Preliminary Remediation Action Plan

Stage 3 Early Works – Rum Jungle Mine Site

Department of Industry, Tourism and Trade

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Acronyms and Abbreviations

ACM	Asbestos containing materials
AMD	Acid and metalliferous drainage
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013)
Auditor	Independent contaminated land auditor responsible for overseeing contaminated land remediation and must be accredited under section 68 of the *Waste Management and Pollution Control Act 1998*
CHMP	Cultural heritage management plan
Commonwealth Approval	Approval (EPBC 2016/7730) granted under the *Environment and Biodiversity Conservation Act 1999 (Cth)*
CSM	Conceptual site model
DITT	Department of Infrastructure, Tourism and Trade
EBFR	East Branch Finniss River
EIS	Environmental Impact Statement
NT Approval	Environmental Approval EP2023/022 – 001, issued pursuant to section 69 of the *Environment Protection Act 2019 (NT)*
ERP	Emergency response plan
ESCP	Erosion and sediment control plan
LTEMP	Long term environmental management plan
NAF	Non acid forming
NLC	Northern Land Council
NT	Northern Territory
NTG	Northern Territory Government
NT EPA	Northern Territory Environment Protection Authority
PAF	Potentially acid forming
PRAP	Preliminary remediation action plan
RAP	Remediation action plan
REMP	Receiving environment monitoring program
RMP	Radiation management Plan
RvMP	Revegetation management plan
WMP	Water Management Plan
WRD	Waste rock dump
WSF	Waste storage facility

1.0 Introduction

The Northern Territory Government (NTG) Department of Industry, Tourism and Trade (DITT) commissioned SLR Consulting Australia Pty to prepare this Preliminary Remediation Action Plan (PRAP) for early Stage 3 remediation works at the former Rum Jungle mine, located approximately 6 km north of Batchelor, Litchfield Council, Northern Territory (NT).

Remediation of the former Rum Jungle mine and its nearby former satellite mine sites of Mt Burton and Mt Fitch is proposed to occur over five stages. Stage 1 and Stage 2 of the remediation project, which included technical studies and stakeholder consultation as part of development of the remediation strategy, have been completed. Stage 3 includes a five-year construction phase and five-year stabilisation phase. Stage 4 and Stage 5 will involve monitoring and management of the rehabilitated areas. Refer to **Figure 1** for an overview of the scope of work included in Stage 3 of the remediation project.

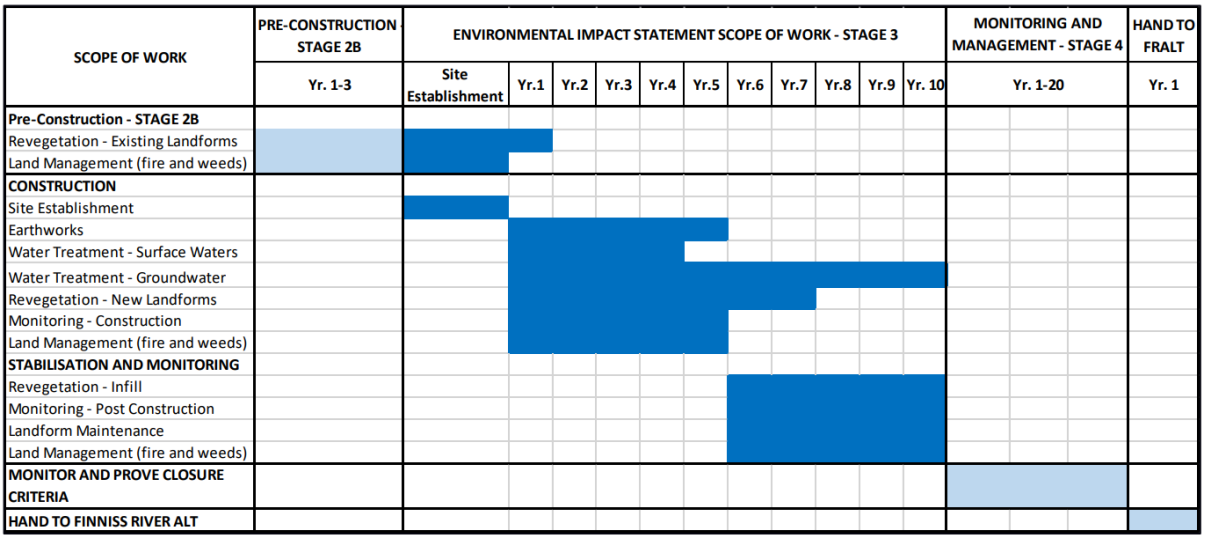
This PRAP is limited to management controls and requirements for the construction of a culvert creek crossing, which is scheduled to occur as part of the site establishment and early works within Stage 3 of the remediation project: Further detail on the scope of work covered by this PRAP is provided in **Section 6.0**.

There are numerous management plans and reports that have been published in relation to the Site. This PRAP does not intend to reiterate or paraphrase existing information pertaining to the history of the Site, nor remediation works beyond the scope of work that this PRAP applies to.

This PRAP has been prepared for the purpose of being suitable for relevant stakeholders involved in the early works of Stage 3 of the remediation project (ie: to provide reference to relevant management plans and documents, where applicable, as well as provide an overview of controls to be implemented throughout the works to ensure the protection of the environment and human health).

For comprehensive detail on the site condition and studies into the contaminating processes, refer to the Draft EIS document (DPIR, 2019a) and the detailed technical reporting within the appendices of the Draft EIS. Significant work has been completed over recent years to characterise site conditions.

Figure 1 Rum Jungle remediation project schedule



Source: DPIR 2019a

1.1 NT Approval and Purpose of this PRAP

Environmental Approval EP2023/022 - 001 (the NT Approval) for the remediation of the Rum Jungle mine was approved by the Minister for Environment, Climate Change and Water Security on 29 March 2023. Approval was granted under section 69 of the *Environment Protection Act 2019* for the rehabilitation works to be undertaken in accordance with the conditions stipulated in the NT Approval.

There are numerous conditions in the NT Approval that refer to a remediation action plan (RAP), which must be prepared, reviewed and endorsed by the contaminated land auditor, accredited under section 68 of the *Waste Management and Pollution Control Act 1998*, (the Auditor) prior to commencement of remediation works. Given that the early works are included within the broader scope of the remediation project, which has been deemed a significant action under the *Environment Protection Act 2019* and will be regulated under the NT Approval, a RAP must be prepared to allow for commencement of the action.

As the early works do not include remediation works (ie: works that involve the handling/movement of identified contaminated material for the purpose of improving the condition of the site and allowing for its intended future land use), this PRAP has been prepared in lieu of a RAP that covers the entire remediation project and that addresses all RAP conditions in the NT Approval.

The purpose of this PRAP is to provide sufficient information, including management plans and controls to be implemented during the early works, to satisfy the Auditor that the early works will be carried out in a way that prevents or minimises potential adverse impacts to environmental, human health, social and cultural values. Note that potential adverse impacts associated with the early works relate to unexpected finds (unidentified sources/areas of contamination that may be encountered during the early works), minor interaction with potentially contaminated soil and groundwater, and indirect impacts from known areas of contamination.

1.2 Objectives

In accordance with condition 2-1 of the NT Approval, the overarching environmental objectives of the broader remediation project are to:

- Improve environmental conditions onsite to support long-term improvement in the downstream aquatic ecosystem condition; and
- Improve environmental conditions onsite to support future use of the land for traditional ceremony, culture and subsistence use of natural resources.

The purpose of the early works included in this PRAP is to facilitate future remediation works that will meet the abovementioned broader objectives.

The objectives of this PRAP are to:

- Detail the requirements and controls for the management of known or assumed contamination within the Site to be implemented for the nominated early works defined in **Section 6.0;**
- Ensure that early works are carried out in accordance with relevant contaminated land legislation, guidelines and standards; and
- Provide guidance to minimise and mitigate potential adverse impacts to environmental, human health, social and cultural values.

1.3 Limitations of this PRAP

Limitations regarding the application of this PRAP include the following:

- This PRAP has been prepared for the Stage 3 early works and site establishment works only. Any works outside of the scope of the early works, as set out in **Section 6.0**, are not included in this PRAP and the preparation of a new RAP will be required prior to commencement of the broader site remediation works.
- This PRAP has been prepared in general accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) (herein referred to as "ASC NEPM") and the National Remediation Framework (CRC CARE 2019), however, as the early works do not include actual remediation works, there are numerous sections that would normally be included in a RAP that have been omitted from this PRAP, as they do not apply to the scope of the early works.

Detailed scopes of work are provided within relevant technical scopes and tender documents for each separate works package included in early works and site establishment covered within this PRAP. A high-level summary of works to be undertaken is included in this PRAP to provide context for the requirements and controls provided herein. In addition, it is understood that detailed methodologies will be developed by contractors as part of their tender applications for some of the scope items included in the early works. These tendering processes are still underway at the time of writing this PRAP.

2.0 Site Overview and Background

The Rum Jungle mine consists of the following land parcels:

- Rum Jungle proper – Section 2968 Hundred of Goyder (vacant NT Crown land recommended for grant under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) by the Aboriginal Land Commissioner Justice Toohey on 22 May 1981)
- Mt Burton – Section 998 Hundred of Goyder (estate in fee simple held privately, unzoned)
- Mt Fitch – within NT Portion 3283 (Crown Lease Perpetual 862 held by the Northern Territory Land Corporation)

Refer to **Figure 2** for a regional overview map indicating the location of each of the abovementioned land parcels. Existing site conditions, including water courses, landform features, impacted areas etc, are indicated in **Figure 3**.

The Site was previously operated for uranium and copper mining between 1953 and 1971. The mining activities at the Site resulted in significant environmental impacts, primarily caused by acid and metalliferous drainage (AMD). The oxidation of sulfidic mine waste rock and tailings and consequent release of AMD has resulted in ongoing pollution of the East Branch of the Finniss River (EBFR) and downstream aquatic ecosystems over the past 50 years.

Rehabilitation of the Site was undertaken in the 1980s by the Australian Government, which reduced the generation of AMD and metal loads being discharged to the Finniss River. However, deterioration of the mine waste landforms and infiltration of the waste rock dumps (WRD) over time has resulted in increased AMD generation and further environmental impacts have resulted.

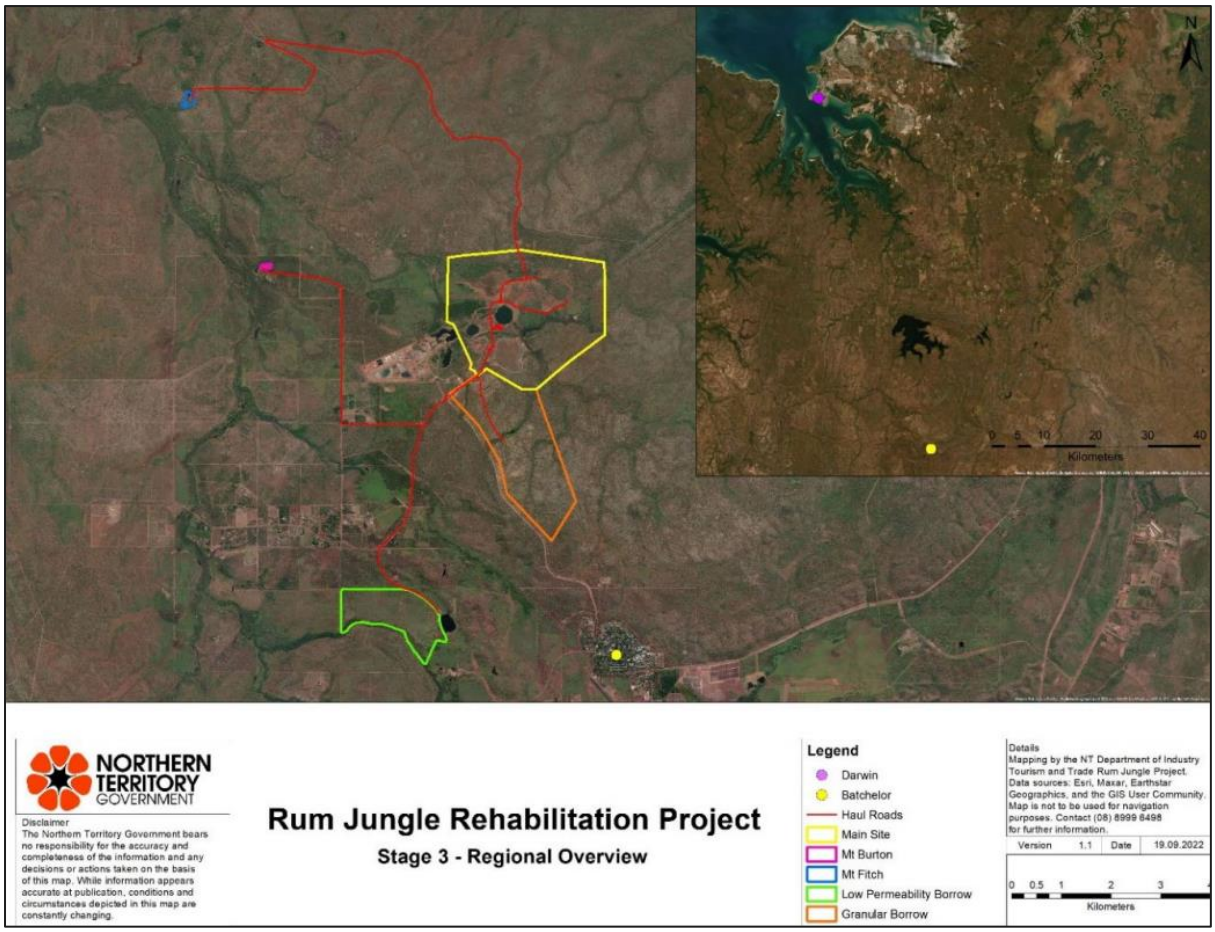
The Australian Government and the NTG began working under a National Partnership arrangement in 2009 to understand the contamination status of the Site by conducting routine monitoring and investigation works. The results and findings of these studies have informed the development of an improved rehabilitation strategy that is consistent with the

views and interests of traditional Aboriginal owners and that meets contemporary environmental and mined land rehabilitation standards.

In 2020, DITT submitted the draft Environmental Impact Statement (EIS) for the rehabilitation of the Site to the NT Environment Protection Authority (NT EPA) for assessment under the *Environmental Protection Act 2019*. The proposed rehabilitation project involves remediation works to address contamination issues that have been primarily caused by the ongoing generation of AMD and pollution of groundwater and waterways.

On 29 March 2023, the NT EPA issued the NT Approval that stipulates conditions to be complied with prior to, during and following completion of the remediation project.

Figure 2 Regional overview map



N
W
E
S

COMMUNICATION SPIRE
OLD CLAY BORROW
ESTIMATED BOUNDARY OF OLD BORROW AREA
CULVERT/BRIDGE
OLD TAILINGS DAM
DILAPIDATED STRUCTURES
OLD STOCKPILE AREA
DYSONS OPEN PIT WASTE ROCK DUMP
FLOW CONTROL WEIR
FINNISS RIVER (EAST BRACH)
DYSONS WASTE ROCK DUMP
MAIN PIT
OLD COPPER EXTRACTION AREA
BRIDGE
STACKED LARGE BOULDERS
INTERMEDIATE PIT
ABANDONED DRILL RIG
FINNISS RIVER DIVERSION
FINNISS RIVER (EAST BRACH)
MAIN WRD LEVEE
BROWNS OXIDE SITE BOUNDARY
INDICATIVE EXTENT OF CULVERT AND CROSSING
RADIOLOGICAL SOILS
LOW LYING FLOOD PRONE SECTION OF ACCESS TRACK
INTERMEDIATE WASTE ROCK DUMP
FITCH CREEK
MAIN WASTE ROCK DUMP
GATE AND CULVERT
GATE AND CULVERT
LITCHFIELD PARK ROAD
RUM JUNGLE ROAD

LEGEND

	AREA OF CONTAMINATED SOIL
	AREA OF RADIOLOGICAL SOIL
	OLD BORROW AREAS
	APPROXIMATE EXTENT OF ASSUMED ASBESTOS CONTAMINATION
	EXISTING ACCESS TRACK
	POOR QUALITY ACCESS TRACK
	RIP RAP LINED FLOW CHANNEL
	CUT ROCK FLOW CHANNEL
	DRAINAGE LINES
	BOUNDARY CHAINLINK FENCE

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DPIR - MINES DIVISION

RUM JUNGLE

EXISTING SITE CONDITIONS

FIGURE 3

3.0 Contamination Status

The primary pollution source at the former Rum Jungle mine site is AMD generated from sulfidic mine waste including tailings and waste rock. The site is contaminated with acids, metals, salts and radioactive material as a result of historical mining. There are also minor amounts of asbestos containing materials (ACM) onsite associated with previous mine buildings and relic mining equipment. The location and extent of contaminated soils is indicated in **Figure 3**.

Groundwater underlying the site is heavily impacted by AMD seepage and likely contributes to pollutant loads in surface waters, along with loads from surface runoff containing high concentrations of salts and metals. The polluted surface and groundwater that discharges from the site are the main contaminant pathways to the Finniss River.

A preliminary conceptual site model (CSM) was developed and included in the Draft EIS (DPIR, 2019a) to summarise the source-pathway-receptors onsite for all sources of known contamination including for AMD, radiological sources and ACM. Refer to **Table 1** for the preliminary CSM.

Note that as the early works do not include handling or active interaction with known contaminated materials, a detailed overview of the contamination status of the Site has not been included in this PRAP. Further detail on the type, location, nature and extent of contamination will be included in the RAP / subsequent RAPs that will be prepared prior to commencement of “Year 1” remediation works, which will include water treatment and handling/movement of impacted material.

The following sources/areas of contamination will require consideration/management as part of the early works that this PRAP applies to, due to the proximity of these areas to early works areas:

- Main WRD – Storage of waste rock from the Main Pit. Area covering 318,275 m^2, 21 m maximum height/depth, total volume of 4,529,675 m^3.
- Main WRD Levee – impacted soil bunds. Area covering 12,950 m^2, 5 m maximum height/depth, total volume of 68,975 m^3.
- Intermediate WRD – Storage of waste rock from Intermediate Pit. Area covering 84,750 m^2, 13 m maximum height/depth, total volume of 734,900 m^3.
- Old Copper Extraction Area – Area used as a copper leach pad. The ore was stripped in the 1980s as part of rehabilitation activities and disposed of in Dyson’s Pit. Area covering 70,000 m^2.
- Radiological soils – Areas where uranium ore was previously stockpiled and milled/processed, as well as potential naturally occurring radioactive material.

Table 1 Preliminary conceptual site model

Source Details		Pathway Details	Receptor Details
Legacy WRDs and Operational Features (primary contamination sources)	*Tailings and WRDs* Intermediate WRD - PAF-I Main WRD - full range of PAF and non acid forming (NAF) Dyson's Pit Overburden - PAF-I Dyson's WRD - predominantly NAF Main North WRD - contaminated spoil (NAF) *Rehabilitated Former Operational Areas* Copper Extraction Area - copper and sulphate Former Plant Site - radiological soils and asbestos containing legacy structures Old Tailings Dam Area - leached metal impacts in subsoils Old Stockpile Areas - radiological soils and isolated pocket of process liquor (in sub-surface)	*Contamination Vectors from Waste Rock and Contaminated Soils* Atmospheric exchange due to cover-system absence or deterioration leading to increased acidification, sulphate and heavy metal release *via* seepage and/or leaching to groundwater. Capillary rise of contaminants through cover systems to surface soils. Seepage of impacts from landforms caused by infiltration and formation of elevated hydraulic pressure within mounded features. Salt affected soils and drainage channel / watercourse sediments (secondary source).	Surface water body and sediments (ultimately EBFR) Groundwater aquifer (and secondary source)
		Surface Water and Groundwater Vectors Lateral migration of impacted soils through fluvial and aeolian dispersion. Lateral migration of exposed residual contamination *via* surface water flow. Vertical or lateral seepage of contamination within groundwater.	
		Radiation Vectors Release of radon and radiation associated with radiological sources.	Atmospheric and dispersion
		Ecological Vectors Direct contact between terrestrial fauna and surface contaminants (sub-surface contaminants with burrowing fauna). Bioaccumulation in terrestrial and aquatic flora and fauna.	Terrestrial flora and fauna (within riparian zone) Aquatic flora and fauna (within surface water bodies)
		Human Health Vectors Ingestion of contaminated media *via* impacted flora, fauna, surface water and/or groundwater. Direct contact with contaminated soils, sediment, surface water and groundwater.	Traditional landowners / users, Site workers Other site visitors
Surface/Ground Water (secondary sources)	*Impacted Groundwater* AMD-impacted groundwater Cu liquor impacted groundwater *Legacy Mine Pits – Surface Waters* Intermediate Pit Main Pit *Surface Water Channels (and sediments)* EBFR Diversion Channel Upper EBFR Fitch Creek Former EBFR Channel (now incorporating Copper Creek)	*Surface Water and Sediment Vectors* Dispersion / migration of contaminants in surface water and sediments. Short term sinks for contaminated sediments. Concentration / settling of contaminants in slow moving or stagnant waters during dry seasons.	Surface water body and sediments
		Groundwater-Surface Water Interaction (seasonally ephemeral) Lateral seepage from groundwater to river in wet seasons. Vertical or lateral seepage from river to groundwater in dry seasons.	Groundwater aquifer
		Ecological Vectors Impacts to riparian zones from contaminated surface water, groundwater, sediment or WRD seepage. Bioaccumulation in aquatic flora and fauna.	Terrestrial flora and fauna (within riparian zone) Aquatic flora and fauna (within surface water body)

Source Details		Pathway Details	Receptor Details
		Human Health Vectors Ingestion of (drinking) or direct contact with (bathing, recreational use) surface water. Ingestion of contaminated media *via* consumption of impacted flora, fauna, surface water and/or groundwater.	Traditional landowners / users, Site workers Other site visitors

4.0 Regulatory and Technical Framework

The following Acts and Regulations relate to this PRAP and the scope of early works:

- *Environment Protection Act 2019 (NT)*
- *Waste Management and Pollution Control Act 1998 (NT)*
- *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
- *Heritage Act 2011 (NT)*
- *Soil Conservation and Land Utilisation Act 1969 (NT)*
- *Weeds Management Act 2001 (NT)*
- *Dangerous Goods Act 1998 (NT)*
- *Work Health and Safety (National Uniform Legislation) Act 2011 (NT)* and *Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT)*
- *Radiation Protection Act 2004 (NT)*
- *Australian Radiation Protection and Nuclear Safety Act 1998 (Cth)*

The following guidance materials have informed the preparation of this PRAP:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013)
- National Remediation Framework (CRC CARE 2019)

Refer to **Section 1.1** for an overview of the NT Approval for the remediation of the Rum Jungle mine. Condition 9 of the NT Approval details the requirements of the RAP. Given this document is a preliminary RAP that does not include remediation of contaminated material, it must be stated that this PRAP does not intend to address all the requirements under condition 9.

The remediation project has also been approved under section 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999*. This approval (Ref: EPBC 2016/7730, herein referred to as the "Commonwealth Approval") was granted by the Department of Climate Change, Energy, the Environment and Water on 7 July 2023.

5.0 Key Stakeholders and Responsibilities

Refer to **Table 2** for the key roles and responsibilities in the early works included as part of this PRAP.

Table 2 Early works roles and responsibilities

Name	Roles and responsibilities
DITT	NT Government department delivering the remediation project, as well as current site controller/occupier. Roles within DITT that have responsibilities under this PRAP include the following: • Project Director – responsible for ensuring project systems are in place and resourced so that the early works can be conducted in a safe and environmentally responsible manner in accordance with this PRAP and relevant management plans and procedures.

Name	Roles and responsibilities
	• Project Services Director and Site Superintendent – responsible for managing the contractors engaged to deliver the early works, as well as for ensuring works are carried out in accordance with this PRAP and all site-specific procedures and protocols are adhered to. • HSE Director and Officer – responsible for ensuring the early works are conducted in a safe and environmentally responsible manner in accordance with this PRAP and relevant management plans and procedures. Responsible for ensuring all personnel working on the site are appropriately inducted and familiar with this PRAP.
NT EPA	Independent regulatory body in the NT, authorised to administer the *Waste Management and Pollution Control Act 1998*, which applies to this PRAP. Responsible for issuing the NT Approval, responding to reported pollution incidents, and undertaking enforcement action for breach of legal instruments and licenses.
Kungarakan and Warai people and the Northern Land Council (NLC)	The Kungarakan and Warai people are the traditional owners of the land that the former Rum Jungle mine site lies on. The traditional owners and the NLC are responsible for consulting with DITT on the views of the traditional owners prior to finalisation of the RAP and the site audit report and throughout the implementation of the rehabilitation project. .
Todd Mitchell AECOM	Contaminated Land Auditor (the Auditor), accredited under section 68 of the *Waste Management and Pollution Control Act 1998*, responsible for reviewing and certifying compliance of relevant documents prepared by the environmental consultant, as per the requirements of the NT Approval, and ensuring the remediation works are conducted in accordance with relevant legislation, guidelines and standards, so that the Site is suitable for its intended use.
Mark Stuckey Environmental Earth Sciences International	Peer Reviewer Contaminated Land Auditor (the Peer Reviewer), accredited under section 68 of the *Waste Management and Pollution Control Act 1998*, responsible for conducting a peer review of the review of the PRAP by the Auditor.
Civil Earthworks Contractor	Contractor engaged to construct the culvert crossing. Responsible for conducting works in accordance with this PRAP and relevant management plans.

6.0 Overview and Timing of Early Works

This PRAP is limited to management controls and requirements for the construction of the internal culvert and crossing, which is scheduled to occur as part of the early remediation works (Stage 3).

Culvert construction is expected to commence in late September 2023 and be completed by late December 2023.

6.1 Site Establishment

6.1.1 Temporary Fencing and Signage

Maintenance of fencing and access gates is already in progress to restrict uncontrolled access to the site. This includes the construction of some new site boundary fencing along existing firebreaks, where possible, to minimise the extent of vegetation clearing required. This activity is not considered part of this PRAP.

Signs will be installed as required to inform construction workers and site visitors of the presence and location of contaminated/restricted areas (eg: radiological soils, Old Copper

Extraction Area). As per the Radiation Management Plan (RMP) (RJ3-4-MP-029), all radiation areas or locations of potential elevated radiation levels at the site will be clearly marked with safety signs that conform to *AS 1319-1994 Safety Signs for the Occupational Environment.*

In addition, buffer zones shall be applied to all archaeological sites, including identified aboriginal and historical objects and places, as identified in the draft Cultural Heritage Management Plan (CHMP) (Martin-Stone, 2020).

6.1.2 Site Facilities

Site facilities for the early works may include demountable crib room and site office facilities and portable toilet and handwashing facilities. These will be imported to the site by the civil earthworks contractor and be removed from the site following completion of the early works. Establishment of site facilities for the following phases of the remediation works will not be included in the early works.

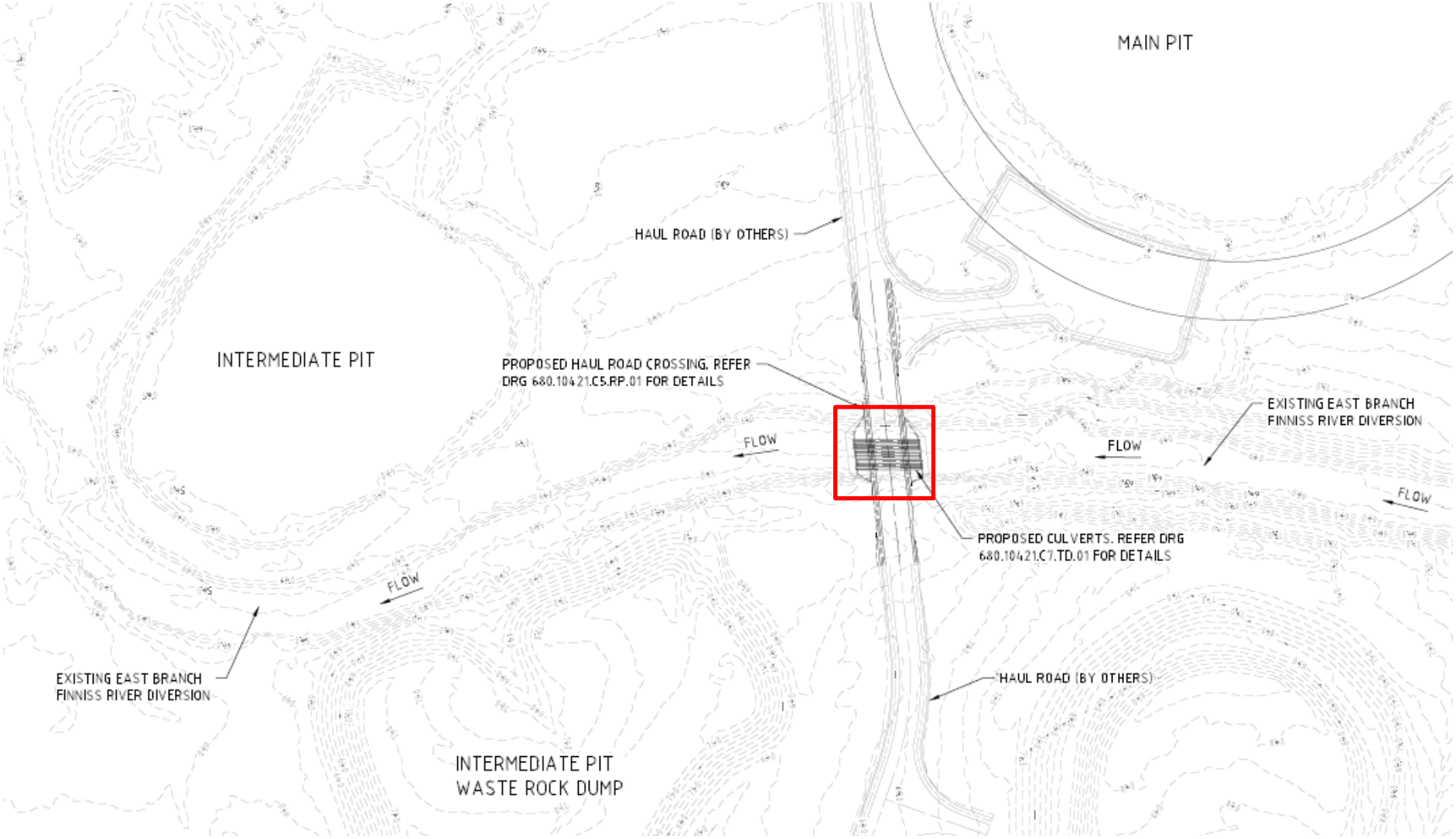
If required, water for dust suppression will be sourced from the Main Pit. The civil earthworks contractor will install a temporary standpipe with a diesel pump to fill water carts.

6.2 Culvert Creek Crossing

The construction of the culvert crossing over the EBFR diversion channel within Rum Jungle proper will be carried out as part of the early works. The internal haul road network, including those parts immediately north and south of the culvert crossing, will be constructed in the next phases of Stage 3 remediation works. The culvert crossing will be installed this dry season while the creek is not flowing to facilitate internal road construction and remediation works to commence in the following year.

Refer to **Figure 4** for a drawing indicating the location of the culvert creek crossing to be constructed as part of the early works in relation to relevant site features. Construction drawings for the culvert crossing are included at **Appendix A**. Note that the section of the crossing to be constructed as part of the early works is from chainage 80 to chainage 180, as indicated in the drawings at **Appendix A**.

Figure 4 - Culvert Crossing



7.0 Performance Criteria

As remediation works are not included in the scope of early works that this PRAP applies to, the requirement to include performance criteria, as per condition 9-1 of the NT Approval, has not been complied with. With the approval of the Auditor, direct reference to performance criteria is not required in this PRAP.

8.0 Contingency Actions

As remediation works are not included in the scope of early works that this PRAP applies to, the requirement to include contingency actions, as per condition 9-1 of the NT Approval, has not been complied with. With the approval of the Auditor, direct reference to contingency actions is not required in this PRAP.

9.0 Health and Environmental Risk Assessment

To comply with condition 9-2(1) of the NT Approval, preparation of this PRAP has been informed by a health and environmental risk assessment. A project risk assessment that considered the Stage 3 remediation project works and the Site at completion of the remediation works was undertaken as part of the EIS process. Detail on the risk identification and assessment process undertaken is included in Chapter 3.4 of the EIS.

The time periods included in the EIS risk register include: (i) Construction (ie: Stage 3 of the remediation project, up to 15 years); and (ii) Post rehabilitation into the long term (ie: Stage 5 of the remediation project, greater than 20 years onwards).

Given that the works covered by this PRAP are limited to the nominated early works for Stage 3 remediation works, a subset of risks included in the risk register relate to the early works. The key risks to health and environment that require management during the early works have been included and risk ratings revised. Refer to **Appendix B** for the health and environmental risk assessment matrix that relates to the early works included in this PRAP. Risk descriptors are also included in **Appendix B**.

Revision of this PRAP will require review of the health and environmental risk assessment and update as necessary to ensure all potential risks associated with the scope of works have been included and considered.

10.0 Requirements and Controls

10.1 Material Movement Tracking

All soil and rock material that is excavated onsite or imported to the site shall be included on a register that will include the following regarding material movements:

- Source of material (eg: imported fill, excavated material from culvert construction area)
- Status of the material (eg: clean fill, waste rock etc)
- Quantity of material
- Reason for material movement (eg: construction of haul road – cut material)
- Location that material is moved to
- Any additional details, eg: sampling and analysis if undertaken, controls implemented to ensure minimal environmental and human health risk etc.
- Stockpile ID if required

Refer to **Appendix C** for an example material movement register.

Maintaining a complete and accurate register of the types and quantities of soil and rock that are relocated during the early works will ensure that subsequent phases of the remediation project capture all known contaminated material that requires management to allow the site to be suitable for its intended future land use.

Note that no soil or rock material can be removed from the site.

10.2 Water Management

10.2.1 Groundwater Management

The only interaction with groundwater will be routine groundwater monitoring, which will be carried out for the duration of Stage 3 of the remediation project in accordance with the monitoring plan set out in the Environmental Monitoring Plan (RJ3-4-P-018).

10.2.2 Surface Water Management

No active discharge of known or suspected contaminated water shall occur as part of the early works. The section of the EBFR diversion channel where the culvert creek crossing will be constructed does not flow over the dry season period that construction works are scheduled to be completed. The design itself has erosion protection measures for the long term.

Routine surface water monitoring will be carried out for the duration of Stage 3 of the remediation project in accordance with the monitoring plan set out in the Environmental Monitoring Plan (RJ3-4-P-018).

10.2.3 Water Management Plan

To comply with condition 9-4(6) of the NT Approval, a water management plan (WMP) is required as part of the RAP. Condition 21-1 of the NT Approval states that the RAP "must include a revised and updated version of the water management plan (Appendix 3 of the Draft EIS - Water Management Plan Stage 3 Rum Jungle Rehabilitation Project version 4 dated 27 November 2019)".

The existing WMP (DPIR, 2019b) for the remediation project has not been updated for the early works, as no active discharge of water will be carried out. As such, and with the approval of the Auditor, a WMP that satisfies condition 21 of the NT Approval has not been included in this PRAP. An updated WMP that satisfies the requirements of condition 21 of the NT Approval will be prepared and included in the main/subsequent RAP.

10.2.4 Receiving Environment Monitoring Program

To comply with condition 9-4(5) of the NT Approval, a receiving environment monitoring program (REMP) is required as part of the RAP. The purpose of the REMP is to identify changes in downstream water quality and flow compared to the pre-construction aquatic ecosystem changes. The requirements of the REMP are outlined under condition 20 of the NT Approval.

A REMP that complies with condition 20 of the NT Approval will be prepared and included in the main/subsequent RAP. With the approval of the Auditor, a REMP is not required as part of the PRAP as the early works does not include the handling/movement of identified contaminated material, and the extent of construction work is limited to the installation of culverts and construction of one crossing.

Note that routine surface water monitoring will be carried out for the duration of the early works in accordance with the monitoring plan set out in the Environmental Monitoring Plan (RJ3-4-P-018).

10.3 Erosion and Sediment Control

Given the small footprint of the works areas (ie: less than ~0.5 hectares), the potential for the early works to contaminate stormwater with sediment, which could potentially impact the receiving environment and the EBFR, is considered low.

The civil earthworks contractor will complete works in line with the project's Site Erosion and Sediment Control Measures Plan (SLR 2022) for the construction of the culvert crossing. This document has been prepared in line with the *Best Practice Erosion & Sediment Control* guideline (IECA 2008).

Erosion and sediment control measures will be in place to minimise the potential impact on downstream water quality. Wind and water erosion of disturbance areas cannot be eliminated completely, however the following measures will be taken to minimise the impact:

- Conducting best practice land clearing procedures for all proposed disturbance areas, focussing on minimising footprint disturbance.
- Undertake disturbance works, as much as is practically possible, during the dry season (May to November) and during periods when good weather is forecast.
- Appropriate storage of soil stockpiles in areas away from roadways and other drainage lines. Suitable sediment control measures will be installed downslope of soil stockpiles and upslope of clean water runoff diverted (where possible).
- Clearly identifying/communicating no-go areas to maintain disturbance areas and traffic movement to the designated areas.
- Effective dust suppression measures.
- Any liquid wastes, fuels and oils stored on-site will be sufficiently bunded to contain any potential spills. Accidental spillage or poor management of fuels, oils, lubricants, hydraulic fluids, solvents and other chemicals during the construction phase will be controlled through spill management actions (including the availability of spill kits) to prevent water quality and ecological impacts and no further mitigation measures are considered necessary. Captured liquid wastes, fuels and oils should be disposed of at an appropriately licenced facility.
- Implementing an effective monitoring and maintenance program for the site.
- Following up civil works with the application of spray grass or a sterile cover crop such as Japanese Millet to rapidly establish cover over all soil stockpiles and disturbed ground.

10.4 Radiation Monitoring and Management

As the early works do not include handling or active interaction with known radiation sources a detailed overview of the radiation status of the site has not been included in this PRAP. Further detail including an updated RMP will be included in the main RAP / subsequent RAPs that will be prepared prior to commencement of main remediation works.

The pathway in which workers may be exposed to radioactive material during the early works includes via inhalation of radioactive dusts (ie: long-lived alpha activity) and radon decay products (eg: radon gas) through incidental exposure (eg: background concentrations generated by wind). Note that no handling of identified sources of radiological soils/rock is scheduled to occur as part of the early works.

A high-level summary of the controls that will be implemented for the early works include the following:

- Ensuring all exposed mobile plant are fitted with high-efficiency particulate air filters to cabins.
- Review of job procedures to ensure the correct controls (personal protective equipment etc) are in place to manage the risk of inhalation of radioactive dusts and radon decay.
- Review of job procedures to ensure the risk of ingestion of radioactive material by hand to mouth transfer is adequately addressed.

10.5 Dust Management

Dust generation is expected to be greatest during mechanical excavation of the ground surface and loading and offloading of soil/rock material. Mobile plant transiting throughout the site is also a source of dust generation that is required to be controlled during the works.

Note that the main potential contaminant of concern regarding dust generation in the areas that early works will be conducted is rouge dust (ie: inhalable/respirable dust).

Water carts will be utilised for dust suppression throughout the works, as required. Water for dust suppression will be sourced from the Main Pit. The civil earthworks contractor will install a temporary standpipe with a diesel pump to fill water carts.

No dust emissions shall be emitted beyond the boundary of each active work area. Visual monitoring of dust emissions will be carried out during the works. If excessive dust emissions are observed, works shall cease and not recommence until soil material has been adequately wetted down.

Note that a DITT representative will be onsite for the duration of the culvert construction works to oversee the works and ensure works are being carried out in accordance with the PRAP.

10.6 Stockpile Management

Stockpiling activities expected to occur as part of the construction of the culvert creek crossing include the following:

- Cut material that is suitable for reuse in construction
- Excess cut material that is not suitable for reuse, including but not limited to geotechnically unsuitable material (ie: material that is not suitable for reuse in construction)
- Imported fill material – will likely require progressive temporary stockpiling for use in culvert crossing construction
- Pavement materials imported to site

Requirements for all stockpiles that are formed during the early works, including materials that are temporarily stored before being reused in construction/remediation activities completed before the onset of this wet season, include the following:

- Stockpile locations must be approved by the site supervisor prior to storing soil or rock materials. The site supervisor will consider the following factors when determining whether a proposed stockpile location is appropriate:
    - Type of material to be stockpiled (ie: soil/rock, contamination status)
    - Volume of material

  - Length of time stockpile will be in place
  - Proximity to sensitive environmental receptors, such as waterways
  - Surface water flows and potential for erosion due to overland flow / slope of ground surface, or potential for impacted runoff to interact with stockpiled material (eg: runoff from a WRD)
  - Contamination status of underlying ground surface
  - Whether there is a requirement to install a separation/barrier layer to proposed stockpile area
  - Availability of alternative suitable locations
- The material movement tracker must be updated for all stockpiles when they are created, added to, moved and removed (refer to **Section 10.1**)
- Maintain appropriate soil moisture content to reduce dust emissions (particularly during handling).

10.7 Decontamination Requirements

Earthmoving plant and equipment will not be permitted to leave site until inspection by the DITT project team. DITT project personnel will visually inspect the equipment leaving site through the main gate for visual cleanliness. If a vehicle appears dirty, then egress from site may be refused until it has been satisfactorily re-cleaned. The radiation safety officer or competent person will be the adjudicator where there is any dispute on the cleanliness of equipment.

10.8 Cultural Heritage Management

To comply with condition 9-4(1) of the NT Approval, a CHMP that addresses the requirements of condition 5 of the NT Approval is required as part of the RAP. A draft CHMP has been prepared for the remediation project and consultation with NLC and the traditional owners is currently underway. Whilst the CHMP is being revised and agreed to by relevant stakeholders (and with the approval of the Auditor), an interim cultural heritage protocol will be implemented for the early works, in lieu of a CHMP that complies with condition 5 of the NT Approval.

Refer to **Appendix D** for a copy of the interim cultural heritage protocol to be implemented for the early works.

Note that no aboriginal or historical objects/places have been identified within the extent of the early works areas (Martin-Stone, 2020).

A CHMP that complies with condition 5 of the NT Approval will be included as part of the main RAP.

10.9 Vegetation and Weed Management

No new clearing will be required for construction of the internal haul road culvert section included in the early works. All existing and proposed access road and tracks have received ground-based topical spraying of weeds over the last several years. This was to reduce the likelihood of weed spread along roads and tracks by vehicle movement.

Management of existing intact native vegetation and culturally significant flora species, as well as weed control, is not considered relevant under this PRAP, as it is unrelated to contaminated land (ie: outside of the scope of the ASC NEPM). Refer to the Weed Management Plan (RJ3-4-MP-011) for further detail.

If any vegetation clearing is required to complete the early works included in this PRAP, the following documents will apply:

- RJ3-4-F-004 Ground/Vegetation Disturbance Form
- RJ3-4-Pr-007 Vegetation Clearing Procedure

To comply with condition 9-4(4) of the NT Approval, a revegetation management plan (RvMP) is required as part of the RAP. As this document is a preliminary RAP in which no remediation works are scheduled to occur, a RvMP that satisfies condition 17 of the NT Approval has not been included in this PRAP.

A RvMP for the revegetation of land disturbed by the remediation project works, which would otherwise be left as exposed soil areas following completion of remediation works, will be prepared and included in the main/subsequent RAP.

10.10 Workplace Health and Safety Management

All contractors engaged to conduct work onsite must prepare their own project-specific risk assessment and safe work method statement. These documents must be provided to DITT for review and approval prior to commencing work onsite. All contractors must also provide relevant licences and tickets relevant to the works to be carried out.

10.11 Emergency Management

An Emergency Response Plan (ERP) (RJ3-4-MP-026) has been prepared for the rehabilitation project to establish and maintain emergency management plans. The ERP collates relevant emergency information and details procedures for a planned and coordinated response to an emergency. Site specific emergency responses shall be included in work, health and safety documentation prepared for the early works.

The following high/extreme risks to people and property were identified in a hazard and risk assessment completed by DITT and are deemed as emergency situations relevant to the remediation project that would trigger the emergency management plan:

- Work accident resulting in serious injury or damage
- Vehicle accident or collision
- Fire
- Cyclone

Refer to **Table 3** for emergency contact details.

Table 3 Emergency contacts

Emergency type/service	Contact	Phone number
Life threatening of time critical emergency	Triple zero – emergency services	000 or 112
Non-life threatening or time critical emergency	Batchelor Community Health Clinic (Monday to Friday, 9am-4pm only)	8976 0011
	Palmerston Regional Hospital	7979 9200
Fire	Batchelor Volunteer fire brigade	8995 5400 / 8946 4105 0418 192 078
Police	Batchelor Police Station	8976 0015 131 444

Emergency type/service	Contact	Phone number
Poisons information	National Poisons Information Centre	13 11 26

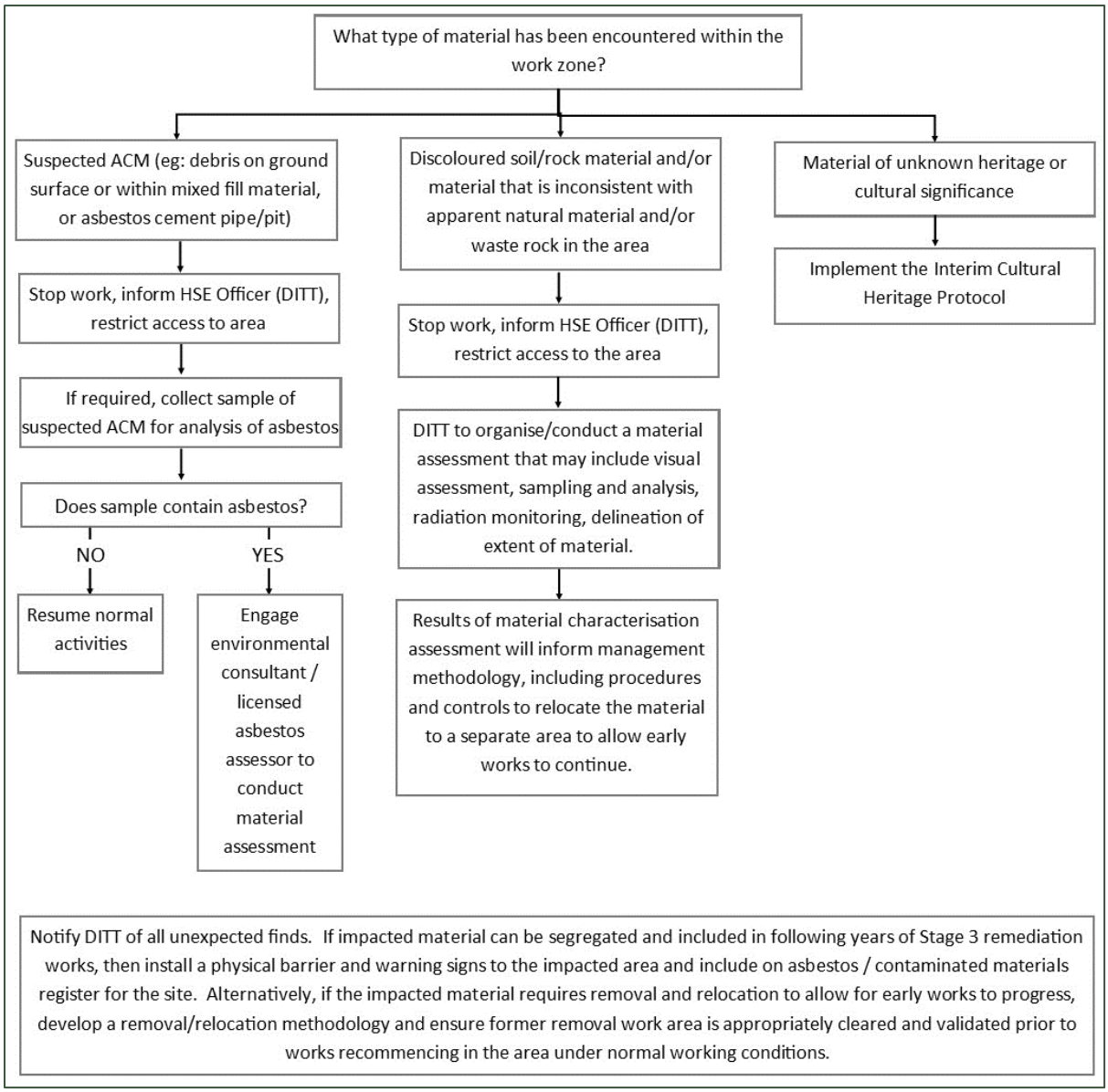
11.0 Unexpected Finds Protocol

An unexpected find refers to the discovery of any material that has not been previously identified and is not included in this PRAP as a contaminated area requiring management and later remediation. Examples include, but are not limited to, ACM and asbestos impacted fill material, tailings, anthropogenic waste.

To minimise the risk of personnel being exposed to potentially hazardous materials, as well as reducing the risk of excess contaminated impacted material being generated if it is not identified immediately upon encountering, the unexpected finds protocol provided in **Figure** 5 shall be implemented. All personnel conducting/overseeing any ground disturbance works shall be aware of and familiar with this unexpected finds protocol.

Note that for unexpected cultural heritage finds, the interim cultural heritage protocol (**Appendix D**) shall be followed.

Figure 5 Unexpected finds protocol



12.0 Notifications and Communications

12.1 Stakeholder Engagement

An Engagement and Communication Strategy (RJ3-3-P-010) has been prepared for the remediation project, which sets out the objectives for stakeholder engagement and communication during each phase of Stage 3 of the remediation project. The objectives for the preliminary phase (ie: early works), include the following:

- Ensure the Rum Jungle rehabilitation work plan remains transparent to the community and that local stakeholders are kept well informed of any developments
- Address stakeholder concerns regarding environmental, cultural and social issues
- Ensure full engagement of Traditional Owners and the local community with the vision and objectives of the rehabilitation of the mine site

- Promote local training, employment and business opportunities through all forms of digital media (email, social media platforms) and paper-based (flyers, posters etc.)
- Ensure community stakeholders are abreast of upcoming issues that might impact them (roadworks)

12.2 Report of Pollution Incidents

Any incidents that occur on the Site that are likely to cause material harm to the environment will be immediately reported to project personnel who will document the incident in accordance with the relevant procedures.

The NT EPA will be notified as soon as practicable after (and in any case within 24 hours after) first becoming aware of a pollution incident which has occurred during the works, in the following instances:

- The actual or potential harm to the health or safety of human beings or ecosystem is not trivial.
- The actual or potential loss or property damage (including clean-up costs) associated with a pollution Incident exceeds $10,000.

The NT EPA Pollution Response Line will be contacted on 1800 064 567 or 8999 3747, as relevant.

If any of the requirements of the NT Approval are contravened, the NT EPA will be notified via pollution@nt.gov.au and/or the NT EPA Pollution Response Line.

Community complaints will be managed by the DITT project team.

12.3 Internal Incident Reporting

The Construction Environmental Management Plan (CEMP) (RJ3-3-MP-003) that has been prepared for Stage 3 of the remediation project outlines the requirements for internal incident reporting. Incident management, including environmental incidents, will be part of DITT's Health, Safety and Environmental Management System.

Environmental incident reports are required for the following events that may occur during the early works:

- Uncontrolled spill or release of substance – eg: fuel, chemicals, contaminated water
- Entry into a restricted/no-go area – eg: culturally restricted areas, radiation control zone, areas beyond designated culvert creek crossing work area
- Discovery or disturbance to unknown culturally significant area or objects
- Identification/uncovering of potentially contaminated soil/rock material
- Excessive dust emissions observed and/or dust observed beyond site boundary considered to be attributable to site activities
- Water quality exceedances of locally derived water quality objectives
- Unexpected fauna mortality – eg: fish kills, bird deaths, multiple mammal deaths
- Bank erosion or instability within river channel
- New weed species detected attributed to construction activities
- Increase in extent of known weeds

The prompt and accurate reporting of incidents will be the responsibility of all employees and supervisors/management will be held accountable for compliance with this requirement. An

incident register will be maintained, and key incidents will be widely shared to reduce the likelihood of incident reoccurrence.

Each incident will be investigated to determine the root cause and how controls can be adjusted to prevent reoccurrence. Actions will be developed, assigned and tracked using the incident management system. Regular check and audits, with timeframes, will be undertaken following an incident to ensure that corrective actions are in place.

12.4 Data and Record Management

As outlined in the CEMP (RJ3-3-MP-003), a digital system will be utilised to store and manage all operational system documents, drawings and plans. Data management software will be utilised to manage all analytical data obtained during the remediation project.

13.0 Ongoing Management and Monitoring

13.1 Long Term Environmental Management Plan

To comply with condition 9-4(2) of the NT Approval, a long term environmental management plan (LTEMP) for the WSFs is required as part of the RAP. The LTEMP will detail ongoing monitoring and management requirements for the WSFs to minimise any risk to future land users.

As this document is a preliminary RAP in which no remediation works are scheduled to occur, a LTEMP that satisfies condition 15 of the NT Approval has not been included in this PRAP. As approved by the Auditor, a LTEMP that complies with condition 15 of the NT Approval will be prepared and included in the main/subsequent RAP.

13.2 Monitoring Plan (Commonwealth Approval)

To comply with condition 3 of the Commonwealth Approval, a monitoring plan must be developed and submitted to the Department of Climate Change, Energy, the Environment and Water at least 12 months prior to completion of Stage 3. The intent of the monitoring plan is to outline monitoring required to demonstrate whether the remediation project is progressing towards, or has achieved, the “State of the Environment” as defined in the Commonwealth Approval.

The monitoring plan required under the Commonwealth Approval will be prepared as a separate document, noting that there will be some overlap of monitoring requirements with the REMP, LTEMP and RvMP.

14.0 References

AS 1319-1994, "*Safety Signs for Occupational Environment*". Standards Australia.

CRC Care 2019, "*Remediation Action Plan: Implementation – Guideline on documentation, record keeping and reporting*", National Remediation Framework, CRC for Contamination Assessment and Remediation of the Environment, Newcastle Australia.

DITT 2021, "*Engagement and Communication Strategy – Rum Jungle Stage 2 Rehabilitation Works*", Document Ref: RJ3-3-P-010, version 1.0, dated 12 November 2021. Department of Infrastructure, Tourism and Trade.

DITT 2022a, "*Environmental Monitoring Plan – Rum Jungle Stage 3 Rehabilitation Works*", Document Ref: RJ3-4-P-018, version 0.4, dated 17 June 2022. Department of Infrastructure, Tourism and Trade.

DITT 2022c, "*Rum Jungle Rehabilitation Stage 2 – Construction Environmental Management Plan*", Document Ref: RJ3-3-MP-003, version 1.0, dated 27 January 2022. Department of Infrastructure, Tourism and Trade.

DITT 2022d, "*Draft Weed Management Plan – Rum Jungle Rehabilitation*", Document Ref: RJ3-4-MP-011, version 0.3, dated 28 January 2022. Department of Infrastructure, Tourism and Trade.

DITT 2022, "*Emergency Response Plan*", Document Ref: RJ3-4-MP-026, version 0.1, dated 13 January 2022. Department of Infrastructure, Tourism and Trade.

DITT 2023, "*Radiation Management Plan – Rum Jungle Stage 3 Rehabilitation Works*", Document Ref: RJ3-4-MP-029. Department of Infrastructure, Tourism and Trade.

DPIR 2019a, "*Draft Environmental Impact Statement – Rum Jungle Rehabilitation Project*". Department of Primary Infrastructure and Resources.

DPIR 2019b, "*Water Management Plan – Stage 3 – Rum Jungle Rehabilitation Project*", version 4, dated 27 November 2019. Department of Primary Industry and Resources.

IECA 2008, "*Best Practice Erosion & Sediment Control – Book 2 – Appendices A – G*". International Erosion Control Association (Australasia).

Martin-Stone 2020, "*Draft Rum Jungle Mine Rehabilitation Stage 2A – Cultural Heritage Management Plan (CHMP)*", version 1.0, dated 10 July 2020.

NEPC 2013, "*National Environment Protection (Assessment of Site Contamination) Measure 1999*", National Environment Protection Council, Amendment No. 1. National Environment Protection Council.

SLR 2022, "*Rum Jungle Rehabilitation – Stage 2A Detailed Engineering Design, Site Erosion and Sediment Control Measures*", Reference 680.10421-R01-v1.1, dated 28 February 2022. SLR Consulting Australia Pty Ltd.

Other references that have informed this report but not been referenced directly:

AECOM 2020, "*Environmental Impact Statement - Contaminated Land Auditor's Assessment Report, Rum Jungle Rehabilitation Program*", Ref: 60474472, Rev 00, dated 18 June 2020. AECOM Australia Pty Ltd.

GHD 2019b, "*Rum Jungle 2A – Air Noise & Vibration Baseline Monitoring Report*", dated May 2019.

Hughes, A & Bollhöfer, A 2010, "*Radiological investigations in the Rum Jungle and East Finniss River areas 2009*", Internal Report 584, November, Supervising Scientist, Darwin.

Robertson GeoConsultants 2023, "*DRAFT Technical Specifications: 2023 Drilling Program at Rum Jungle*", Letter dated 20 April 2023.

SLR 2020, "*Rum Jungle Rehabilitation – Stage 2A Detailed Design, Detailed Engineering Design Summary Report*", Reference 680.10421.900000-R01-v1.0, dated 19 June 2020. SLR Consulting Australia Pty Ltd.

Appendix A Culvert and Crossing Construction Drawings

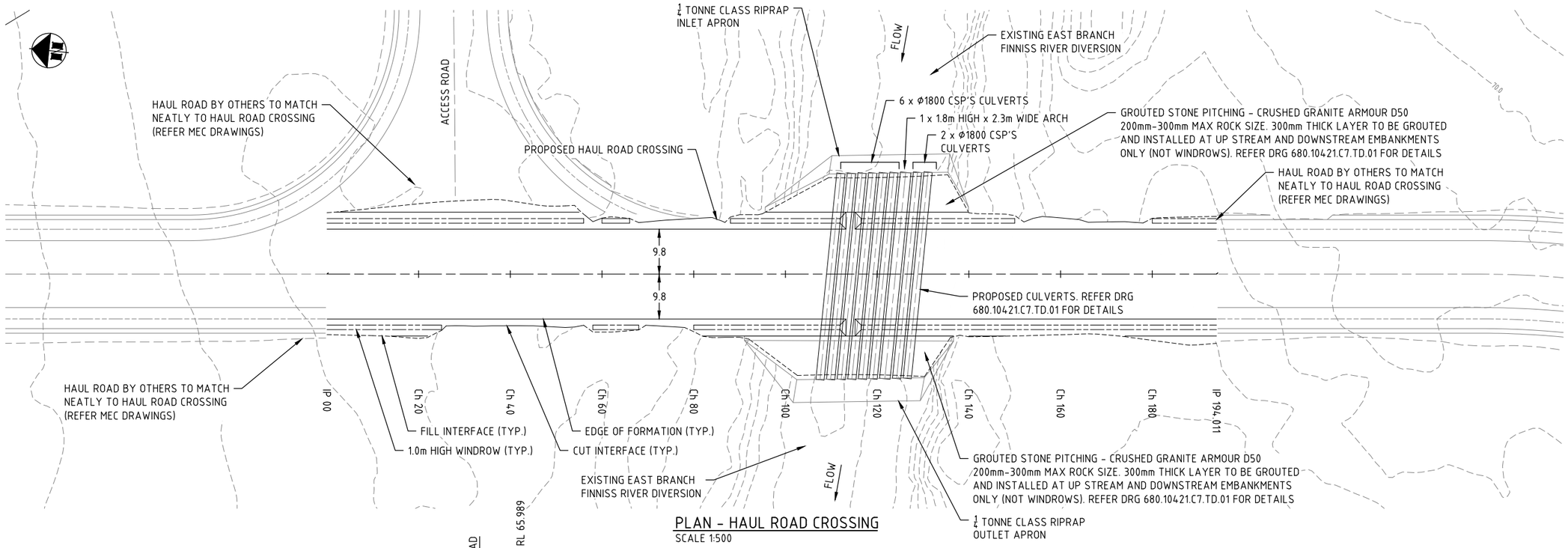
Preliminary Remediation Action Plan

Stage 3 Early Works – Rum Jungle Mine Site

Department of Industry, Tourism and Trade

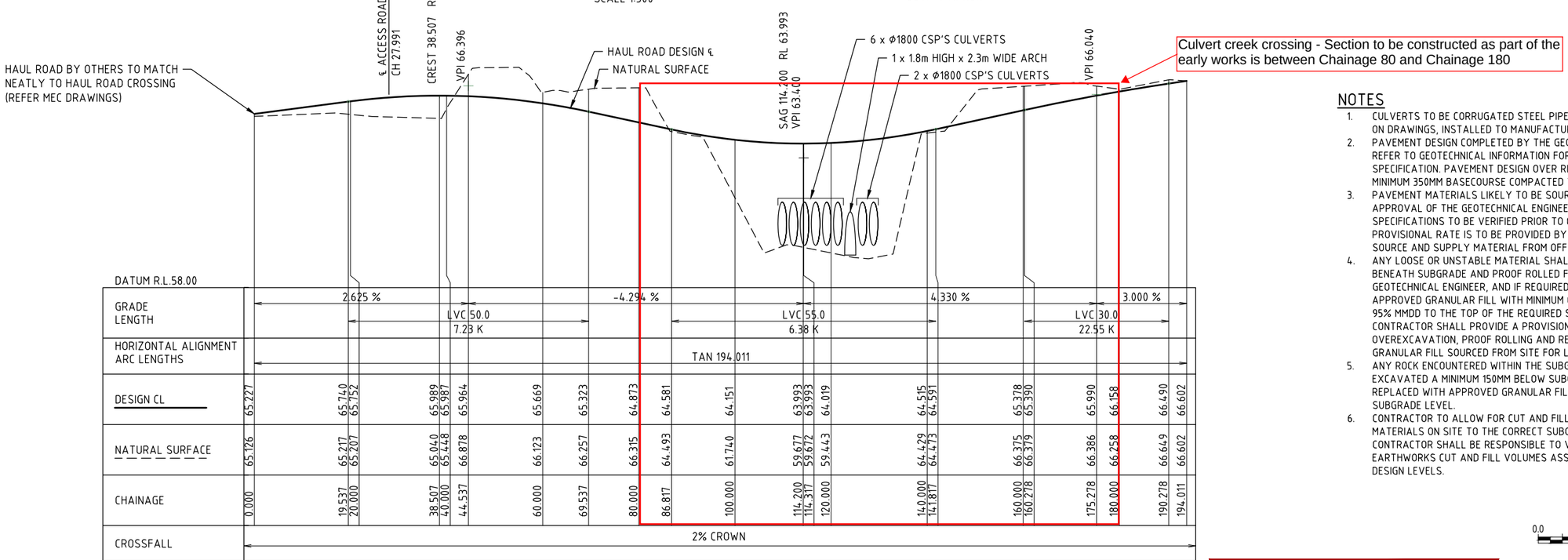
SLR Project No.: 680.30185.00000

27 September 2023



PLAN - HAUL ROAD CROSSING

SCALE 1:500



CHAINAGE	DESIGN CL	NATURAL SURFACE
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19.537	65.740	65.217
20.000	65.752	65.207
38.507	65.989	65.040
40.000	65.987	65.448
44.537	65.964	66.878
60.000	65.669	66.123
69.537	65.323	66.257
80.000	64.873	66.315
86.817	64.581	64.493
100.000	64.151	61.740
114.200	63.993	59.677
114.317	63.993	59.672
120.000	64.019	59.443
140.000	64.515	64.429
141.817	64.591	64.473
160.000	65.378	66.375
160.278	65.390	66.379
175.278	65.990	66.386
180.000	66.158	66.258
190.278	66.490	66.649
194.011	66.602	66.602

HAUL ROAD CROSSING - PROFILE

SCALE HOR 1:500 VER 1:100

NOTES

1. CULVERTS TO BE CORRUGATED STEEL PIPES AND ARCHES AS SHOWN ON DRAWINGS, INSTALLED TO MANUFACTURER'S REQUIREMENTS.
2. PAVEMENT DESIGN COMPLETED BY THE GEOTECHNICAL ENGINEER, REFER TO GEOTECHNICAL INFORMATION FOR DETAILS AND SPECIFICATION. PAVEMENT DESIGN OVER RIVER CROSSING TO BE MINIMUM 350MM BASECOURSE COMPACTED TO 98% MMDD.
3. PAVEMENT MATERIALS LIKELY TO BE SOURCED FROM SITE TO THE APPROVAL OF THE GEOTECHNICAL ENGINEER. ALL MATERIAL SPECIFICATIONS TO BE VERIFIED PRIOR TO CONSTRUCTION. A PROVISIONAL RATE IS TO BE PROVIDED BY THE CONTRACTOR TO SOURCE AND SUPPLY MATERIAL FROM OFF SITE.
4. ANY LOOSE OR UNSTABLE MATERIAL SHALL BE REMOVED FROM BENEATH SUBGRADE AND PROOF ROLLED FOR INSPECTION BY THE GEOTECHNICAL ENGINEER, AND IF REQUIRED RELACED WITH AN APPROVED GRANULAR FILL WITH MINIMUM CBR 15, COMPACTED TO 95% MMDD TO THE TOP OF THE REQUIRED SUBGRADE LEVEL. THE CONTRACTOR SHALL PROVIDE A PROVISIONAL RATE FOR OVEREXCAVATION, PROOF ROLLING AND REPLACING WITH APPROVED GRANULAR FILL SOURCED FROM SITE FOR LIFTS OF 200MM/M².
5. ANY ROCK ENCOUNTERED WITHIN THE SUBGRADE SHALL BE EXCAVATED A MINIMUM 150MM BELOW SUBGRADE LEVEL, AND REPLACED WITH APPROVED GRANULAR FILL TO THE FINISHED SUBGRADE LEVEL.
6. CONTRACTOR TO ALLOW FOR CUT AND FILL USING EXISTING MATERIALS ON SITE TO THE CORRECT SUBGRADE LEVELS. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY AND ALLOW FOR EARTHWORKS CUT AND FILL VOLUMES ASSOCIATED WITH ROAD DESIGN LEVELS.

0.0 5.0 10 15 20 METRES
SCALE 1:500

0.0 1.0 2 3 4 METRES
SCALE 1:100

FOR CONSTRUCTION

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY
1	ISSUED FOR IMPLEMENTATION	28/05/20	MFC	PFENG

AMENDMENTS Plot Date: 28/05/2020

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civil and structural engineering consultants
Suite 1, 8 Knuckey Street
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PO Box 104
Parap NT 0804
Telephone: (08) 7922 4100
nt@pfeng.com.au

DRAWN	CHECKED
M. CALLAGHAN	B. WASSINK
DATE: 18/05/2020	DATE: 18/05/2020
DESIGNED	CHECKED
M. CALLAGHAN	B. WASSINK
DATE: 18/05/2020	DATE: 18/05/2020
DESIGN PROJECT LEADER	NTG PROJECT MANAGER
D. O'TOOLE	J. HARTNETT
DATE: 28/05/2020	DATE: 28/05/2020

Northern Territory Government

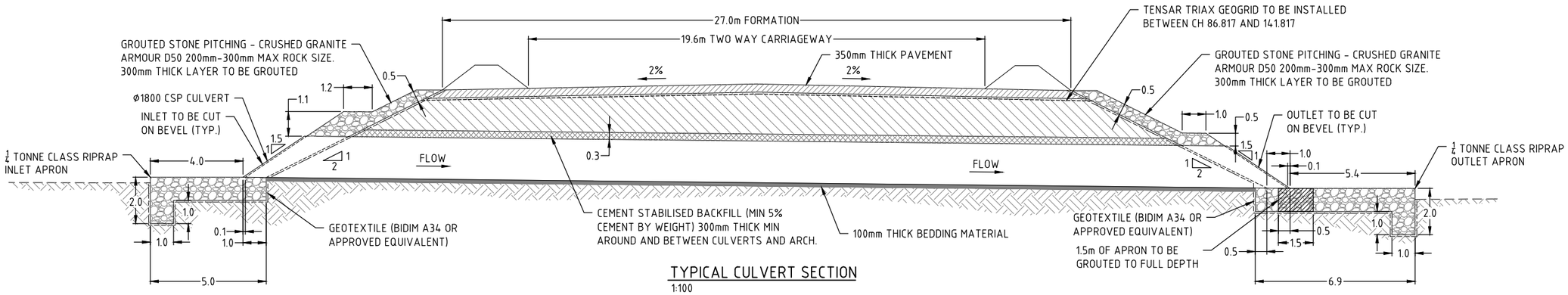
DARWIN REGION
RUM JUNGLE
RUM JUNGLE REHABILITATION - STAGE 2A DETAILED DESIGN

HAUL ROAD CROSSING PLAN AND PROFILE

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
N/A	N/A	4 OF 5	680.10421.C5.RP.01	1	A1

Ver. Jan' 2020

PLOTTED ON: 28/May/2020 1:42 PM
USER: MATTHEW CALLAGHAN
FILE LOCATION: F:\2018\Projects\18-259 Rum Jungle Finnis River\Drawings\CIV\680.10421.C5.RP.01.dwg



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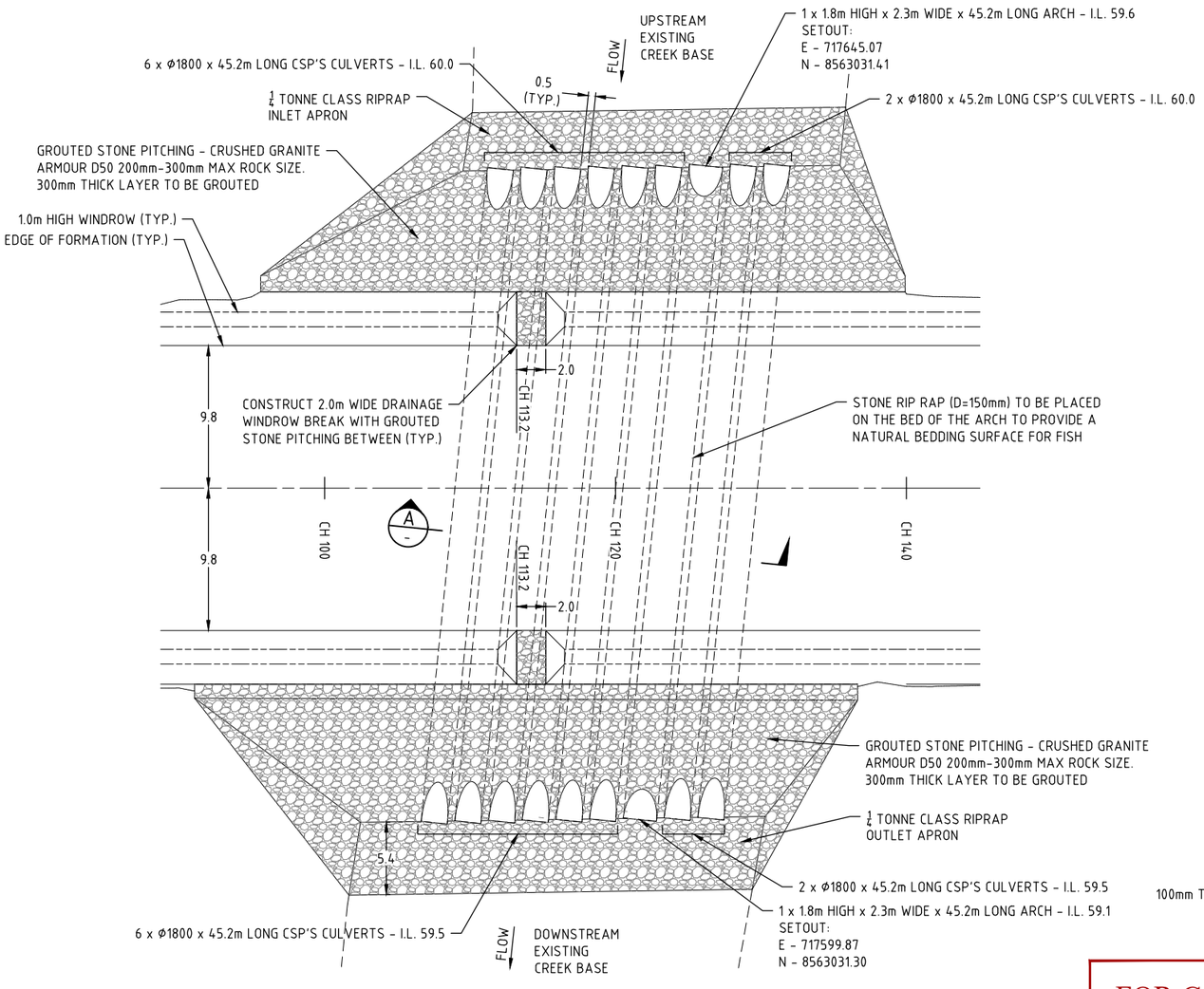

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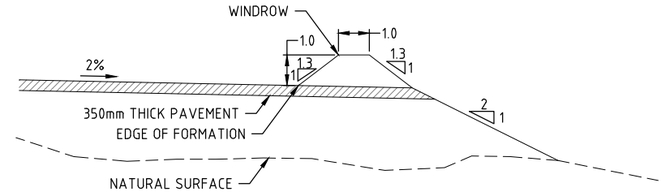
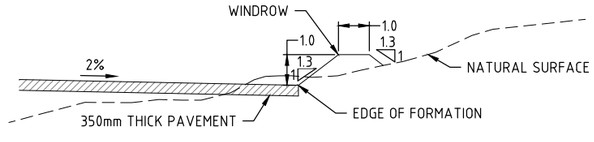


TYPICAL PAVEMENT DETAIL - NATURAL SURFACE BELOW PAVEMENT AT EDGE OF FORMATION
1:100



TYPICAL PAVEMENT DETAIL - NATURAL SURFACE ABOVE PAVEMENT AT EDGE OF FORMATION
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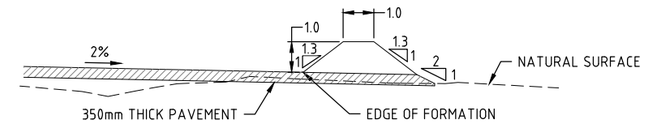
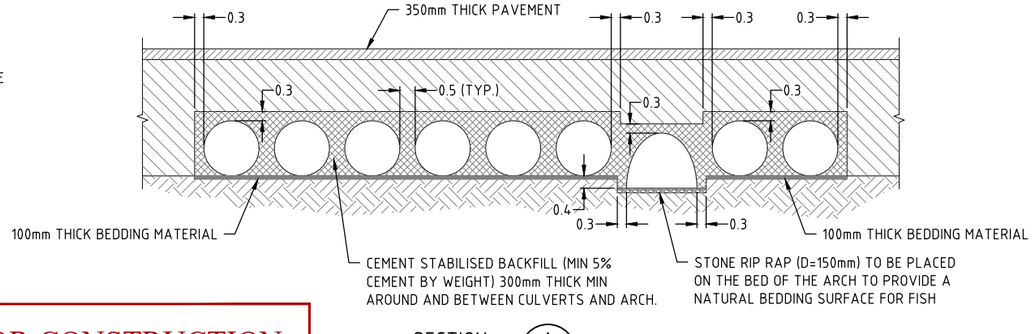


TYPICAL PAVEMENT DETAIL - NATURAL SURFACE WITHIN PAVEMENT AT EDGE OF FORMATION
1:100



FOR CONSTRUCTION

SECTION A - SCALE 1:100

SCALE 1:100 (0.0, 1.0, 2, 3, 4 METRES)

SCALE 1:200 (0.0, 2.0, 4, 6, 8 METRES)

No.	DESCRIPTION	DATE	INIT.	DEPT/COMPANY
1	ISSUED FOR IMPLEMENTATION	28/05/20	MFC	PFENG

AMENDMENTS — Plot Date: 28/05/2020

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Suite 1, 8 Knuckey Street
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DRAWN	CHECKED
M. CALLAGHAN DATE: 18/05/2020	B. WASSINK DATE: 18/05/2020
DESIGNED	CHECKED
M. CALLAGHAN DATE: 18/05/2020	B. WASSINK DATE: 18/05/2020
DESIGN PROJECT LEADER	NTG PROJECT MANAGER
D. O'TOOLE DATE: 28/05/2020	J. HARTNETT DATE: 28/05/2020

Northern Territory Government

DARWIN REGION
RUM JUNGLE
RUM JUNGLE REHABILITATION - STAGE 2A DETAILED DESIGN

HAUL ROAD CROSSING SECTIONS AND DETAILS

NTG PROJECT No.	NTG ASSET No.	SHEET No.	NTG DRAWING No.	AMENDMENT	SHEET SIZE
N/A	N/A	5 OF 5	680.10421.C7.TD.01	1	A1

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USER: MATTHEW CALLAGHAN
FILE LOCATION: F:\2018\Projects\18-259 Rum Jungle Finnis River\Drawings\CIV\680.10421.C7.TD.01.dwg

Appendix B Health and Environmental Risk Assessment Matrix – Early Works

Preliminary Remediation Action Plan

Stage 3 Early Works – Rum Jungle Mine Site

Department of Industry, Tourism and Trade

SLR Project No.: 680.30185.00000

27 September 2023

Contaminant	Source	Receptor	Exposure pathway	Cause	Initial risk			Controls	Residual risk			Notes
					Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating	
Radiological soil	Identified radiological soil areas *Note: No early works are within known areas of radiological materials.*	Onsite workers	Inhalation	Emission of radionuclides within dust emissions from exposed surfaces due to wind erosion	Moderate	Possible	Medium	• All radiation areas or locations of potential elevated radiation levels near the early works site will be clearly signposted and delineated. All personnel working onsite shall be made aware of the presence and location of radiological soil areas and requirements for access. • Use of dust mitigation measures as required, which may include use of water spray on tracks and within culvert crossing construction area. Use of appropriate respiratory protection (ie: P2 face mask) if working in windy conditions. • Use of water spray as required to minimise dust generation.	Minor	Unlikely	Low	Due to minimal ground disturbance and earthworks scheduled to occur during the early works and given that no soil disturbance is planned within areas of identified radiological impact, the potential likelihood of detrimental impacts to human health is considered low. Residual risk consequence reduced to minor for all potential exposure pathways and causes as the controls to be implemented will reduce the duration of potential dust emissions and thus reduce exposure time. Note: The source pathway receptor linkage is not complete for members of the public to be exposed to radiation during the early works. This is due to the following: • Handling/disturbance of waste rock, which is a source of radon decay products and long lived alpha activity in dust) is not scheduled as part of the early works. Any dust generation from WRDs would be passive/incidental (ie: no additional dust generation from WRDs expected beyond background levels – additional dust generated during early works would be attributed to excavation and handling of material associated with construction of new internal haul road culvert section, vehicle movements onsite etc) • Exposure to gamma radiation is not currently a pathway for members of the public since gamma dose rate decreases by the square of the distance from the source. Gamma dose rates in the nearest occupied areas are not detectable above background levels.
				Unauthorised access into identified areas of radiological soil	Moderate	Possible	Medium		Minor	Unlikely	Low	
			Ingestion	Unauthorised access into identified areas of radiological soil	Moderate	Possible	Medium		Minor	Unlikely	Low	
PAF material	Waste rock – WRDs and WRD Levee	Aquatic ecosystems	Plant uptake and ingestion	Disturbance of waste rock and improper storage (eg: stockpiling adjacent to surface water or leaving exposed to the elements) during culvert construction	Moderate	Possible	Medium	• Stockpile locations must be approved by the DITT project team prior to storing soil or rock materials • Implementation and adherence to the erosion and sediment control outlined in this PRAP.	Moderate	Unlikely	Low	• No interaction with any other areas of identified PAF material is expected as part of the early works.
Asbestos	Asbestos containing building materials & ACM impacted soil material - dumped anthropogenic waste and tailings material to the north of the site	Onsite workers	Inhalation of asbestos fibres	Damage to existing buildings that include ACM, due to unauthorised access. Unauthorised access into identified areas of asbestos impacted soil	Minor	Unlikely	Low	• All buildings and areas where ACM have been identified at the site will be clearly signposted and delineated. All personnel working onsite shall be made aware of the presence and location of asbestos hazard areas and requirements for access. • Unexpected finds protocol for any chance finds of ACM debris during the early works	Minor	Unlikely	Low	• Active work areas for the early works will be a considerable distance away from areas where asbestos impacted / building materials have been identified. ACM within the old buildings is bonded and does not pose a health risk if it remains in situ in good condition. The areas where ACM impacted soil has been identified are over 1 km from the culvert crossing work area.
Sediment	Exposed soil surfaces across the site, particularly within culvert creek crossing area and adjoining tracks	Aquatic ecosystem	N/A – increased sediment loading has the potential to reduce water and habitat quality	Altered surface flow patterns due to slope of culvert creek crossing and adjoining sections of road – could result in an increased sediment load to the EBFR. Residual soil/rock material from road construction could erode to EBFR in wet season.	Moderate	Possible	Medium	• Implementation of erosion and sediment control • Schedule works for the dry season • Routine inspections during the wet season and periods of high rainfall • Supervision of contractors by DITT project team	Moderate	Unlikely	Low	Minimal alternation to surface flow patterns expected as a result of the culvert creek crossing. Given the crossing will be paved, sediment load in runoff from directly above/adjacent to this section of the EBFR is expected to be less than previously.

Consequence Descriptors					
Category of Impact	***Minor***	***Moderate***	***Serious***	***Major***	***Catastrophic***
Health	Reversible health effects of little concern First aid treatment	Reversible health effects of concern Medical treatment	Severe reversible health effects of concern Lost time illness	Single fatality or irreversible health effects or disabling illness	Multiple fatalities or serious disabling illness to multiple people
Safety	Low level short-term subjective inconvenience or symptoms First aid treatment	Reversible injuries requiring treatment, but does not lead to restricted duties Medical treatment	Reversible injury or moderate irreversible damage or impairment to one or more persons Lost time injury	Severe irreversible damage or severe impairment to one or more persons	One or multiple fatalities or permanent damage to multiple people
Onsite Environment	Near-source confined and promptly reversible impacts (Typically a shift)	Near-source confined and short-term reversible impact (Typically a week)	Near-source confined and medium-term recovery impact (Typically a month)	Impact that is unconfined and requiring long-term recovery, leaving residual damage (Typically years)	Impact that is widespread unconfined and requiring long-term recovery, leaving major residual damage (Typically years)
Off-site Environment	Not applicable	Near-source confined and promptly reversible impact. (Typically a shift)	Near-source confined and short-term reversible impact. (Typically a month)	Near-source confined and medium-term recovery impact (Typically a month)	Impact that is unconfined and requiring long-term recovery, leaving residual damage (Typically years)
Socio-economic	Local, small scale, easily reversible change on social characteristics or values of the communities of interest or communities can easily adopt or cope with change	Short-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change	Medium-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change	Long-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change	Irreversible changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change
Cultural Heritage	Reparable damage to site or item of low cultural significance	Irreparable damage to site or item of low cultural significance	Repairable damage to site or item of cultural significance	Irreparable damage to site or item of cultural significance	Irreparable damage to site or item of international cultural significance
****Terrestrial flora & fauna***	Localised (less than a hectare) and/or brief (days)	Small scale (few hectares) and/or short-term (weeks)	Medium scale (many hectares) and/or medium-term (months)	Large scale (many square kilometres) and/or long-term (years)	Regional and/or permanent, resulting in the dominance of only a few species
****Aquatic ecosystems***	Confined and/or brief (days)	Small scale (limited to watercourse within the project area) and/or short-term (weeks)	Medium scale (few kilometres downstream) hectares) and/or medium-term (months)	Large scale (many kilometres downstream) and/or long-term (years)	Regional and/or permanent, resulting in the dominance of only a few species

Likelihood Descriptors	
Descriptor	**Explanation**
Almost Certain	The event is expected to occur in most circumstances This event could occur at least once during a project of this nature 91-100% chance of occurring during the project
Likely	The event will probably occur in most circumstances This event could occur up to once during a project of this nature 51-90% chance of occurring during the project
Possible	The event could occur but not expected This event could occur up to once every 10 projects of this nature 11-50% chance of occurring during the project
Unlikely	The event could occur but is improbable This event could occur up to once every 10-100 projects of this nature 1-10% chance of occurring during the project
Rare	The event may occur only in exceptional circumstances This event is not expected to occur except under exceptional circumstances (up to once every 100 projects of this nature) Less than 1% chance of occurring during the project

Likelihood	Consequence Level				
	Minor	Medium	Serious	Major	Catastrophic
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium
Extreme	Intolerable - Risk reduction is mandatory wherever practicable. Residual risk can only be accepted if endorsed by senior management				
High	Intolerable or tolerable if managed to as low as reasonably practicable - Senior management accountability				
Medium	Intolerable or tolerable if managed to as low as reasonably practicable - Management responsibility				
Low	Tolerable - Maintain systematic controls and monitor				

Appendix C Example Material Movement Tracker

Preliminary Remediation Action Plan

Stage 3 Early Works – Rum Jungle Mine Site

Department of Industry, Tourism and Trade

SLR Project No.: 680.30185.00000

27 September 2023

Material Movement Tracker (soil and rock) - Early Works - Rum Jungle Mine Rehabilitation

Date	Material type	Source of material	Quantity (tonnes or cubic metres)	Reason for material movement	Location material is moved to	Stockpile ID (as required)	Notes

Appendix D Interim Cultural Heritage Protocol

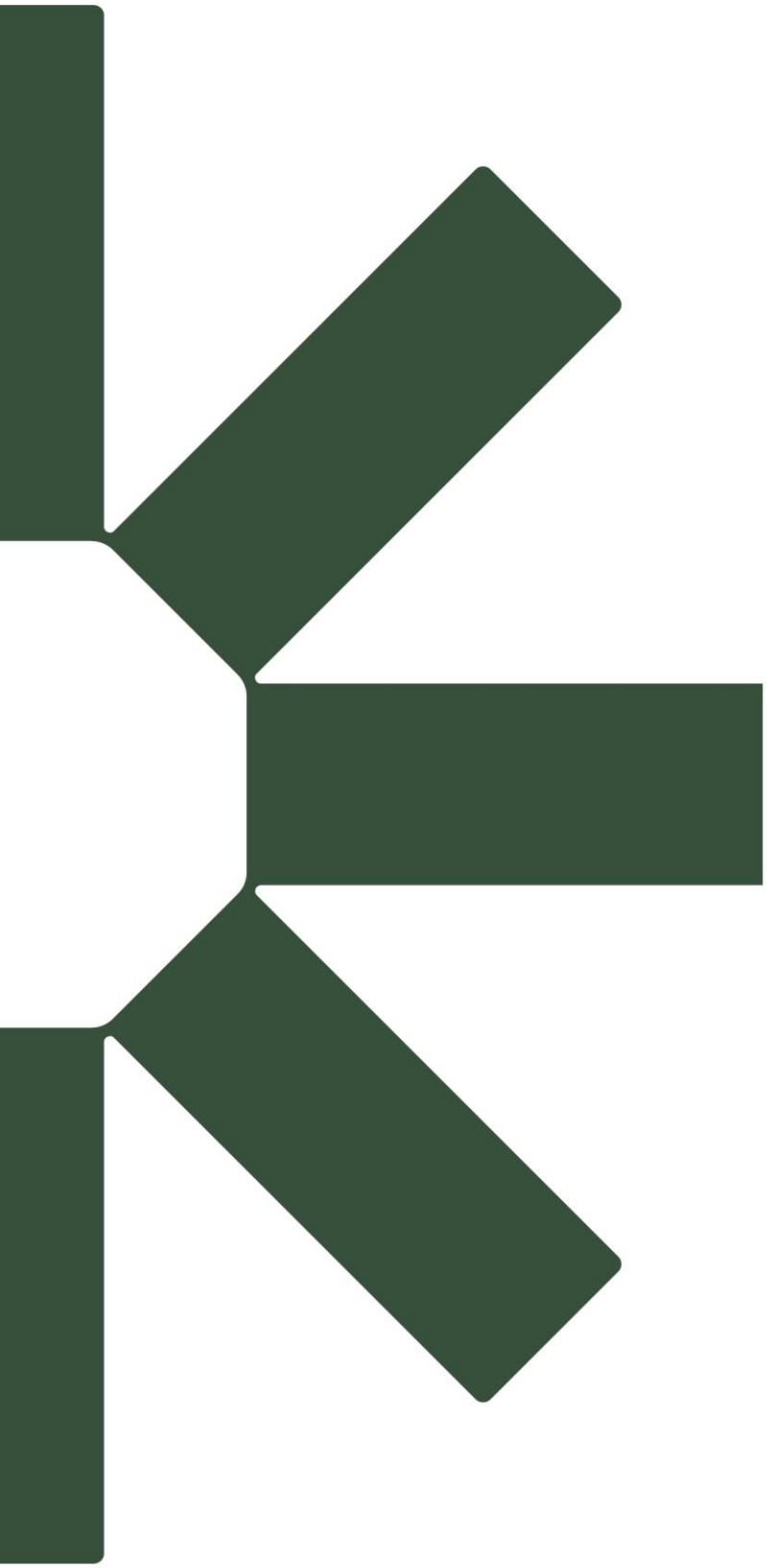
Preliminary Remediation Action Plan

Stage 3 Early Works – Rum Jungle Mine Site

Department of Industry, Tourism and Trade

SLR Project No.: 680.30185.00000

27 September 2023



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