant pond.	• Pump down decant pond as quickly as possible. • Stop water transfers into TSF.	• Install additional pumps to pump down decant pond as quickly as possible. • Ensure water transfers into TSF remain ceased.	• Pump down decant pond as quickly as possible. • Ensure water transfers into TSF remain ceased until advised otherwise by Manager Mine Services.	• In consultation with Manager Mine Services and Dams Engineer develop a plan to seal the dam.
Manager Mine Services	• Conduct monthly inspections and audits of Tailings Storage Facility. • Ensure TSF operated in accordance with this Operations Plan.	• Notify DES as soon as practicable, but within **forty-eight (48)** hours of becoming aware, when the level of contents of the regulated dam reaches or exceeds the MRL level, as per EA conditions. • Notify General Manager. • Increase monitoring frequency from monthly to weekly. • Establish contact with RPEQ dam engineer and notify them of the situation. • Monitor weather forecast for large rainfall events.	• Notify DES as soon as practicable, but within **forty-eight (48)** hours of becoming aware, when the level of contents of the regulated dam reaches or exceeds the MRL level, as per EA conditions. • Notify General Manager. • Ensure tailings and water transfers to TSF cease. • Increase monitoring frequency from weekly to daily.	• Ensure affected area downstream is evacuated. • Notify General Manager. • Immediately notify DES in event of uncontrolled dam discharge as per EA conditions.	• Conduct post overflow dam inspection. • Compile Release Report if any water was discharged off site during the overtopping. • Notify DES as per EA conditions. • Immediately arrange for Dams Engineer to inspect site following an overtopping event. • Notify General Manager, if advised of any imminent risk by Dams Engineer. • Determine in consultation with Dams Engineer, the need to isolate the pit crest from vehicle and pedestrian access. • Implement remedial works if advised by Dams Engineer. • Determine in consultation with Dams Engineer, when/if conditions have sufficiently stabilised to return to normal operating conditions.	• Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop a dam stabilisation and remediation plan. • In consultation with Dam Engineer and CHPP Superintendent develop a short-term tailings & water management strategy. • In consultation with Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety inspection.	• N/A	• N/A	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works etc.).	• Conduct site inspection. • In consultation with Manager Mine Services develop a pit stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short term tailings & water management strategy. • In consultation Manager Mine Services coordinate clean-up and rehabilitation plan.

TARP 2 – PIT EROSION, INSTABILITY AND SEEPAGE

Triggers	Operations Plan – Below Ground Storage facility			EAP	
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Sunny Day Failure – Static)**	Black: Dam Failure – Below ground storage so not considered possible from typical overtopping scenario.
	No visible cracks around perimeter of dam No visible slumping Rill erosion < 0.5 m No significant change to monitored seepage flow rates and seepage areas	Visible cracks around perimeter or dam Rill erosion 0.5 m to 1.5 m Previously seepage area / flow rate increases by >25% New seepage area with steady outflow rate	Local scale slumping or cracks opening further around perimeter Major crack/s Rill erosion > 1.5 m deep Previous seepage area / flow rate increases by >50% New seepage area with significant outflow rate	Large cracks opening around the perimeter of the dam or sudden loss of level in the dam OR Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and geotechnical assessment.	Dam Failure – Sudden loss of level in dam
Electrical Engineering Manager	• Ensure TSF dewatering pumps are operating	• N/A	• N/A	• N/A	• N/A
CHPP Superintendent	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services.	• Cease tailings deposition into TSF.	• In consultation with Manager Mine Services and Dams Engineer develop a short-term tailings and water storage contingency plan.
Mine Services Supervisor	• Ensure TSF is operated in accordance with this operations plan.	• N/A	• Change operational procedure if advised by Manager Mine Services. • Maintain / restore decant pond to minimum operating conditions (≤ 1m deep)	• Cease all water transfers into TSF. • Pump down decant pond as low as possible.	• N/A
Manager Mine Services	• Conduct monthly inspections and audits of TSF.	• Notify CHPP Superintendent. • Increase frequency of dam monitoring inspections from monthly to weekly. • Establish contact with RPEQ dam engineer and notify them of the situation. • Raise work order for repair of cracking or erosion if no engineered design is considered necessary.	• Immediately notify CHPP Superintendent & General Manager. • Immediately arrange for Dam Engineer to inspect site. • Increase frequency of dam monitoring inspections from weekly to daily. • Determine, the need to isolate pit crest from vehicle and pedestrian access. • Determine, in consultation with Dam Engineer, need to change dam operational plan / reduce water level. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Notify General Manager. • Contact Dams Engineer to seek advice regarding potential short-term remediation options to minimise risk of failure. • Notify DES of imminent dam failure risk. • Instruct decant pond to be pumped down as low as possible. • Instruct cessation of tailings deposition into TSF.	• Immediately notify DES in event of dam failure. • Arrange for Dams Engineer to inspect pit crest once conditions have stabilised. • In consultation with Dams Engineer develop a pit stabilisation and remediation plan. • In consultation with Dams Engineer and CHPP Superintendent develop a short-term tailings and water storage contingency plan. • In consultation with Dams Engineer coordinate a clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety inspection.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop a pit crest stabilisation and remediation plan. • In consultation with Manager Mine Services and CHPP Superintendent develop a short-term tailings and water storage contingency plan. • In consultation with Manager Mine Services assist / help coordinate a clean-up and rehabilitation plan.

APPENDIX D: TARPS – PLAINS LEVEE

TARP 1 – EMBANKMENT EROSION AND INSTABILITY

Trig	Operations Plan			EAP	
	Green: Normal Operating	Yellow: Alert	Orange: Elevated Risk of Failure	Red: Levee Failure Imminent	Black: Levee Failure
	No visible cracks. No visible bulges / slumping. Rill erosion < 0.5 m.	Visible cracks. Rill erosion 0.5 m to 1.5 m.	Local scale (bench downstream slope) bulges / slumping Major crack/s. Rill erosion > 1.5 m deep.	Global scale (entire downstream slope) bulges / slumping; or Levee Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and geotechnical assessment.	Levee Failure.
Mine Projects Manager	• Conduct routine inspections and audits of the levee.	• Notify Manager Mine Services. • Increase frequency of levee inspections to weekly.	• Immediately notify Manager Mine Services. • Increase frequency of levee inspections to daily. • Isolate embankment from vehicle and pedestrian access as directed.	• Immediately notify Manager Mine Services.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Review inspection and audit reports for the levee.	• Determine when conditions have sufficiently stabilised to return to normal operating conditions.	• Immediately arrange for Dam Engineer to inspect levee. • Advise General Manager of evacuation zone (Jellinbah Plains Mining Area). • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimise risk of failure. • Notify DES of imminent dam failure risk.	• Immediately notify DES in event of levee failure. • Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect levee once conditions have stabilised. • In consultation with Dams Engineer develop an embankment stabilisation and remediation plan. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety audit.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g., additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

APPENDIX E: TARPS – MINE WATER STORAGES

TARP 1 – EMBANKMENT SEEPAGE

Triggers	Operations Response Plan			Emergency Response Plan	
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Sunny Day Failure – Static)**	**Black: Dam Failure**
	No significant change to monitored Seepage Flow Rates and Seepage Areas **No seepage present**	**New Seepage Area Identified at the embankment toe** **Previously Identified Seepage Area / Extent increases by >25%** **Previous Seepage Flow Rate increases by > 25%**	**New seepage area identified elevated above the embankment toe** **Increase in cloudy appearance of seepage water** **Previous seepage area / flow rate increases by > 50%**	**Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer site inspection and geotechnical assessment, or:** **Rapid increase in rate or cloudy appearance of seepage (piping failure has started)**	**Dam Failure**
Mine Services Supervisor	• Ensure dam operated in accordance with this operations plan.	• Notify Manager Mine Services.	• Immediately notify Manager Mine Services. • Prevent access to the area if advised. • Change operational procedure if advised by Manager Mine Services. • Maintain / restore dam water level below MAOL.	• Pump down dam water level to as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections and audits of the dam.	• Notify Mine Services Supervisor. • Increase frequency of dam inspections from monthly to weekly. • Determine when conditions have sufficiently stabilised to return to normal operating conditions.	• Immediately notify Mine Services Supervisor. • Immediately arrange for Dam Engineer to inspect dam. • Increase frequency of dam inspections from weekly to daily. • Communicate hazard to all departments with personnel downstream of the dam. • Co-ordinate water quality monitoring of seepage water to confirm source. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Determine, in consultation with Dam Engineer, need to change dam operational plan / reduce water level. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Notify DES of imminent dam failure risk (regulated structures only). • Advise General Manager of evacuation zone. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimise risk of failure.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • Immediately notify DES in event of dam failure (regulated structures only). • Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop a dam stabilisation and remediation plan. • In consultation with Mine Services Supervisor and Dam Engineer develop a short term water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety audit.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop a dam stabilisation and remediation plan. • In consultation with Manager Mine Services and Mine Services Supervisor develop a short term water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 2 – EMBANKMENT EROSION AND INSTABILITY

Triggers	Operations Plan			EAP	
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Black: Dam Failure**	**Black: Dam Failure**
	No visible cracks **No visible bulges / slumping** **Rill erosion < 0.5 m** **Surveyed embankment movement <15mm since previous survey or <50mm since initial benchmark survey**	**Visible cracks** **Rill erosion 0.5 m to 1.5 m** **embankment movement >15 mm since previous survey or >50 mm since initial benchmark survey**	**Local scale (bench downstream slope) bulges / slumping** **Major crack/s** **Rill erosion > 1.5 m deep** **Surveyed embankment movement > 50 mm since previous survey or > 100 mm since initial benchmark survey**	**Global scale (entire downstream slope) bulges / slumping** **or** **Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and geotechnical assessment.**	**Dam Failure**
Mine Services Supervisor	• Ensure dam is operated in accordance with this operations plan.	• Notify Manager Mine Services.	• Immediately notify Manager Mine Services. • Change operational procedure if advised. • Maintain / restore dam water level below MAOL. • Prevent access to the area if advised.	• Pump down dam water level to as low as possible.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections and audits of the dam.	• Notify Mine Services Supervisor. • Increase frequency of dam inspections from monthly to weekly. • Determine when conditions have sufficiently stabilised to return to normal operating conditions.	• Immediately notify Mine Services Supervisor. • Immediately arrange for Dam Engineer to inspect dam. • Increase frequency of dam inspections from weekly to daily. • Communicate hazard to all departments with personnel downstream of the dam. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Determine, in consultation with Dam Engineer, need to change dam operational plan / reduce water level. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Advise General Manager of evacuation zone. • Notify DES of imminent dam failure risk (regulated structures only). • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimise risk of failure.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • Immediately notify DES in event of dam failure (regulated structures only). • Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop a dam stabilisation and remediation plan. • In consultation with Mine Services Supervisor and Dam Engineer develop a short term water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety audit.	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop a dam stabilisation and remediation plan. • In consultation with Manager Mine Services and Mine Services Supervisor develop a short term water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 3 – HIGH WATER LEVEL

Triggers	Operations Response Plan			Emergency Response Plan		
	Green: Normal Operating	**Yellow: Alert**	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Flood Failure – Overtopping)**	**Return to Normal Operating**	**Black: Dam Failure**
	Water Level < MAOL	**Water Level > MAOL but below spillway & water level is static.**	**Water level > MAOL, water level is rising and further rainfall forecast**	**Flow over spillway Embankment toe or embankment adjacent to spillway severely eroded due to spillway discharge.**	**Overflows have ceased Water level is receding**	**Dam Failure**
Mine Services Supervisor	• Ensure dam operated in accordance with this operations plan.	• Notify Manager Mine Services. • Ensure dewatering pumps are operating. If pumps are inoperable, raise notification to repair - follow up on maintenance schedule. • Organise maintenance to repair decant pumps (if inoperable). • Ensure spillway is clear of debris.	• Immediately notify Manager Mine Services. • Prevent Access to the Area.	• Immediately notify Manager Mine Services.	• Notify Manager Mine Services.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Conduct monthly inspections of Dam.	• Notify General Manager. • Communicate hazard to all Departments with personnel downstream of the dam. • Monitor weather forecast for large rainfall events.	• Immediately notify General Manager. • Increase inspection frequency from monthly to daily. • Note: DES do not need to be notified in the event of an MAOL exceedance.	• Raise emergency call – notify General Manager. • Advise General Manager of evacuation zone. • Notify DES of imminent dam failure risk (regulated structures only).	• Immediately arrange for Dams Engineer to inspect site following release event. • Raise Emergency Call - notify General Manager, if advised of imminent risk by Dams Engineer. • Conduct post spillway overflow dam inspection. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, when / if conditions have sufficiently stabilised to return to normal operating conditions.	• Refer to Jellinbah Emergency Response Plan (HMP-003). • Immediately notify DES in event of dam failure (regulated structures only). • Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop a dam stabilisation and remediation plan. • In consultation with Mine Services Supervisor and Dam Engineer develop a short term water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct annual dam safety audit.	• N/A	• N/A	• N/A	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g. additional investigations, operational changes, monitoring requirements, remedial works, etc.).	• Conduct site inspection. • In consultation with Manager Mine Services develop a dam stabilisation and remediation plan. • In consultation with Manager Mine Services and Mine Services Supervisor develop a short term water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.

TARP 4 – SEISMIC EMBANKMENT INSTABILITY (SUNNY DAY FAILURE)

Operations Response Plan		Emergency Response Plan	
Triggers	**Orange: Elevated Risk of Failure**	**Red: Imminent Risk of Failure (Sunny Day Failure – Seismic)**	**Black: Dam Failure**
	Earthquake with magnitude > 5 within region and felt at site.	**Dam Failure Imminent – Based on outcomes of RPEQ Dams Engineer inspection and assessment following Seismic Event.**	**Dam Failure.**
Mine Services Supervisor	• N/A	• Cease water transfers into TSF.	• Refer to Jellinbah Emergency Response Plan (HMP-003).
Manager Mine Services	• Immediately arrange for Dam Engineer to inspect site. • Communicate hazard to all departments with personnel within the dam area. • Monitor weather forecast, increase inspection frequency during rainfall events. • Determine, in consultation with Dam Engineer, the need to isolate embankment from vehicle and pedestrian access. • Implement remedial works if advised by Dam Engineer. • Determine, in consultation with Dam Engineer, if conditions are sufficiently stable to return to normal operating conditions.	• Raise emergency call – notify General Manager. • Advise General Manager of evacuation zone. • Contact Dams Engineer to seek advice regarding potential short term remediation options to minimize risk of failure. • Notify DES of imminent dam failure risk (regulated structures only).	• Immediately notify DES in event of dam failure (regulated structures only). • Refer to Jellinbah Emergency Response Plan (HMP-003). • Arrange for Dams Engineer to inspect dam once conditions have stabilised. • In consultation with Dams Engineer develop an embankment stabilisation and remediation plan. • In consultation with Dam Engineer and Mine Services Supervisor develop a short-term water management strategy. • In consultation with Emergency Response Leader and Dams Engineer assist / help coordinate clean-up and rehabilitation plan.
RPEQ Dams Engineer	• Conduct site inspection and geotechnical assessment. • Advise Manager Mine Services of recommended actions to reduce risk of failure (e.g., additional investigations, operational changes, monitoring requirements, remedial works, etc.). • Develop appropriate remediation design if needed.	• Advise of any available short-term remediation solutions to minimize risk of failure.	• Conduct site inspection. • In consultation with Manager Mine Services develop an embankment stabilisation and remediation plan. • In consultation with Manager Mine Services and Mine Services Supervisor develop a short term water management strategy. • In consultation with Emergency Response Leader and Manager Mine Services assist / help coordinate clean-up and rehabilitation plan.