



# Jervois Base Metal Project

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## Mining Management Plan

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## Document Amendments


Section	Amendment
1.1 Operator Details	Update of key site contacts and management structure
1.2 Title Details	Tenure expiry dates updated; new figure included to show new pipeline ML layout
1.3 Project Description	Plenty Highway sealed distance updated
	Proposed project layout, disturbance area, pipeline alignment/length and drilling meterage updated
1.3.2 Project Summary and Improvements	Disturbance area Table 5 updated
2.3.3 Workforce	Personnel estimate Tables removed, replaced with Figure 27
2.3.4 Community Affairs	MMP version updated to 2021/2022
4.1 Life of Mine Plan	Project sequence dates and mining sequence updated; detailed mine plan, plant feed Tables removed
4.2 Mining Reserves	Mineral resources Table updated
4.3 Project Construction	Construction schedule Table updated
4.3.2 Removal of Land Contamination	Inclusion of reference to larger Reward dump over historic disturbance areas
4.3.3 Site Access	Updated to include proposed route to Mt Isa; reference to larger suite of mining equipment included
4.3.6 Water Supply Pipeline	Description of new pipeline route included
4.3.8 Unca Creek Diversion	Diversion Figure updated
4.3.9 Tailings Storage Facility	Design changed to single cell arrangement
4.3.11 Electricity Provision	Proposed wind farm included
4.4 Mining	Updated to reflect use of larger equipment, new layouts of Reward and Bellbird pits and dumps; ore throughput rate increased up to 2 Mtpa; ROM storage capacity reduced; mining sequence revised

Section	Amendment
4.5 Processing Activities	Process plant flow diagram updated; crushing, grinding and flotation processes updated
4.6 Water Supply Borefield and Pipeline	Revised to include new pipeline alignment
4.8 Exploration Activities	Data replaced with 2023 data
5.2 Environmental Policy	New policy included
5.3 Environmental Commitments	Introduction revised; Project delay dates removed/updated
5.8 Key Environmental Activities	Dates updated
8.6 Life of Plan	Closure remediation activities table revised
8.7 Background for Costing	Disturbance figures updated to include changes to Reward pit and waste dump
8.8 Security Estimate	Disturbance areas, calculated cost and staged payments updated
A3 Environmental Commitments	Delay dates updated/removed; disturbance area updated; FIFO references updated; status of SIMP Reports updated

## Document Authorisation

	Authors/Reviewers		Approved By
Date	15/01/2024	15/01/2024	15/01/2024
Name	Megan Sharp	Russell Dwyer	Russell Dwyer
Signature			

I Denis Wood, Chief Executive Officer, declare that to the best of my knowledge the information contained in this Mining Management Plan is true and correct and commit to undertake the works detailed in this plan in accordance with all the relevant Local, Northern Territory and Commonwealth Government legislation.

SIGNATURE: 

DATE: 15/01/2024

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## Mining Management Plan Checklist

Y/N	Page	Requirement	Departments Comment
Y	iii	Has the plan been endorsed by a senior representative of the company?	
Y	12	<b>Introduction:</b> Have Operator details been included?	
Y	13	Is the company structure described?	
Y	13	Are title details included?	
Y	21	Is there a project summary and description improvements?	
Y	27	<b>Site Conditions:</b> Have all the physical environment conditions for the site and surrounds been identified?	
Y	56	Have the current land uses and users and stakeholders been identified?	
Y	63	Have Community Affairs been described?	
y	65	<b>Statutory and Non-Statutory Requirements:</b> Has all legislation relevant to the operation and associated permits and approvals been identified? Have all non-statutory obligations been identified and included?	
Y	54	Have Aboriginal and heritage sites been identified?	
Y	67	<b>Operational Activities:</b> Have all operational activities relating to mining, processing, exploration and any related activities for the site been addressed in the MMP?	
Y	Included in Acid and Metalliferous Drainage Plan	<b>Waste Rock Characterisation:</b> Have results of waste rock characterisation been included and discussed? Has a waste characterisation report been included? Does the MMP include a waste rock management plan?	
Y	108	<b>Environmental Management:</b> Has the Environmental Management structure and responsibilities been outlined?	
Y	109	Has the Environmental Policy been included?	
Y	111 and Appendix A3	Has a register of environmental commitments been included? Has a summary of all recommendations from the Environmental Impact Assessment been included and addressed if the project has been formally assessed?	
Y	115	Has training and induction been addressed?	
Y	116	Is there an Environmental Emergency and response plan?	
Y	116 and Appendix A1	Have all environmental aspects and potential impacts been identified? Has a risk assessment been carried out?	
Y	118 EM Plan provided as a	Have Environmental Management Plans (EMP's) for identified risks been developed and included?	

Y/N	Page	Requirement	Departments Comment
	separate document		
Y	EM Plan provided as a separate document	<b>EMPs:</b> Do all EMP's include: <ul style="list-style-type: none"> <li>• objectives and targets</li> <li>• management and mitigation strategies</li> <li>• monitoring and measurement</li> <li>• discussion and analysis of results</li> <li>• non-conformances and corrective actions?</li> </ul>	
Y	123	<b>Water Management:</b> Has a comprehensive description of surface water conditions been included?	
Y	129	Has a comprehensive groundwater model been described?	
Y	135	Have information or knowledge gaps been identified and described for water management?	
Y	135 & corresponding Management Plans	Are there comprehensive details (including scopes of work) on actions proposed to be taken to respond to any identified information or knowledge gaps?	
Y	136	Have hazards been identified that could result from activities related to the operation and rank the associated risks of impacts to both surface and groundwater?	
Y	141	Are all strategies and actions that will be undertaken to manage any risks identified included?	
Y	143	Has the water monitoring program been detailed?	
Y	123, 129 & corresponding Management Plans	Has all monitoring data been included?	
Y	123, 129 & corresponding Management Plans	Has an interpretation of data by a suitably qualified person been included?	
Y	123, 129 & corresponding Management Plans	Has a discussion of trends over time been detailed?	
Y	144 & corresponding Management Plans	Have details of remedial/corrective strategies and scopes of work been included?	
Y	145 & corresponding Management Plans	Have proposed actions been detailed?	

Y/N	Page	Requirement	Departments Comment
N	N/a as works under the MMP have not yet commenced	<b>Incident Reporting:</b> Has a table of all incidents recorded on site been included and discussed?	
Y	146 & corresponding MRCP	<b>Closure Planning:</b> Has a Life of Plan – Unplanned Closure plan been included? Are all disturbances described? Are remediation activities that would be required in the event of unplanned closure described? Are activities required to achieve end land use objectives, described?	
Y	15 & corresponding spreadsheet	Does the MMP include a detailed costing of closure activities for the life of plan? Have all past disturbances and those proposed for the next reporting period been identified and included?	
Y	All	<b>Maps and Plans:</b> Maps and plans have scale, scale bar, legend and north point? Datums used are MGA94 or GDA 94 (expressed in decimal degrees) with elevations based on AHD?	

## 1 Introduction

This Mining Management Plan (MMP) details the Project activities proposed for the nominated period, potential environmental impacts from these activities and the strategies to be implemented to manage impacts to environment values. This MMP will be amended as required to reflect changes in Project activities which result in a change to the level of environmental impact or when environmental management strategies are altered.

In accordance with recommendation two in the Northern Territory Environment Protection Authority (NT EPA) Assessment Report of 2019, Jervois Operations Pty Ltd <sup>1</sup>will provide written notice in advance to the NT EPA and the Responsible Minister if they alter the Jervois Base Metal Project and/or commitments, safeguards or mitigation measures in the Environmental Impact Statement (EIS) in such a manner that the environmental significance of the action may change, in accordance with clause 14A of the *Environmental Assessment Administrative Procedures 1984*.

This version of the MMP is confidential and is for internal and NTG use only. In accordance with the *Mining Management Act*, a public version of this MMP will be prepared to meet public reporting requirements.

### 1.1 Operator Details

Jervois Operations Pty Ltd is an Australian mineral exploration company, wholly owned by KGL Resources Ltd who are listed on the Australian stock exchange. KGL acquired the Jervois Base Metal Project in 2011 and set a strategic direction to improve the mineral resource at Jervois, particularly to increase the grade of copper. KGL's aim is to be a low cost copper producer which sustains its viability in fluctuating markets. The Jervois Base Metal Project will be operated by Jervois Operations Pty Ltd.

Jervois Operations Pty Ltd  
 Level 5, 167 Eagle Street  
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 Phone: 07-3071 9003  
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 Website: www.kglresources.com.au

**Table 1 – Key Site Contacts**

Name	Title	Email
Russell Dwyer	Project Manager Designated Occupational Health & Safety Manager	rdwyer@kglresources.com.au
Megan Sharp	Environment & Community Consultant	msharp@kglresources.com.au
Atiq Amiri	Exploration Manager	aamiri@kglresources.com.au
Salma Masti	Site Geologist	Smasti@kglresources.com.au
Jalu Firdausi	Site Geologist	jfirdausi@kglresources.com.au

*Note: Names and contact details for specific roles such as the Occupational Health and Safety Manager and the Mine Manager are designated to current personnel and will be updated when new appointments are made for these roles.*

<sup>1</sup> A change of company name from Kentor Minerals (NT) Pty Ltd to Jervois Operations Pty Ltd was registered with the Australian Securities and Investments Commission effective 29 November 2021. The Company ABN remains unchanged (ABN 71 152 107 527).

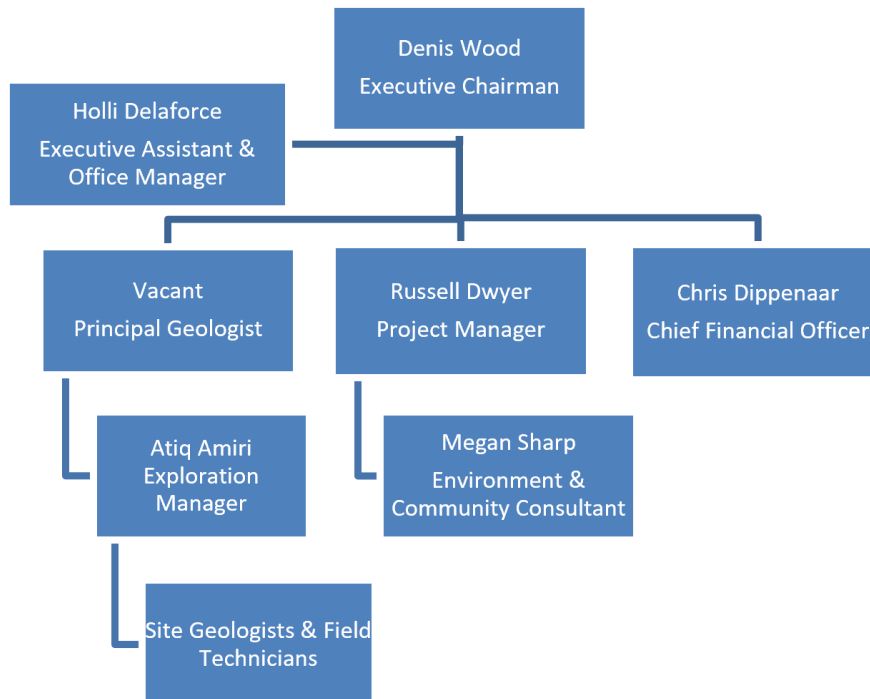


**1.1.1 Organisational Structure and Responsibility**

The existing management structure for the Jervois Project is shown in the following Figure. Once final feasibility is approved the management team will expand to oversee the construction phase of the Project and then the operational phase. Key site appointments for the construction phase will be the OH&S Manager and a site based Environmental Officer/Manager.

At the appropriate stages during the construction phase, remaining appointments will be made to enable the safe and efficient establishment of mining and processing operations.

Maintenance of the MMP and associated EMP’s are the responsibility of the Project Manager and the Environment and Community Consultant.



**Figure 1 – Existing Management Structure**

**1.2 Title Details**

The Project is located within Exploration Licence (EL) 25429 and several Mineral Leases held by Jinka Minerals Limited, a 100% owned subsidiary of KGL Resources as detailed in Table 2.

Table 2 – Mining interests

Tenure No.	Status	Grant Date	Expiry Date	Holder	Area (Ha)
ML 30180	Granted	28/01/2014	27/01/2034	Jinka Minerals Limited	33.21
ML 30182	Granted	26/03/2014	25/03/2034	Jinka Minerals Limited	481.7
ML 30829	Granted	18/08/2017	17/08/2032	Jinka Minerals Limited	1,438
EL 25429	Granted	02/02/2007	01/02/2025	Jinka Minerals Limited	Approximately 3,800
ML 32277 (Lucy Creek Borefield)	Granted	23/07/2020	17/08/2032	Jinka Minerals Limited	124.1

*Note: A new Mineral Lease application was made on 29 August 2023 for the realignment of the Lucy Creek borefield water pipeline – refer to Section 4.3.6/Figure 4 for details. ML 32277 may be partially relinquished upon grant of this new tenure.*

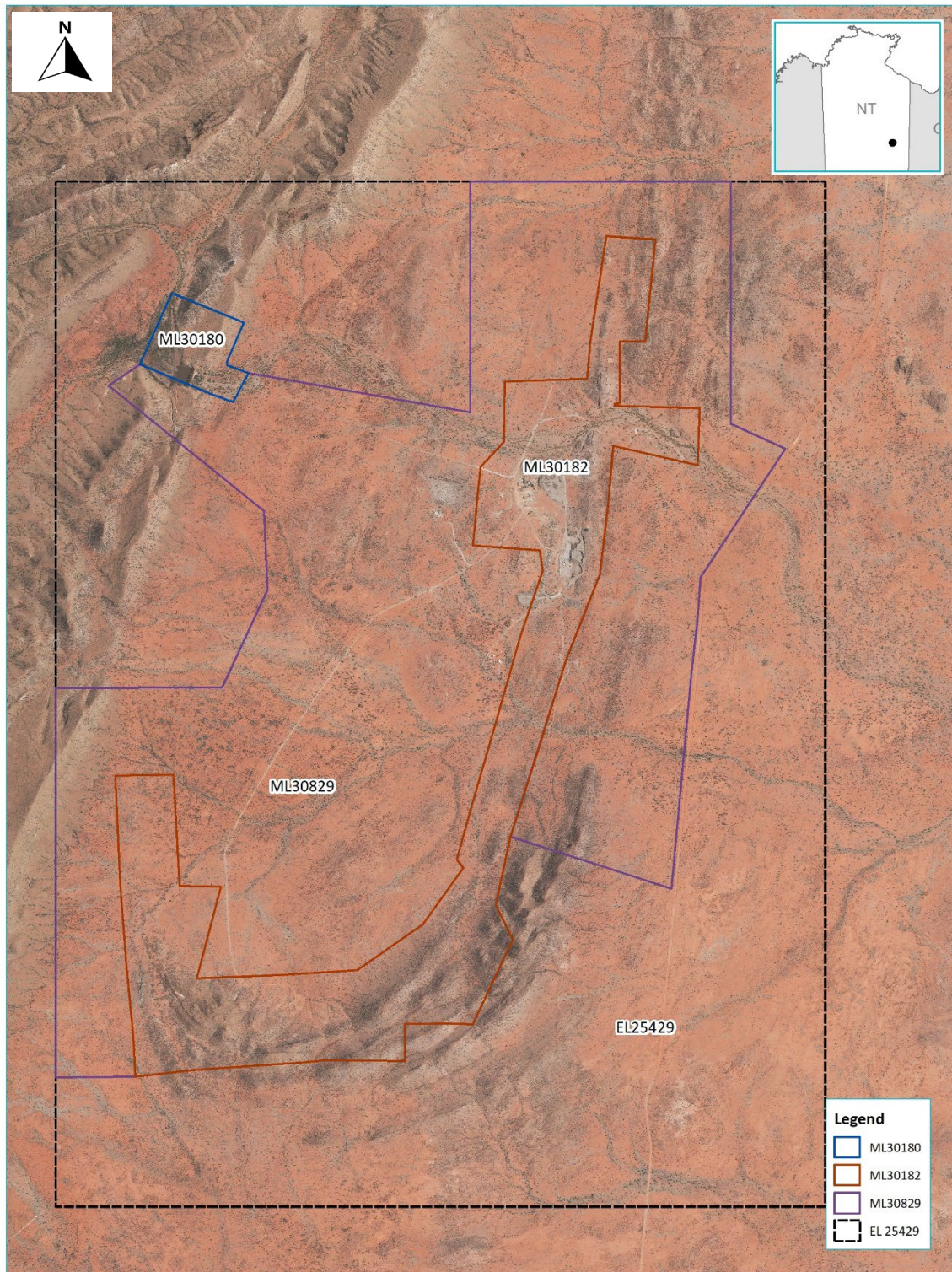


Figure 2 – Project Tenures





Figure 3 – ML 32277 Location





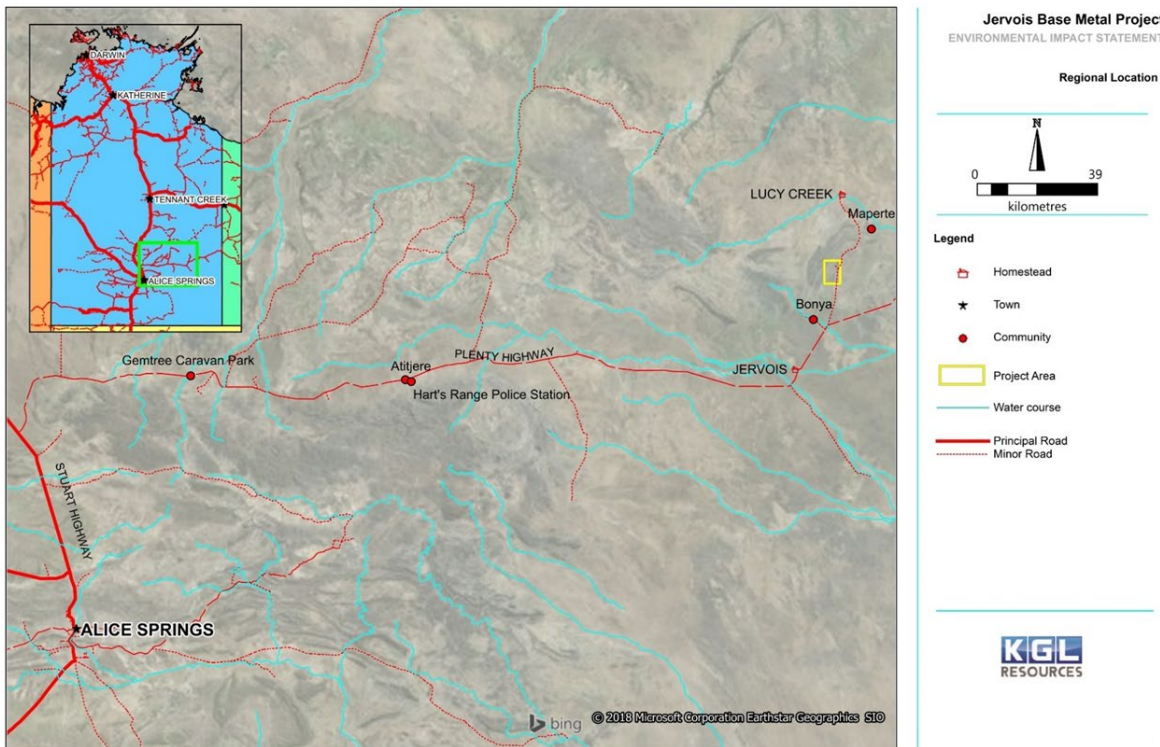
Figure 4 – New Pipeline ML Location



### 1.3 Project Description

#### 1.3.1 Project Location

The Jervois Base Metal Project ('the Project') is located approximately 383 kilometres by road (270 kilometres as the crow flies) north-east of Alice Springs in the Northern Territory of Australia. Road access to the Project from Alice Springs is via the Stuart and Plenty highways, this being 68 kilometres north along the Stuart Highway, 296 kilometres east on the Plenty Highway to the Lucy Creek property turnoff and 19 kilometres down road number 194 to the mine access. Of the 383 kilometres, the Stuart Highway is sealed to full width, approximately 150 kilometres is sealed along the first section of the Plenty Highway with all the other parts of the route being unsealed.



**Figure 5 – Location of the Project**

The Project is located within the Jervois Pastoral Lease owned by Jervois Pastoral Company Pty Ltd. The Jervois homestead is located approximately 35 kilometres south of the Project whilst the Lucy Creek property homestead is approximately 24 kilometres north of the Project.

There are two Aboriginal communities within 20 kilometres of the Project. The Bonya Community is approximately 17 kilometres to the south-west and the Maperte Community is approximately 16 kilometres to the north-east. Bonya currently has accommodation for approximately 80 people. The Maperte Community consists of only two currently unoccupied houses. According to the local property owners and members of the Bonya Community, Maperte has been mostly unoccupied for some time.

Other regional community centres include the Atitjere Community, also known as Harts Range, which is located along the Plenty Highway approximately 160 kilometres west of the Project and the Gemtree Caravan Park which is located along the sealed section of the Plenty Highway.

The development of the Project is proposed to include the mining of open pits in the Reward and Bellbird areas, mining of underground resources below these open pits and at the Rockface area which has no open pit resource.

Associated infrastructure will include topsoil stockpiles, waste rock stockpiles, access and mining haul roads, an explosives magazine, a tailing storage facility, process plant infrastructure, a solar array, the diversion of Unca Creek around the Reward open pit, and village accommodation. The overall mining area facilities are shown in Figure 6.



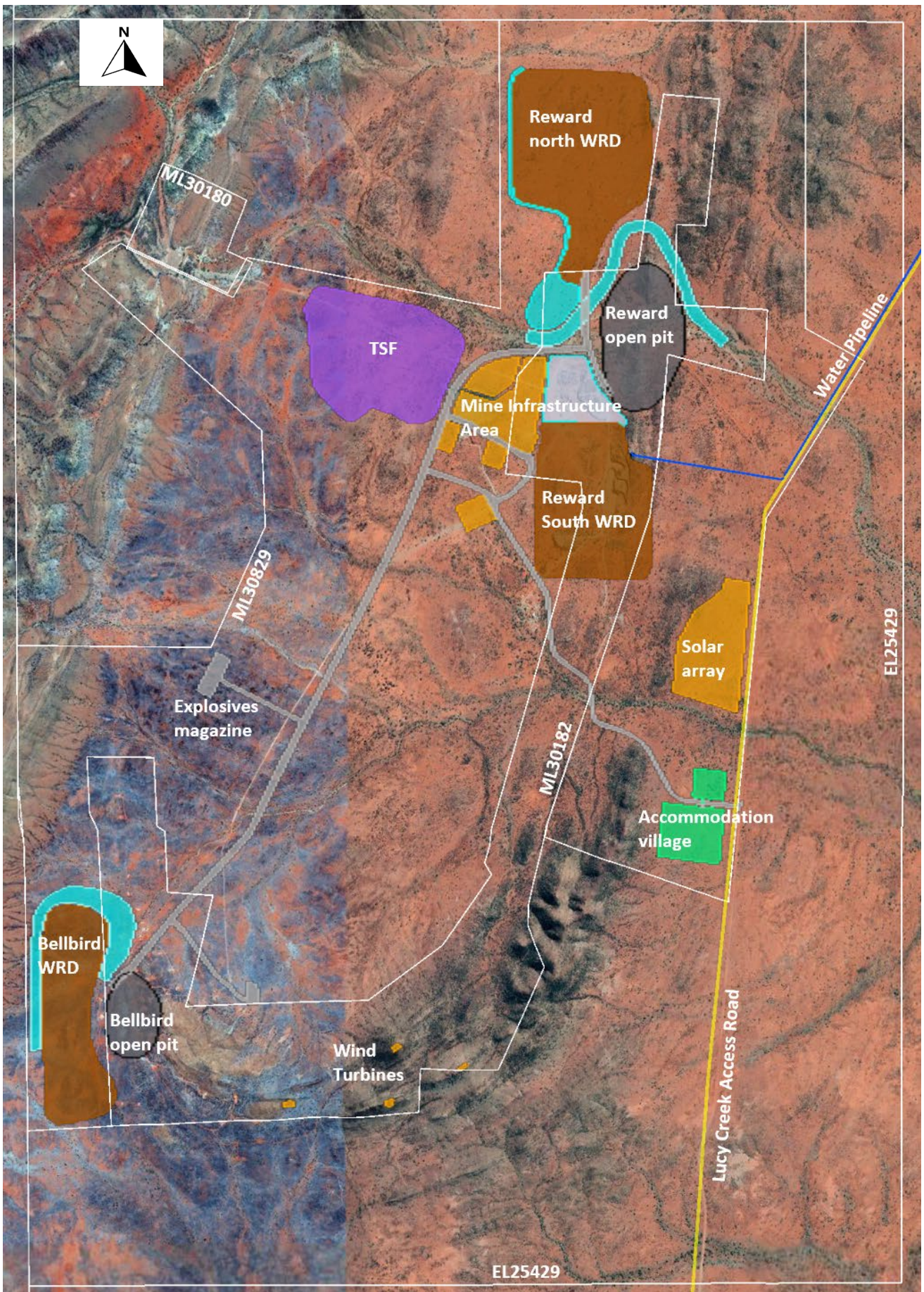
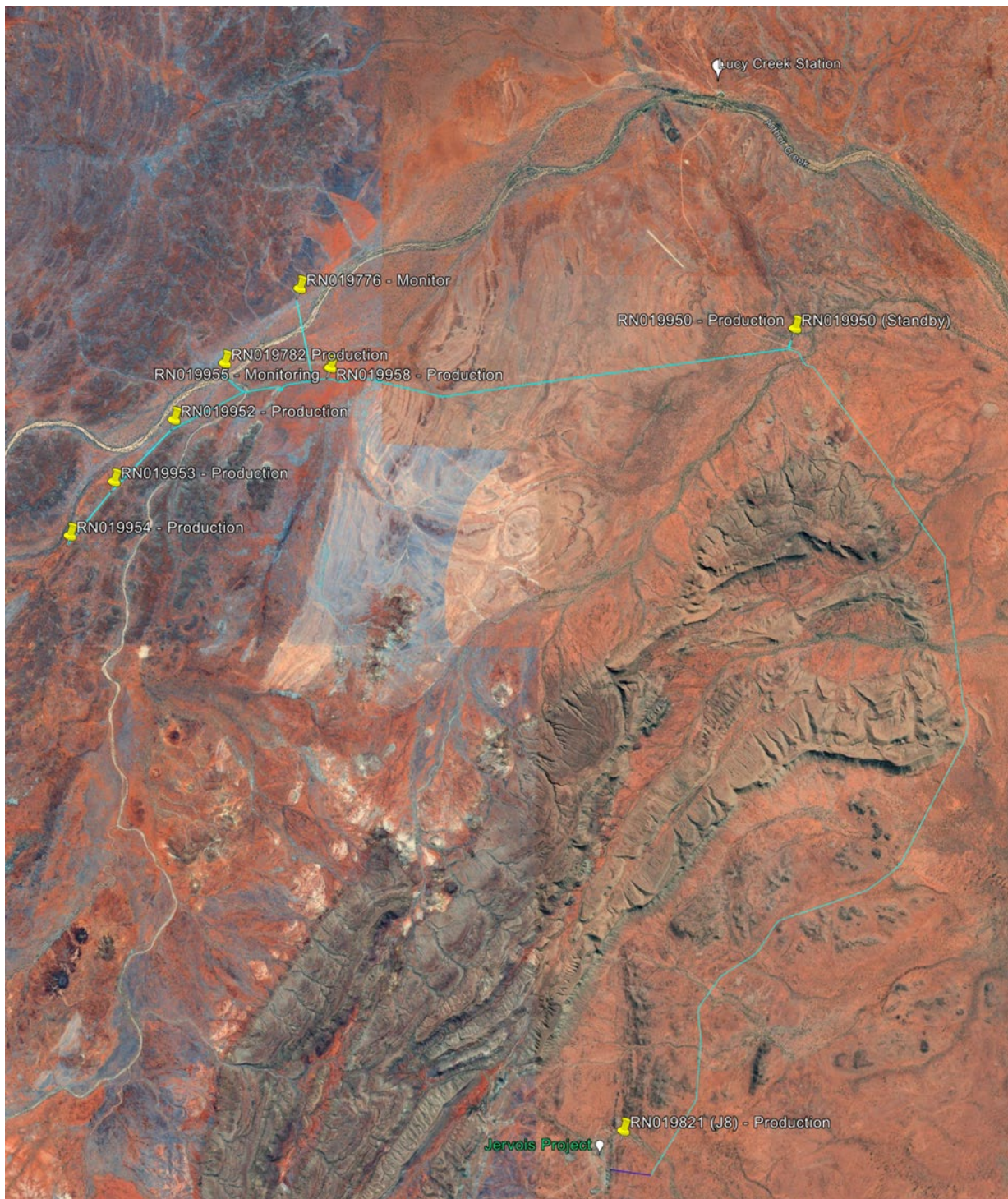


Figure 6 – Proposed Project Layout



The required water supply for the Project has been identified south west of Lucy Creek Pastoral Station homestead and is shown in Figure 7.



**Figure 7 – Project Water Supply Borefield and Pipeline**

### **1.3.2 Project Summary and Improvements**

The Jervois Project has a rich history of exploration and mining activities over the past 90 years. Base metals were first discovered in the Jervois Range area in 1929 during the mustering of stray cattle on a track leading from Tobermorey on the Northern Territory/Queensland border. Small scale mining commenced and a small mining settlement (The Plenty River Mining Camp) was located at Jervois in the 1930's. In the 1950's leases over the area were acquired by Kurt Johannsen who mined copper carbonate on a small scale for the fertiliser

industry and later as a flux in the smelting process at Mount Isa. Since then, numerous companies have owned the Project and conducted exploration and mining activities across the site.

**Table 3 – EL 25429 Mining History**

Project History	
<b>1929 – 1950</b>	<p><b>Tom Hanlon and others</b>            Base metals discovered.            Early prospecting and small scale mining activities.</p>
<b>1952 – 1962</b>	<p><b>Kurt Johannsen</b>            Small scale mining, construction of processing plants and pits.</p>
<b>1961 – 1965</b>	<p><b>New Consolidated Goldfields (Australasia) Pty Ltd</b>            The first modern systematic exploration program.</p>
<b>1963 – 1977</b>	<p><b>Jervois Mining Limited</b>            Operated a small scale copper mine.</p>
<b>1969 – 1973</b>	<p><b>Petrocarb Mineral Exploration</b>            Petrocarb Mineral Exploration (SA) Pty Ltd acquired certain key leases in 1969 – 1970. During 1971 and 1972 intensive diamond drilling and lesser percussion drilling took place. Approximately 110 holes were drilled on the Reward, Marshall and Green Parrot Prospects.</p>
<b>1973 – 1974</b>	<p><b>Petrocarb Joint Venture</b>            A joint venture agreement between Petrocarb Exploration NL, Wilstone Pty Ltd and Union Corporation (Australia) Pty Ltd was negotiated in late 1973, whereby Union Corporation undertook exploration in the Jervois area.</p>
<b>1980 – 1983</b>	<p><b>Plenty River Mining</b>            The Jervois area remained inactive between 1975 and 1980 when Plenty River Mining Company NT Limited negotiated a tribute agreement with Petrocarb, whereby Plenty River would be assigned the leases in return for payment of a royalty on production.            A treatment plant designed to treat Green Parrot lead-zinc-copper-silver ore at a rate of 125,000 tpa was completed in early 1982, together with township and services. Open pit mining at Green Parrot commenced in 1982, and the plant was successfully commissioned in April 1982. It was then placed on care and maintenance in June 1982 after having produced about 500 t of concentrate.            The plant was again commissioned in August 1983 and operated on Green Parrot oxidised ore for five months, treating 25,000 t. Due to a sharp decline in metal prices the plant was placed on care and maintenance in December 1983 and has not operated since.</p>
<b>1983 – 1984</b>	<p><b>Plenty River Mining – Anaconda Joint Venture</b>            With the objective of discovering a large stratiform base metals orebody of the Broken Hill type, Anaconda Australia Inc. negotiated a joint venture agreement with Plenty River Mining in September 1983.</p>
<b>1984 – 1987</b>	<p><b>Regional Drilling</b>            Some diamond drilling was completed including holes to test airborne magnetic anomalies in the Bellbird and Green Parrot South areas. No significant mineralisation was intersected and the targeting of further magnetic anomalies was abandoned. Core holes were also drilled at Van Gils Prospect on the Outer J line of mineralisation which were not encouraging. Diamond drill holes were also completed at Killeen yielding zinc/lead intersections.</p>
<b>1991 – 1996</b>	<p><b>Plenty River Mining – Normandy Poseidon Joint Venture</b>            Plenty River Mining reached an agreement with Normandy Poseidon in October 1991, whereby Poseidon Exploration Limited would extend their exploration program.</p>
<b>1997 – 1999</b>	<p><b>Britannia Exploration</b>            In 1997 Britannia Gold NL carried out a survey and RC drilling program following acquisition of the tenements from Tyson Resources who held an option to purchase from Plenty River Mining.</p>
<b>1999 – 2001</b>	<p><b>MIM Exploration Pty Ltd</b>            In early 1999, Britannia Gold NL offered the exploration lease and mine leases as part of a Joint Venture package to MIM Exploration Pty Ltd. MIM Exploration entered the Joint Venture</p>

	agreement as manager and operator in August 1999 and conducted several surveys, studies and test work.
<b>2004</b>	<b>Reward Minerals</b> When Reward Minerals assumed control of the Project in April 2004, they began the first of a series of drilling campaigns aimed at investigating the established prospects in detail, as well as extending exploration to other parts of the large tenement holding to identify additional prospects. Drilling focused on the Bellbird, Green Parrot, Reward and Marshall deposits. Intense mining activity in Australia hampered the drilling program due to difficulties in sourcing suitable drilling contractors willing to work in such a remote location.
<b>2009</b>	<b>Jinka Minerals</b> Jinka Minerals was spun out of Reward Minerals. Jinka Minerals acquired the tenements in 2009 (Jinka Minerals 2011).
<b>2011</b>	<b>KGL Resources</b> Kentor Gold Ltd (now KGL Resources Ltd) acquired Jervois through acquisition of Jinka Minerals Ltd. KGL has conducted drilling programs each year since the acquisition and has steadily increased the size and confidence of the resource.

Source: Lycopodium Minerals Pty Ltd. (2014). *Pre-Feasibility Study Report, Jervois Copper Project*. Earthsea Pty Ltd. (2018). *Archaeological Desktop Assessment and Survey Report: KGL Resources Jervois Base Metals Project, EL25429 Plenty Highway, Northern Territory*.

As a result of this historic activity, the Project area is littered with a substantial amount of disturbance. As indicated in Table 4 and Figure 8, this historic disturbance includes several abandoned tailings storage facilities, numerous waste rock dumps, abandoned processing plants and associated equipment, power generation equipment, pits, prospecting trenches, ROMs, water storages and evaporation ponds, an exploration camp, exploration disturbances, roads and tracks. The historic disturbance covers an area of approximately 173 ha.

**Table 4 – Historic Project Disturbance Areas**

Description	Historic Disturbance Area (Ha)
Accommodation village	10
Mine Infrastructure Area	68
Open pits	27
Jervois Dam	7
Tailings Storage Facility	14
Borrow Pits (excluding the overlapping areas)	5
Topsoil Stockpiles and Waste Rock Dumps	8
Borefield and Pipeline	14
Roads and Tracks	20
<b>Total Disturbance</b>	<b>173</b>

The proposed development of the Project will disturb areas of historic disturbance. The areas disturbed by the proposed Project are shown in Figure 9 below.



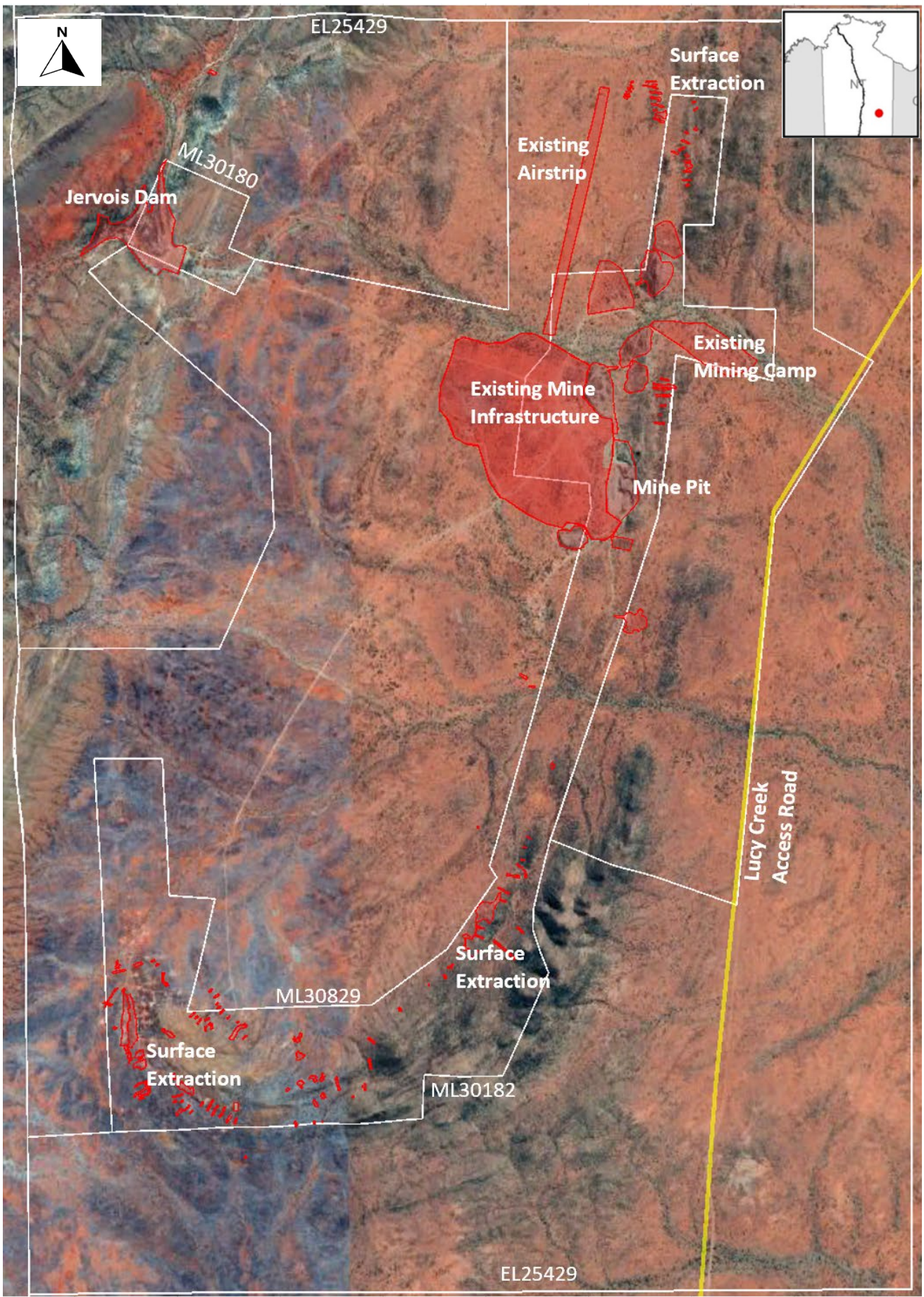


Figure 8 – Historic Project Disturbance Areas



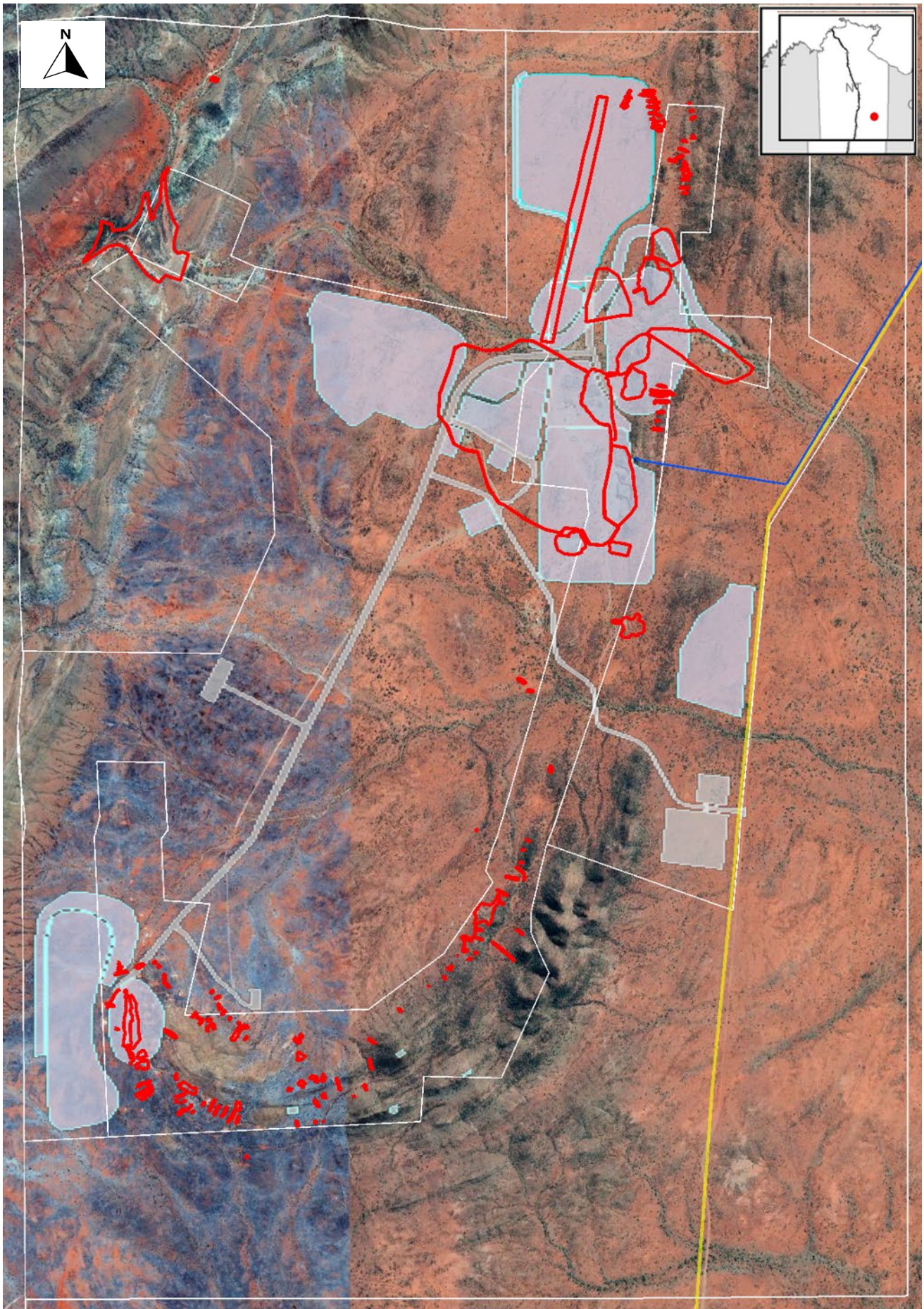


Figure 9 – EL Proposed Disturbance Area in Comparison to Historic Disturbance Areas



The following Table nominates the historic disturbance areas within the EL combined with new disturbance areas associated with the development of the Project.

**Table 5 – EL Disturbance Area Summary**

Proposed Action	Historic Disturbance Area (Ha)	Additional Clearing Area Required (Ha)	Total Footprint (Ha)
Accommodation Village	10	5	15
Mine Infrastructure Area	68	-29	39
Proposed Solar Array & Wind Farm	0	27	27
Open Pits	27	19	46
Jervois Dam	7	0	7
Surface Water Infrastructure (excluding the MIA area and the Jervois Dam)	0	47	47
Tailings Storage Facility	14	41	55
Borrow Pits (excluding the overlapping areas)	5	26	31
Topsoil Stockpiles and Waste Rock Dumps	8	160	168
Borefield and Pipeline	14	46	60
Roads and Tracks	20	19	39
<b>Total</b>	<b>173</b>	<b>361</b>	<b>534</b>

Since acquiring the Project in 2011 Kentor Minerals, and now Jervois Operations, has been conducting exploration activities to improve on the knowledge of the mineral resource. Kentor Minerals/Jervois Operations have completed over 237,426m of drilling, conducted geophysical and geochemical surveys, detailed geological mapping and supported research on the deposit by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Northern Territory Geological Survey (NTGS). As a result, Kentor Minerals/Jervois Operations has been able to establish a base metal mining project which encompasses the full diversity of this geological deposit. The overall objective for the Project is to create a robust, low cost copper producer that can sustain its viability during times of fluctuating international base metal markets.

Exploration activities conducted by Kentor Minerals/Jervois Operations that have caused disturbance to the land within the EL area has been restricted to access tracks and drill pads. The temporary exploration camp is located in a previously disturbed area.

As a significant portion of the historic mining disturbance area (173 ha) will be subject to disturbance as a result of the Project activities, these areas will be rehabilitated in accordance with rehabilitation strategies and objectives outlined in the Mine Rehabilitation Closure Plan (MRCP). Consequently, the legacy of historic mining in the Project EL area will be improved as a result of the Project activities with only a portion of the disturbed areas including the airstrip and some minor surface extraction sites to remain as is.

The water supply borefield of up to six (6) production bores is located south of the Lucy Creek homestead as indicated in Figure 7. Access to the borefield area is via the Lucy Creek Access Road 194 and existing pastoral tracks. The water supply pipeline from the borefield to the Project is approximately 41 km long and will connect the individual production bores and follow a route back to the Project area along the existing Road 194 easement. The proposed borefield and pipeline will require minimal additional clearing as they are located within existing disturbance areas. The borefield is essentially as disturbed as it will ever be as infrastructure

installation will be smaller than the area used for drilling etc. Any clearing required for the pipeline will be in areas that can readily be rehabilitated once the pipe is installed.

## 2 Site Conditions

### 2.1 Physical Environment

#### 2.1.1 Climate

The climate of the Project area is categorised as a semi-arid desert environment with dry, hot summers and short, dry winters. Rainfall predominantly occurs during the summer months between November and April. The warmer months between October and March have mean daily maximum temperatures over 33°C. Maximum average monthly temperatures in January are 38.5°C (Australian Government Bureau of Meteorology, 2019). The cooler months from May to August have mean minimum temperatures below 10°C with a minimum average July temperature of 5.3°C (Australian Government Bureau of Meteorology, 2019). Mean relative humidity is 39% at 9 am and 24% at 3 pm (Australian Government Bureau of Meteorology, 2019).

**Table 6 - Mean Maximum Temperatures (1967 – 2019)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
38.5	37	34.7	30.6	25.4	22	22	25	29.7	33.4	36.1	37.7

Source: Australian Government Bureau of Meteorology, November 2019

**Table 7 - Mean Minimum Temperatures (1967 – 2019)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22.9	22.2	19.5	14.5	10	6.6	5.3	7.1	11.3	15.7	19.1	21.5

Source: Australian Government Bureau of Meteorology, November 2019

**Table 8 - Mean Annual Evaporation (1967 – 1975)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
441	386	300	234	157	120	121	161	210	293	336	350

Source: Australian Government Bureau of Meteorology, November 2019

The mean annual rainfall recorded for the Jervois Bureau of Meteorology weather station since 1966 is 292.4 mm. Annual rainfall varies widely, with a range of 95.8 mm (2013) to 933.4 (2010) (Australian Government Bureau of Meteorology, 2019). Long- term rainfall trends show a pattern characteristic of the northern Australian arid zone with long, dry periods lasting approximately 12 to 15 months interrupted by short, large magnitude rainfall events. Most rainfall occurs between November and April when flooding can occur following storm events. Seasonal flooding can occur from river flows from Arthur Creek and the Georgina Basin.

**Table 9 - Mean Annual Rainfall (1966 – 2019)**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	49.8	55.4	35.6	15.9	16.8	10.0	13.6	7.1	10.5	13.9	23.4	39.5

Source: Australian Government Bureau of Meteorology, November 2019

The predominant wind direction is east and south-east although during storm events and rainfall periods the winds are predominantly from the west. Mean monthly 9 am wind speed ranges from 9.1 km/h (June) to 15.9 km/h (October) and 3 pm wind speed ranges from 12 km/h (May) to 14.1 km/h (January) (Australian Government Bureau of Meteorology, 2019).

**Table 10 - Wind Speed (1967 – 2019)**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	14.2	13.1	13.2	11.9	11.0	10.6	11.2	12.6	14.1	14.6	14.5	14.0

Source: Australian Government Bureau of Meteorology, November 2019

**Rose of Wind direction versus Wind speed in km/h (01 Dec 1967 to 10 Aug 2019)**

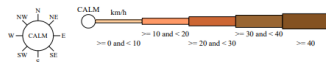
Custom times selected, refer to attached note for details

**JERVOIS**

Site No: 015602 • Opened Jan 1965 • Still Open • Latitude: -22.9434° • Longitude: 136.1442° • Elevation 328m

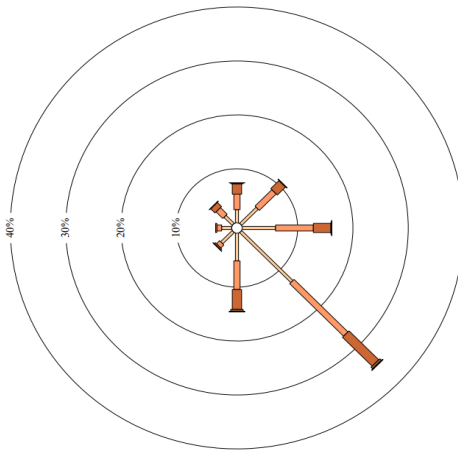
An asterisk (\*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am  
17912 Total Observations

Calm 5%



**Rose of Wind direction versus Wind speed in km/h (01 Dec 1967 to 10 Aug 2019)**

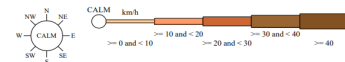
Custom times selected, refer to attached note for details

**JERVOIS**

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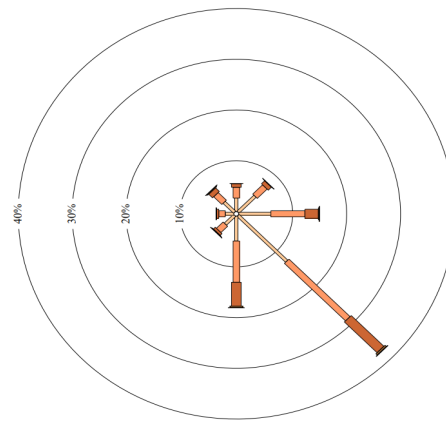
An asterisk (\*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm  
17689 Total Observations

Calm 2%



**Figure 10 – Rose of Wind Direction versus Wind Speed (1967 – 2019)**

Source: Australian Government Bureau of Meteorology, November 2019

Fire occurs infrequently in the region and a higher fire risk exists in years following seasons of good rains when there is an increased chance of large wildfires due to the increase in available fuel loads. Since 1997 the Project area has only been burnt once, in 2002 following the very wet years from 1999 to 2001. Widespread fires that burnt much of Central Australia in 2011 and the beginning of 2012 did not affect the Project area. The Project area has had minimal bushfire impacts with one small isolated fire located at the Jervois Dam in 2011 (Low Ecological, 2017).

**2.1.2 Land Systems**

**Topsoil and Subsoil**

A detailed soil-landscape assessment was undertaken for the Project EL area (VPS Land Assessment and Planning, 2018). The soil survey identified and mapped six soil-landscape units (Figure 11 and Table 11). Soil textures on the site are of low to moderate clay throughout the soil profile and loamy and clayey sands on the surface. Based on The Australian Soil Classification (Isbell, 2002), the dominant soils across the site are Rudosols on the hills and rises, with Red Kandosols and Red-orthic Tenosols on the gently undulating plains.



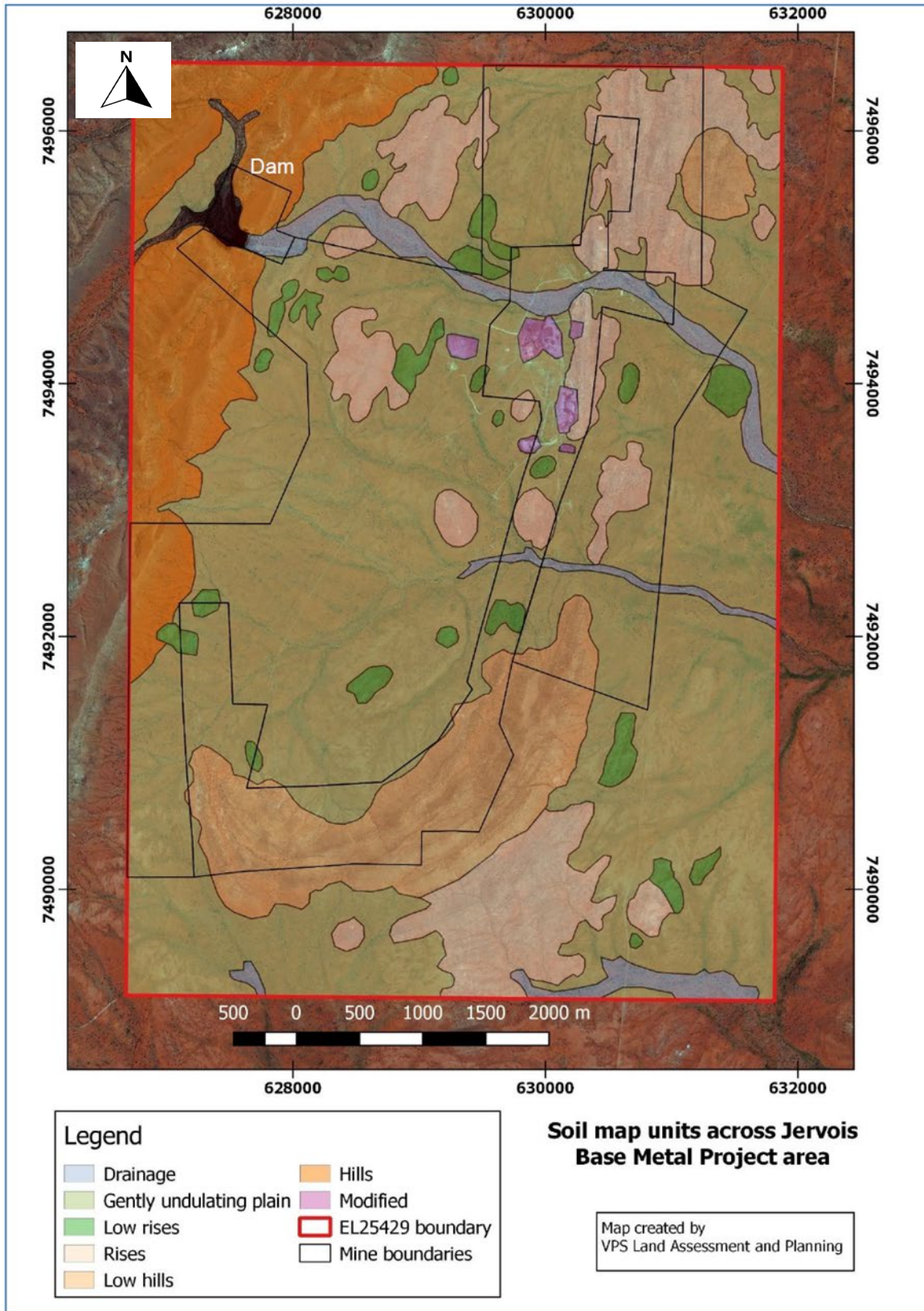


Figure 11 – Soil Map Units across the Project Area

**Table 11 - Summary of soil-landscape map units across Jervois Project area based on detailed survey (VPS 2018)**

Landform	Slope range	Relief	Dominant soil	Minor Soil	Profile depth	Drainage	Gravels	Rock outcrop	Topsoil depth	topsoil texture	Acid* reaction
Gently undulating plain	0-3% (occ 5%)	< 9m	Kandosols	Tenosols	Shallow to Moderately deep (occ Deep)	Well	Slightly gravelly, occ Moderately gravelly	Nil	0 - 10cm	Clayey sand (Loamy sand)	Nil
Stream	0.5-2%	< 9m	Kandosols	Tenosols	Shallow to Deep	Well	Variable	Nil	Variable	Clayey sand	Nil
Low rises	3-5% (occ to 8%)	5 - 9m	Tenosols, Rudosols	Kandosols	Very shallow to Shallow	Rapid	Very gravelly	Slightly rocky	0 - 10cm	Clayey sand to Sandy loam	Nil
Rises	10-25%	9 - 30m	Tenosols, Rudosols	Kandosols	Very shallow to Shallow	Rapid	Moderately to very gravelly	Rocky	0 - 8cm	Loamy sand to Clayey sand	Nil
Low hills	10-50%	30 - 90m	Rudosols	Tenosols	Very shallow to Shallow	Rapid	Moderately to very gravelly	Very rocky	N/a	Clayey sand	Nil
Hills	10-75%	90 - 300m	Rudosols		Very shallow	Rapid	Very gravelly	Very rocky	N/a	N/a	N/a
Modified	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

\* Acid is used to assess for the presence of calcareous segregations within the soil layer. Nil reaction indicates that no segregations are present.

The Dryland Salinity Hazard Map of the Northern Territory (Tickell, 2002) indicates that the Jervois Project area lies within an area of Low to Very low risk of dryland salinity. Soils across the Jervois Project EL area comprise well drained, light to moderately textured soils (maximum clay content 20-30%) with low electrical conductivity values and low fertility (low cation exchange capacity) (Perry et al 1962), therefore the risk of sodicity (and hence dispersibility) within the soils across the site is expected to be low (VPS Land Assessment and Planning, 2018).

Two of the seven broad land systems along the pipeline and borefield route are the same land systems as found within the Project EL (Bond Springs and Sonder). As such, the soils across these areas are the same as those found within the Project EL. The broad soils descriptions of the remaining five land systems are described as sandy, silty and clayey soils. More information on these land systems are provided in Section 2.1.2 Vegetation. This area also lies within an area of Low to Very Low risk of dryland salinity.

### Contamination

The Project area is part of a historic mining district which has been mined sporadically for 90 years. As a result of the historical activities, the site is a brownfield/disturbed site, with a substantial amount of existing disturbance within the Project footprint. A Contaminated Land Preliminary Site Investigation (CLPSI) identified potentially affected media as shallow soil, groundwater and sediments and surface water in Unca Creek (WMV Environmental Pty Ltd, 2019). Potential sources of contamination from historic mining activities that could be identified include mine infrastructure areas, a processing plant and associated stockpiles, dams and other facilities, the airstrip, possible explosives store and magazine/warehouse. Chemicals of potential concern (COPCs) associated with these areas could include acids, alkalis, explosives, metals, PCBs, hydrocarbons, solvents, SVOCs and VOCs. A complete representation of the historic contamination sources and COPCs are provided in Table 5.1 of the CLPSI in Appendix A-6 of the Supplement Report.

As reported in the CLPSI, maps, records and data availability for the historic mining activities is not comprehensive with some limited information obtained from historic photographs and geological reports and the 2018 archaeological assessment. As a result of the lack of available data, the extent of disturbance or

contamination from historic mining activities cannot be comprehensively confirmed, it can only be assumed based on the information available.

More detail on the historic mining activities and disturbance areas is provided in Section 1.3.2.

### **Topography**

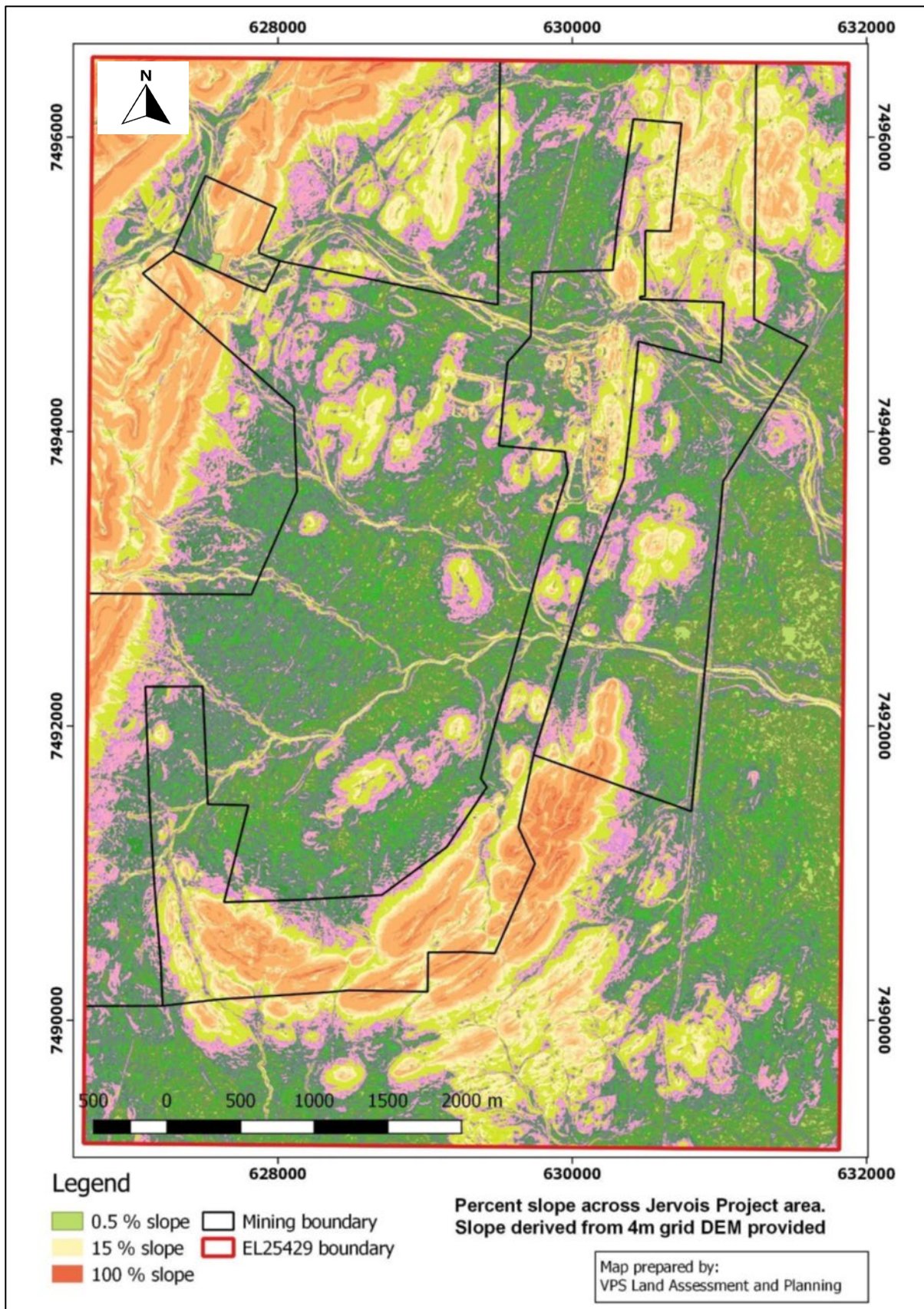
The Project lies within the Channel Country Bioregion which extends across the Georgina Basin into Queensland and is characterised by red earths and shallow sandy soils over Cambrian sedimentary rocks. The region is typified by plains and low, rolling hills and braided river systems. Higher relief is provided by isolated ranges such as the Jervois and Toko Rangers (Baker et al, 2005).

On a local scale, the Project is on the south-eastern ridge of the Jervois Range. The Jervois Range is approximately 250 m high and is composed of pre-Cambrian gneiss and schists, separating Central Australia from the plains to the east. The range runs through the northeast edge of the Project EL creating a drainage divide.

Across the undulating plains that dominate the Project area, scattered shear-sided, narrow and shallow gullies have been observed (VPS, 2018). These gullies are likely to be the result of the long history of cattle grazing and mining across the Project area, and at times are considered reasonably stable when the floors of these gullies are grassed.

Several ephemeral gullies and deeply etched creeks drain into the area from the Jervois Range contributing to the Plenty and Marshall Rivers, which flow into the Georgina Basin. Arthur Creek provides the main drainage from north and west of the Jervois Range, which also drains into the Georgina Basin (Lindsay-Park, 2005).





**Figure 12 – Percent Slope Across Jervois Project Area**

The topography for the borefield area south of the Lucy Creek Homestead, was derived from the National Digital Elevation Model (DEM) 1 Second Hydrologically Enforced product, derived from the National DEM SRTM 1 Second and National Watercourses, Lakes and Reservoirs. (<http://www.ga.gov.au/elvis/>). The horizontal resolution is 1 second (about 90 metres) and the vertical resolution is 1 metre.



The Shuttle Radar Topography Mission (SRTM) Digital Terrain Elevation Data (DTED) are used with the consensus view that it has a minimum vertical accuracy of 9 m absolute error at 90% confidence world-wide and the minimum vertical accuracy for Australia is 6 m (Farr, et al., 2007).

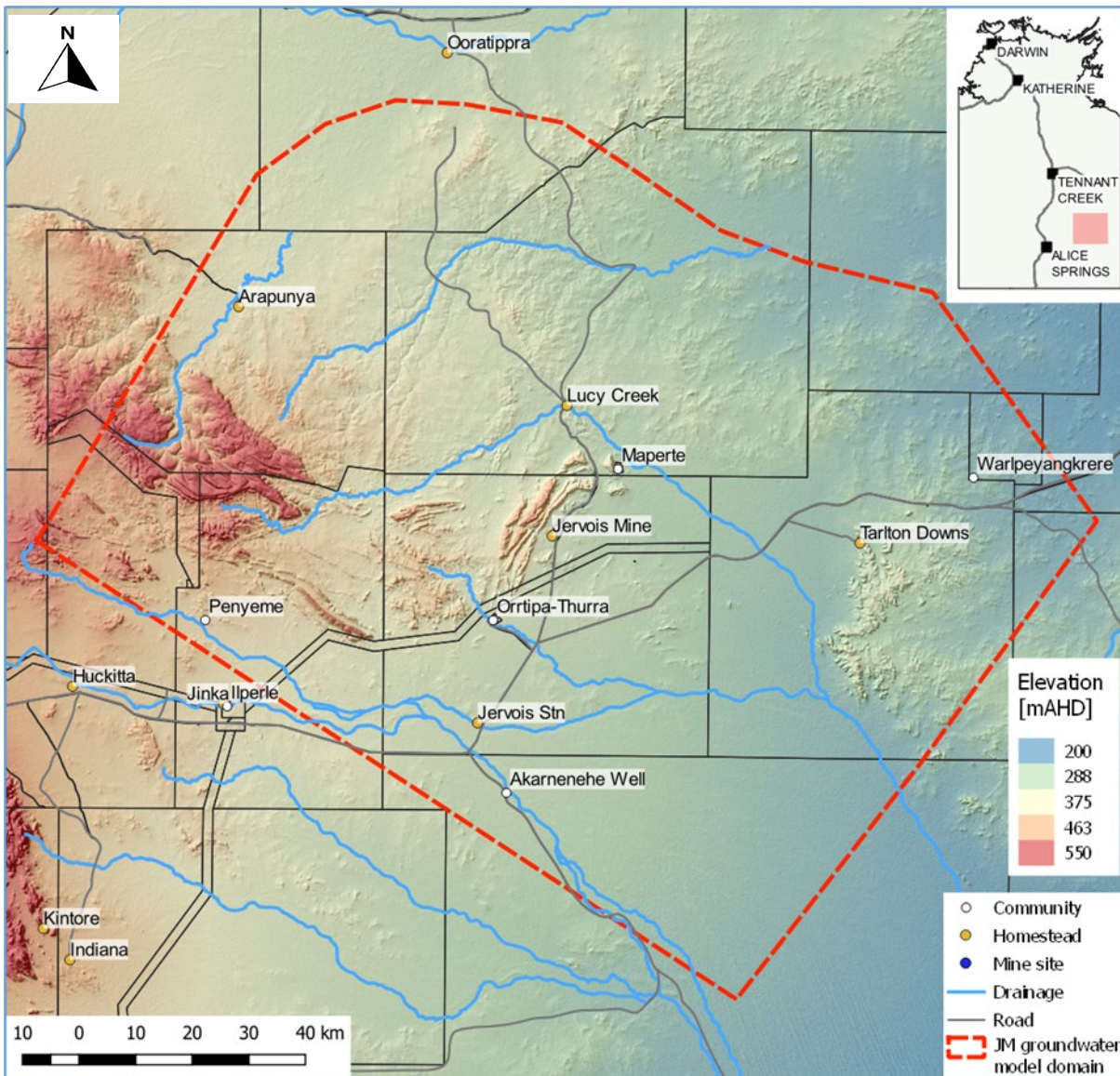
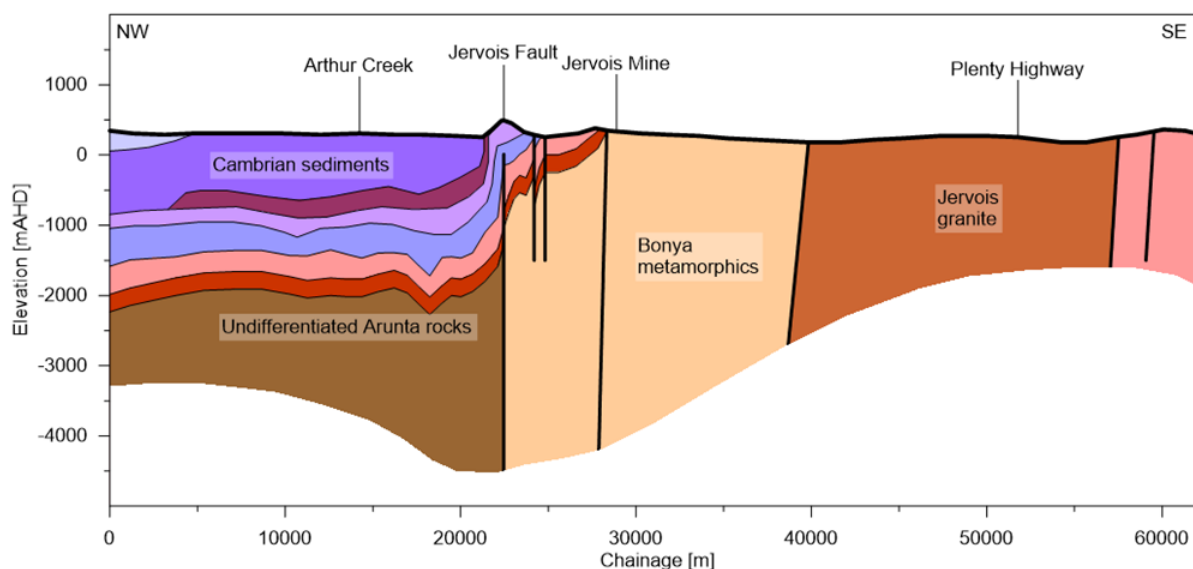


Figure 13 – Topography of the Study Area with Surface Water Drainage

**Geology**

The site lies on the eastern side of the Jervois Fault with largely crystalline rocks of the Arunta Orogenic domain (schists, granites and gabbros) to the south-east of the fault and sediments of the Georgina Basin Sequence to the east and north (Figure 14). The mine water supply borefield about 20 km north of the mine site is located in the carbonate sediments of the Georgina Basin, where the thin Cambrian sediments of the southern Georgina Basin onlap to the Paleoproterozoic basement rocks of the Arunta Block.



**Figure 14 – Geological cross-section through the study area showing the relationship between the Cambrian sediments, Bonya Metamorphics and Arunta rocks. Jervois Mine offset along strike. (source: CloudGMS 2018)**

The geology of the area has been mapped by the Bureau of Rural Sciences, 1991. The north western portions of Jervois are made up of sedimentary sandstone, limestone and conglomerate of the Jervois range, while the remaining area overlies felsic and mafic intrusives such as schist and granites. The Bonya Metamorphics (formerly “Bonya Schist”) crop out extensively in the vicinity of the Jervois mine (Figure 14). The economically prospective lithologies within the tenement are within the Bonya Metamorphics.

Bedrock over much of the area is covered by soil and shallow alluvium with outcrop restricted to the low hills (Figure 15). The calc-silicate and carbonate-rich lithologies in particular, tend to be silicified and more resistant to weathering and erosion. Rapid changes in rock types and tight isoclinal folding add to the difficulties of geological mapping and only broad correlations are possible within the Project area.

At Jervois, the Bonya Metamorphics is dominated by quartz-muscovite schist representing metamorphosed siltstone and mudstone. The schist is interbedded with fine to medium grained beds of metasandstone that typically vary from 1 cm to 30 cm but much thicker beds and lenses of metasandstone have been mapped at the surface. The Bonya Schist is interpreted to be derived from a thick sequence of argillaceous to arenaceous sediments with intercalations of limestone that suggest a shallow marine environment of deposition.

Within the fine grained schistose beds there are broad belts with distinctive cordierite and/or andalusite porphyroblasts that give the rock a knotted appearance. Beds of marble and calc-silicate rock occur throughout the Jervois Project area, but have poor strike continuity due to flattening and attenuation during deformation.

Although minor in extent, narrow beds of finely bedded quartz-tourmaline and fine to coarse grained volcanic/volcaniclastic rocks of rhyolitic composition have been mapped. The Jervois sequence has been intruded by several phases of pegmatite and an amphibolitic rock interpreted to correlate with the Attutra Metagabbro (ca 1786 Ma).



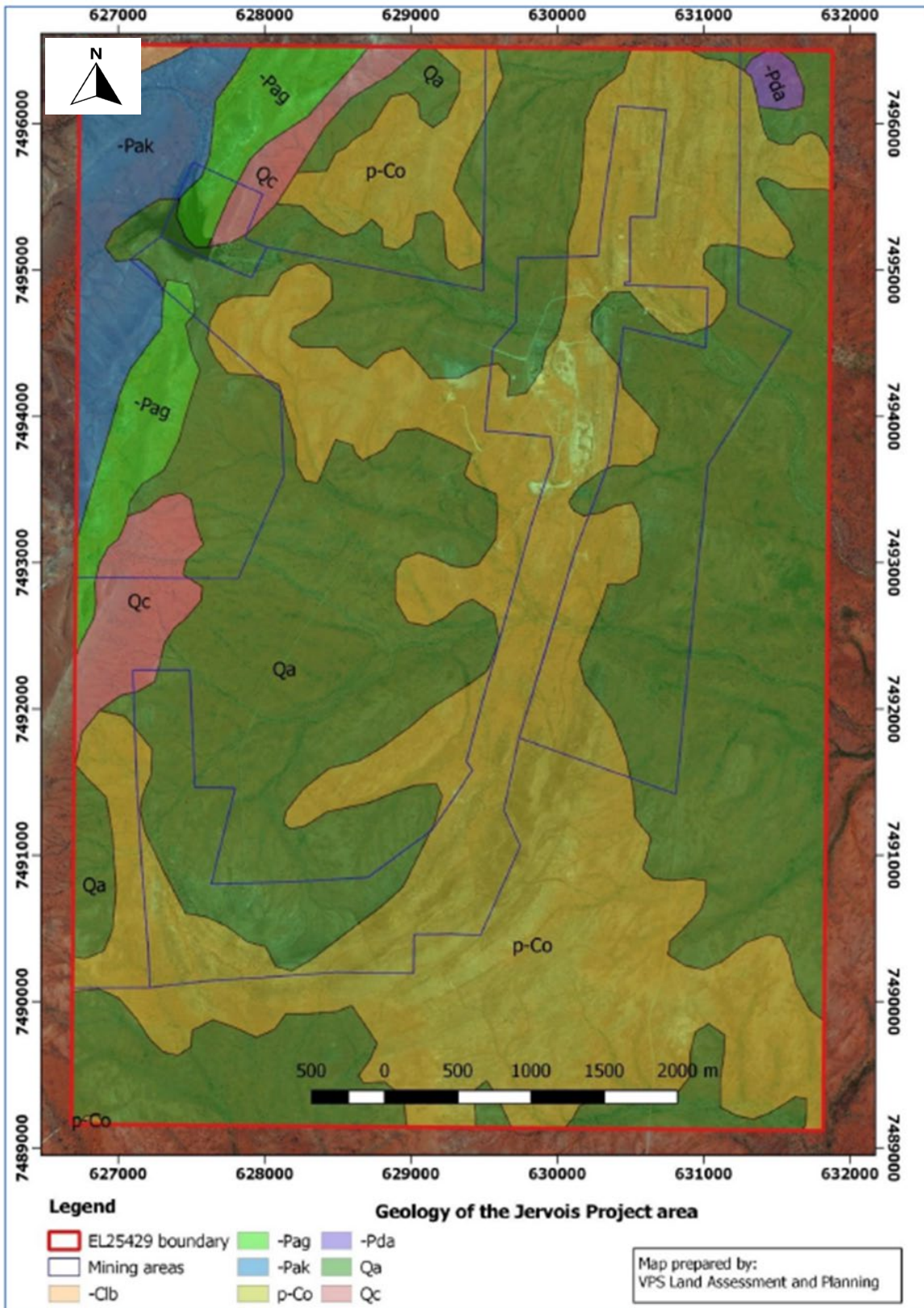


Figure 15 – Geology of the Project Area

**Table 12 – Summary of geology map units of Jervois Project (NT Geological Survey data) referenced in Figure 15**

Unit	Rock Group	Unit Age	Unit Name	Lithology
Qa	Sedimentary	Quaternary		Soil, silty or sandy, alluvial and aeolian: includes other Quaternary units locally
Qc	Sedimentary	Quaternary		Colluvium; scree
-Clb	Sedimentary	Early Cambrian	Mount Baldwin Formation	Quartz arenite, medium to coarse-grained, thin to thick-bedded, dusky red
-Pak	Sedimentary	Adelaidean	Elkera Formation	Siltstone to sandstone, micaceous, laminated to thin-bedded, blue-grey to dusky red; dolostone horizons, some stromatolitic
-Pag	Sedimentary	Adelaidean	Grant Bluff Formation	Quartz arenite to quartz-wacke, fine-grained, fissile and undulose-laminated; lesser coarse-grained, cross-bedded, ripple-marked, quartz arenite: grey
-Pda	Igneous	Proterozoic	Attutra Metagabbro	Gabbro; dolerite; rare norite: all altered; magnetite rock
p-Co	Metamorphic	Proterozoic	Bonya Schist	Muscovite, biotite and two-mica schists, some with andalusite, sillimanite or garnet; calc-silicate rock; metapelitic and meta-acid volcanic rocks; amphibolite; skarn-like rock; magnetite quartzite; rare migmatite

### Vegetation

Eight land systems occur across the entire Project area as described in Table 13 and shown in Figures 16 and 17.

**Table 13 – Project Land Systems**

Land System	Code	Description
Bond Springs	Bs	Bold rocky low hills and hills mostly on granite, gneiss, rhyolite and some schist; common rock outcrop and surface stone with shallow gritty or stony soils
Ilgulla	Il	Plains, rises and plateaux on weathered and unweathered Cambrian limestone, dolomite, chalcedony, shale, sandstone and siltstone with associated sand sheets; sandy and earth soils
Lucy	Lu	Plains, rises and plateaux on weathered and unweathered Cambrian limestone, dolomite, chalcedony, shale, sandstone and siltstone with associated sand sheets; sandy and earth soils
Sandover	Sa	Alluvial floodplains, swamps, drainage depressions and alluvial fans; sandy, silty and clay soils on Quaternary alluvium
Singleton	Sn	Level to undulating sandplains with red sands



Land System	Code	Description
Sonder	So	Rugged ranges on quartzite, sandstone and conglomerate; outcrop with shallow, stony sandy soils
Unca	Uc	Gently undulating stony plains with patches of calcareous soils and gidyea
Woodduck	Wo	Alluvial floodplains, swamps, drainage depressions and alluvial fans; sandy, silty and clay soils on Quaternary alluvium

Three broad land systems (Sonder, Bond Springs and Unca) occur within the Project EL area with the majority of the Project EL area falling within the Bond Springs (Bs) land system. The Sonder (So) and Unca (Uc) land systems occupy the north-western and southern portions of the project area respectively. The So system shows distinct differences in landscape and geology, being composed of sedimentary sandstone and quartzite in the form of steep, benched cuestas and ridges.

Seven broad land systems (Bond Springs, Ilgulla, Lucy, Sandover, Singleton, Sonder and Woodduck) occur across the borefield and pipeline area as shown on Figure 17.

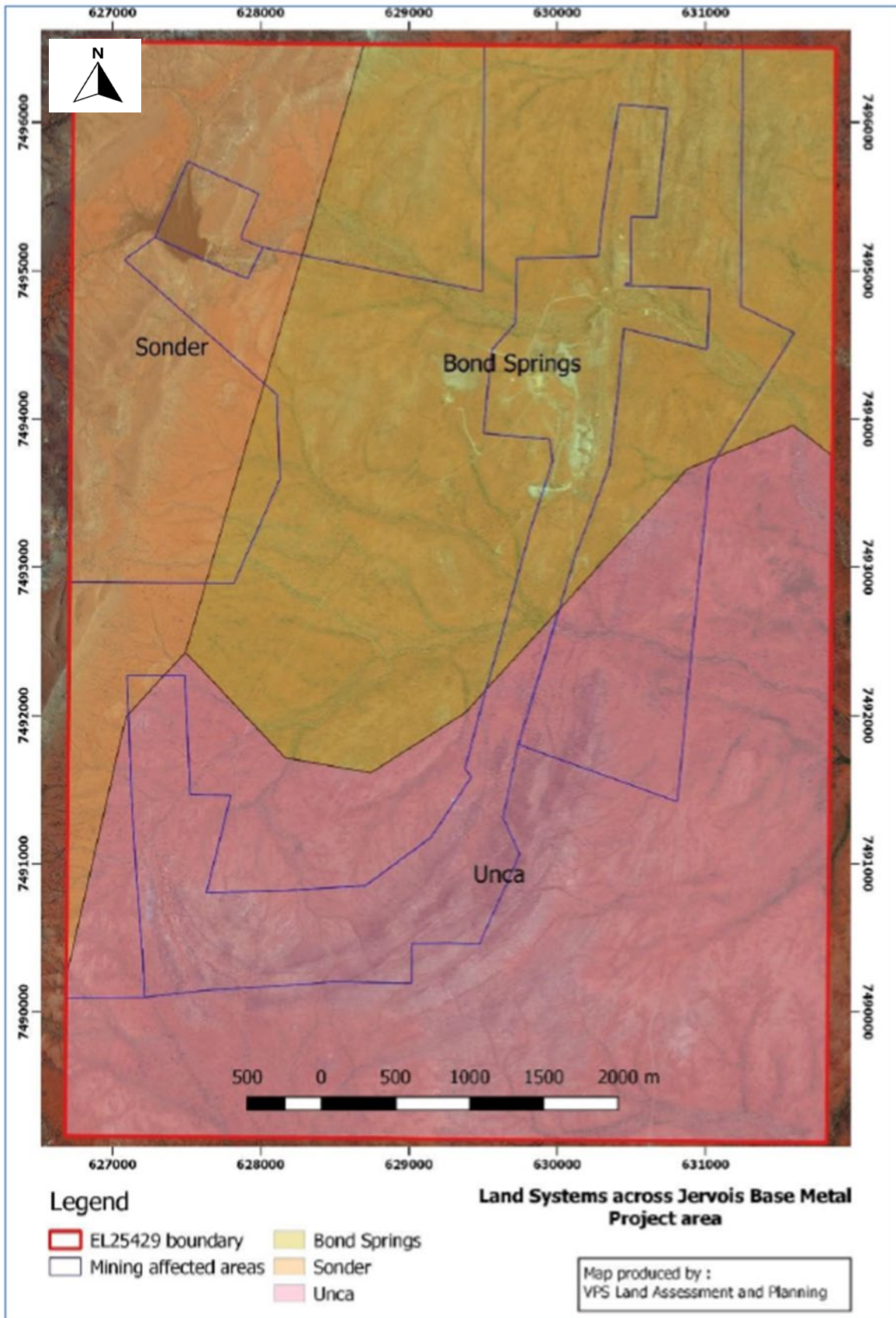
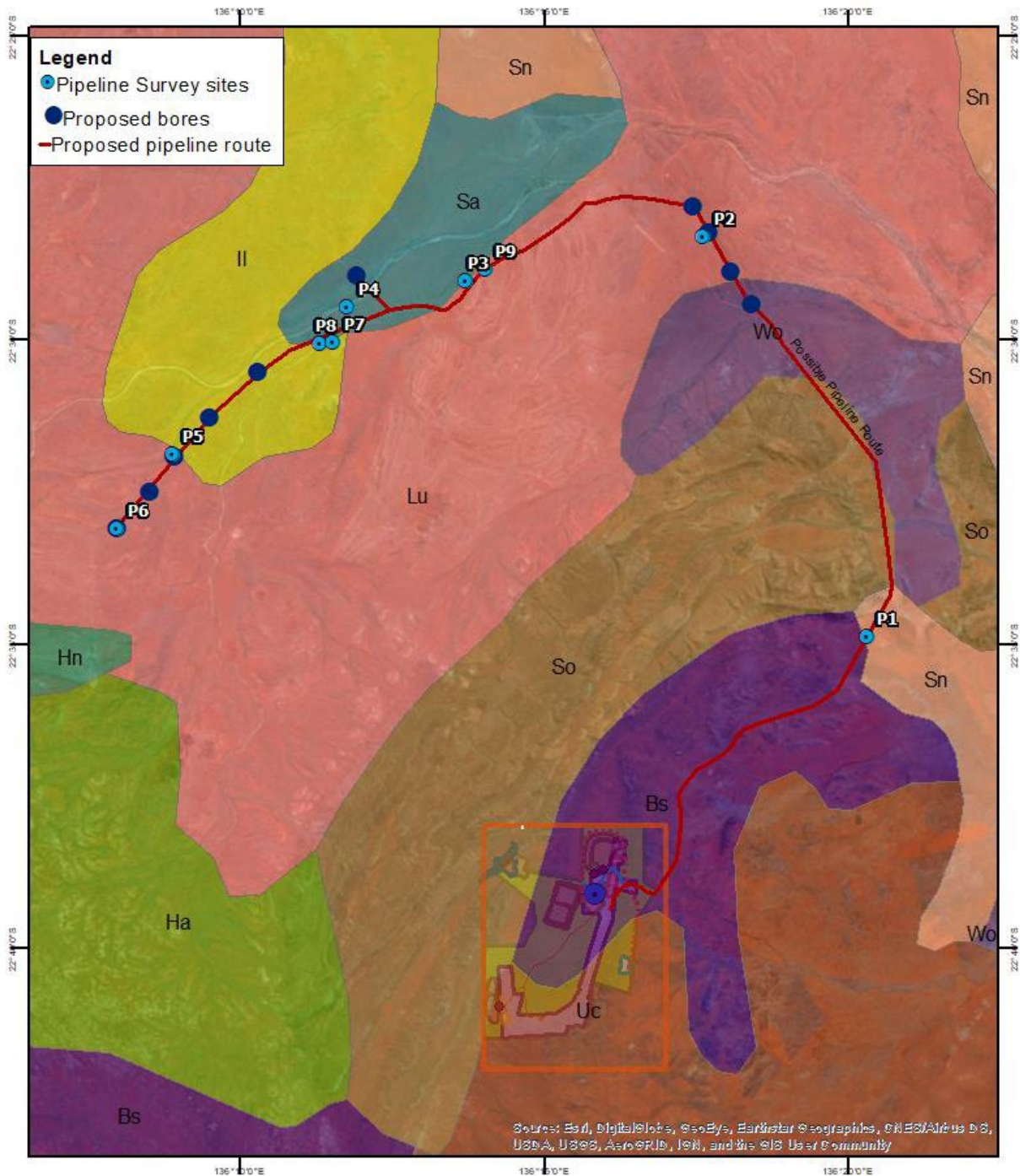
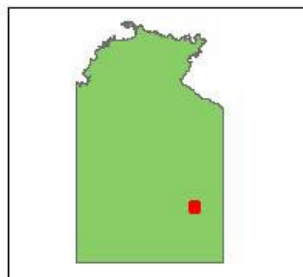


Figure 16 – Project EL Land Systems



Low Ecological Services P/L  
Projection: UTM  
Map grid of Australia: Zone 53  
Horizontal datum: GDA94  
Data: Landsystems Perry et al. 1962

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**KGL Resources**  
**Jervois Project**  
Land systems

Figure 17 – Project Borefield and Pipeline Land Systems



### 2.1.3 Flora

#### Broad Vegetation Types

Numerous flora surveys of the Project area have been completed by Low Ecological Services Pty Ltd between 1985 and 2019. Vegetation surveys of the Project area identified a total of 196 flora species within the Project EL area (Appendix 3 of the 2018 Landscape, Flora and Fauna Report) and 79 flora species in the borefield and pipeline area (Appendix 2 of the 2019 Landscape, Flora and Fauna Supplement Report). Four broad vegetation types occur across the entire Project area, two in the EL area and four within the borefield and pipeline area. The two broad vegetation classes in the Project EL area closely correspond to land system boundaries, with Class 74 occurring within the Sonder land system, while Class 71 covers the remainder of the Project area (Figure 18). The borefield and pipeline area is dominated by four broad vegetation types (Figure 19). The riparian vegetation communities along Arthur Creek include *Eucalyptus* and *Corymbia* species whilst Bean Trees were observed in the southern section of the pipeline area.

**Table 14 – Broad Vegetation Types within the Project Area**

Vegetation Unit	Broad Vegetation Classification	Structural Formation	Fine Vegetation Description
63	Acacia with grass understorey	<i>Acacia georginae</i> (Gidyea) Low open-woodlands	<i>Acacia georginae</i> (Gidyea) low open-woodland with open-grassland understorey.
71	Acacia with grass understorey	Sparse shrubland	<i>Acacia aneura</i> (Mulga) tall sparse shrubland with grassland understorey.
74	Acacia with grass understorey	Sparse shrubland	<i>Acacia stowardii</i> (now <i>sibirica</i> ) (Bastard Mulga), <i>Cassia</i> , <i>Eremophila</i> (Fuschsia) sparse shrubland.
95	Hummock grassland	Grassland	Mixed species sparse-grassland or herbland.

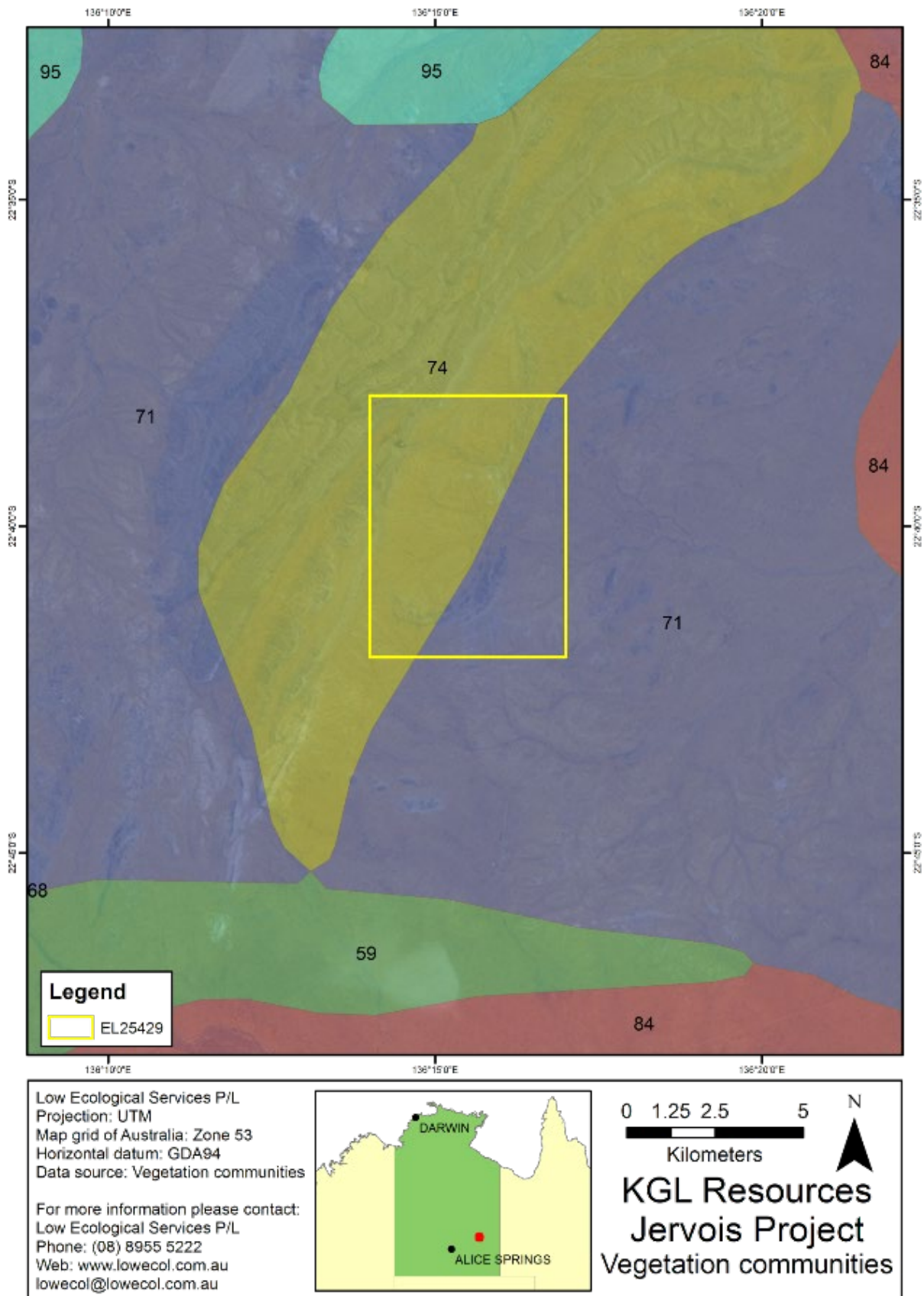
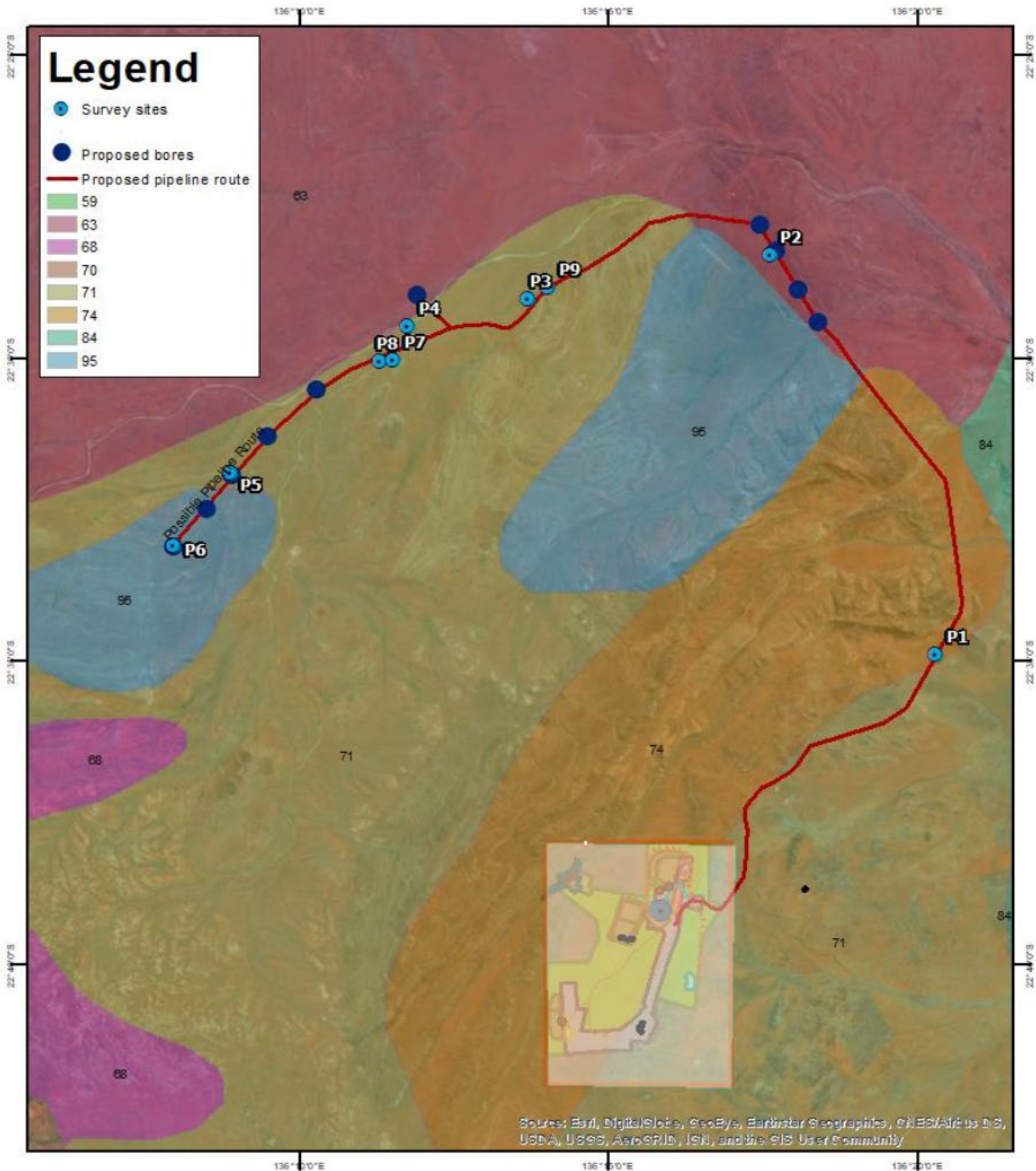
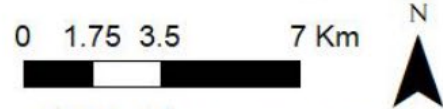


Figure 18 – Broad Vegetation Types within the Project EL Area



Low Ecological Services P/L  
Projection: UTM  
Map grid of Australia: Zone 53  
Horizontal datum: GDA94  
Data Source: Wilson et al.

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**KGL Resources**  
**Jervois Project**  
Vegetation types

Figure 19 – Broad Vegetation Types within the Borefield and Pipeline Area

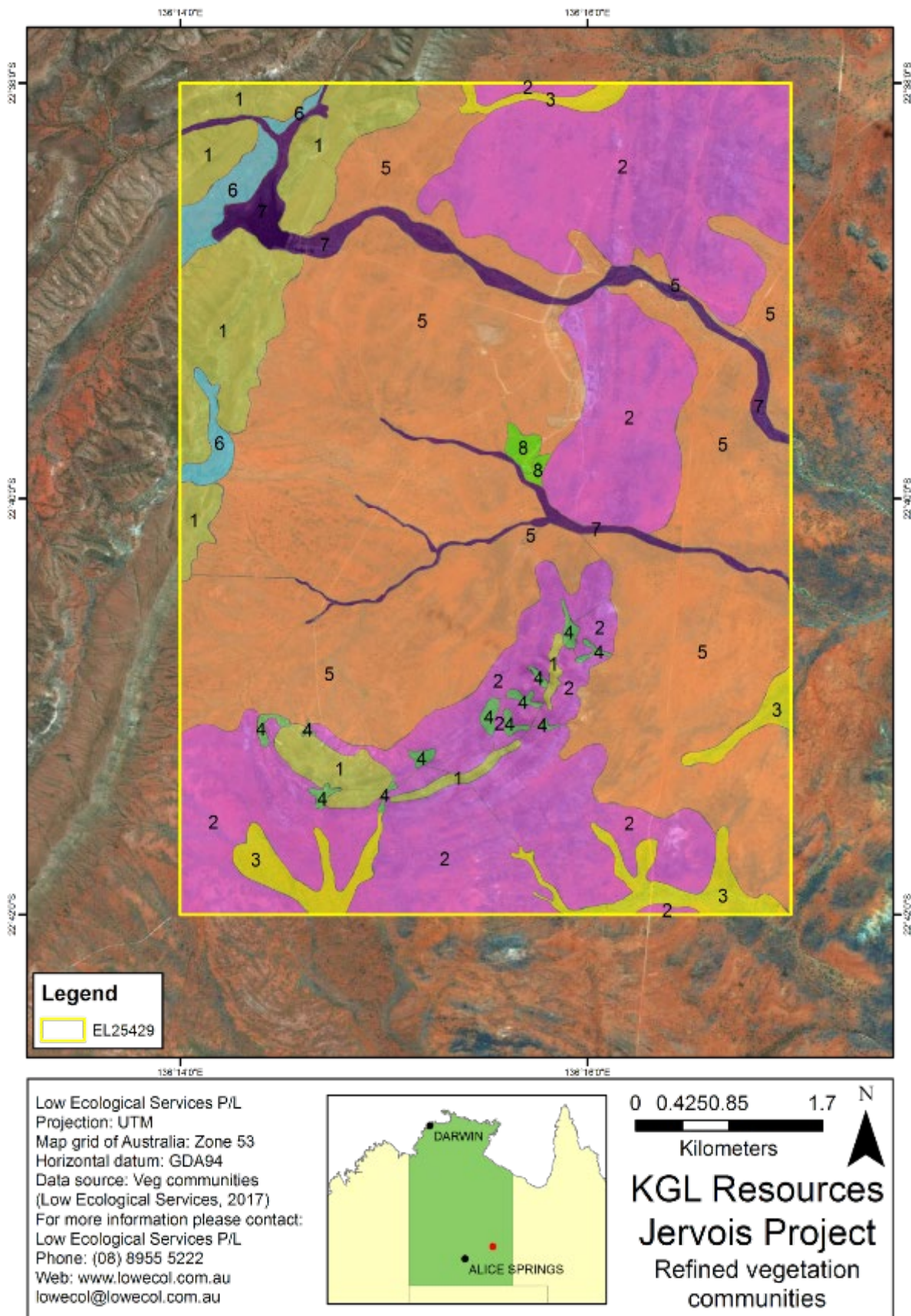
### Vegetation Communities

Eight vegetation communities have been mapped over the Project EL area (Table 15 and Figure 20) which is located mostly within the Jervois Range Site of Botanical Significance (SoBS). The SoBs contains five taxa of NT Significance; *Bolboschoenus caldwellii*, *Eremophila cordatisepala*, *Fimbristylis velata* and, *Sauropus rigens*. There are no Sites of Conservation Significance (SoCS) within 20 km of the Project.

**Table 15 – Vegetation Communities in the Project EL Area**

Map Ref	Vegetation type	Description
1	Grassland	Hummock grassland with sparse shrubs and low trees – <i>Triodia basedowii</i> , <i>Triodia pungens</i>
2	Low shrubland	Sparse, low <i>Acacia siberica</i> shrubland over short grasses and forbs
3	Tall open woodland	<i>Acacia estrophiolata</i> tall open woodland over short grasses with sparse shrubs
4	Tall woodland	Tall <i>Acacia aneura</i> woodland over short grasses in fire protected valleys and upper reaches of drainage lines
5	Tall open woodland	Tall open woodland with <i>Corymbia</i> and <i>Acacia siberica</i> over short grasses and forbs; on floodplains and at the base of ranges
6	Low woodland	Sparse low <i>Acacia</i> woodland over hummock grasses
7	Riparian area	<i>Eucalyptus camaldulensis</i> tall woodland over sparse grasses in drainage channels and rocky creek beds
8	Low open woodland	<i>Acacia georginae</i> (Gidgee) dominated woodland. Sparse grass and forb understorey





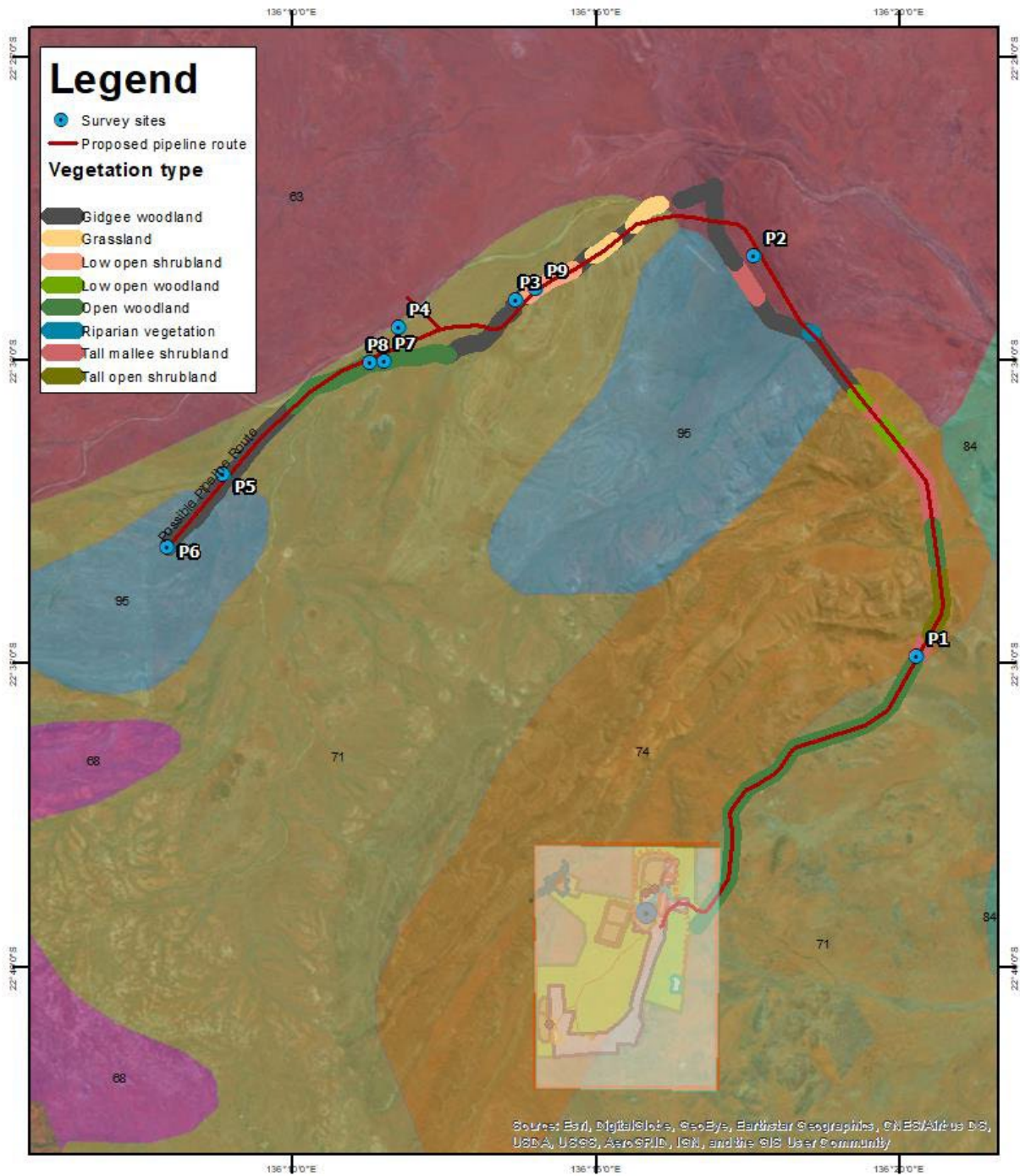
**Figure 20 – Vegetation Communities in the Project EL Area**

Ground truthing identified eight broad vegetation communities along the borefield and pipeline route (Table 16 and Figure 21). The Jervois Range SoBs is traversed by the southern section of the proposed pipeline.



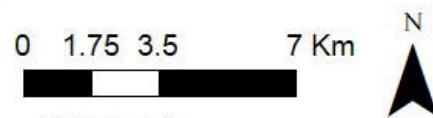
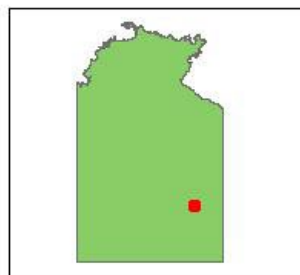
Table 16 – Vegetation Communities in the Borefield and Pipeline Area

Vegetation type	Description
Gidgee woodland	<i>Acacia georginae</i> dominant low woodland.
Grassland	Grassland with forbs and annual grasses with scattered <i>Corymbia apparrerinja</i> , <i>Corymbia opaca</i> and <i>Eucalyptus intertexta</i> . Intermittent patches of <i>Acacia stowardii</i> .
Low open shrubland	<i>Acacia stowardii</i> dominated low open shrubland. Ground layer of annual grasses. Undulating plain.
Low open woodland	Low open woodland. <i>Acacia Georginae</i> , <i>Acacia estrophiolata</i> , <i>Corymbia opaca</i> , <i>Atalya hemiglauca</i> trees. Shrubs and <i>Triodia pungens</i> .
Open woodland	Tall open woodland with <i>Corymbia apparrerinja</i> , <i>Eucalyptus intertexta</i> , <i>Acacia estrophiolata</i> and a mixed mid-storey of <i>senna</i> and <i>eremophila</i> species.
Tall Mallee shrubland	Mallee shrubland with <i>Eucalyptus pachyphylla</i> and <i>Eucalyptus gamophylla</i> with <i>Triodia pungens</i> .
Tall open shrubland	Tall open shrubland with <i>senna</i> and <i>Eremophila</i> species. Emergent trees include <i>Acacia estrophiolata</i> and <i>Erythrina vespertilio</i> .
Riparian area	Riparian woodland dominated by <i>Eucalyptus cameldulensis</i> .



Low Ecological Services P/L  
Projection: UTM  
Map grid of Australia: Zone 53  
Horizontal datum: GDA94  
Data Source: Wilson et al.

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**KGL Resources**  
**Jervois Project**  
Vegetation type

Figure 21 – Vegetation Communities in the Borefield and Pipeline Area

### Significant Vegetation

To date field surveys have not recorded any listed threatened ecological communities or threatened flora species in the Project area.

In accordance with the NT Land Clearing Guidelines, significant vegetation communities within the Project area include the Jervois Range SoBS, riparian communities dominated by *Eucalyptus camaldulensis* (River Red Gum) along Unca and Arthur Creeks and trees containing large hollows. The majority of the Project EL and a portion of the pipeline lies within the Jervois Range SoBS.

A community of mature bloodwood and ironwood trees was identified as significant by the 2018 Landscape, Flora and Fauna Assessment due to their age and being habitat trees containing hollows for nesting birds and mammals. While these trees were to be cleared for the tailings storage facility, the updated tailings storage facility has been revised and contracted to the north to avoid these trees. There is no other planned development in this area.

The 2018 Landscape, Flora and Fauna Assessment identified a small patch (approximately 3.5 hectares) of large Mulga trees (*Acacia aneura*) in a fire shadow area on the north slope of the hills in the south-east of the EL (refer to Figure 16 of the 2018 Landscape, Flora and Fauna Assessment). These trees are estimated to be 150 to 200 years old and were identified as regionally exceptional due to their fire sensitive nature and the rarity of mulga woodlands of this age. This grove has been protected from fire due to its isolated location and the reduced ground vegetation due to grazing. As there is no intention to have any workings, infrastructure or other disturbances in the area where the community of Mulga is located, this area will not be impacted by proposed mining operations. This area will be physically demarcated as an exclusion zone.

Of the many flora species identified across the Project EL, only two species listed as near threatened under the Territory Parks and Wildlife Conservation Act (TPWC Act), *Eremophila cordatisepala* (Desert fuchsia) and *Sauropus rigens* were recorded during on-ground surveys. No communities or flora species listed under the EPBC Act were found in the Project EL area.

The 2012, 2013, 2017 and 2018 field surveys documented several records of *E. cordatisepala* in the Project EL area (Figure 22). The record at site J02 adjacent to the Reward Pit and within 10 metres of the existing Project access road will be subject to impacts from a proposed borrow pit. The record at J14<sup>2</sup> is within 30 metres of the Lucy Creek Access Road (in the south of the Project area) which may be subject to indirect impacts from dust deposition.

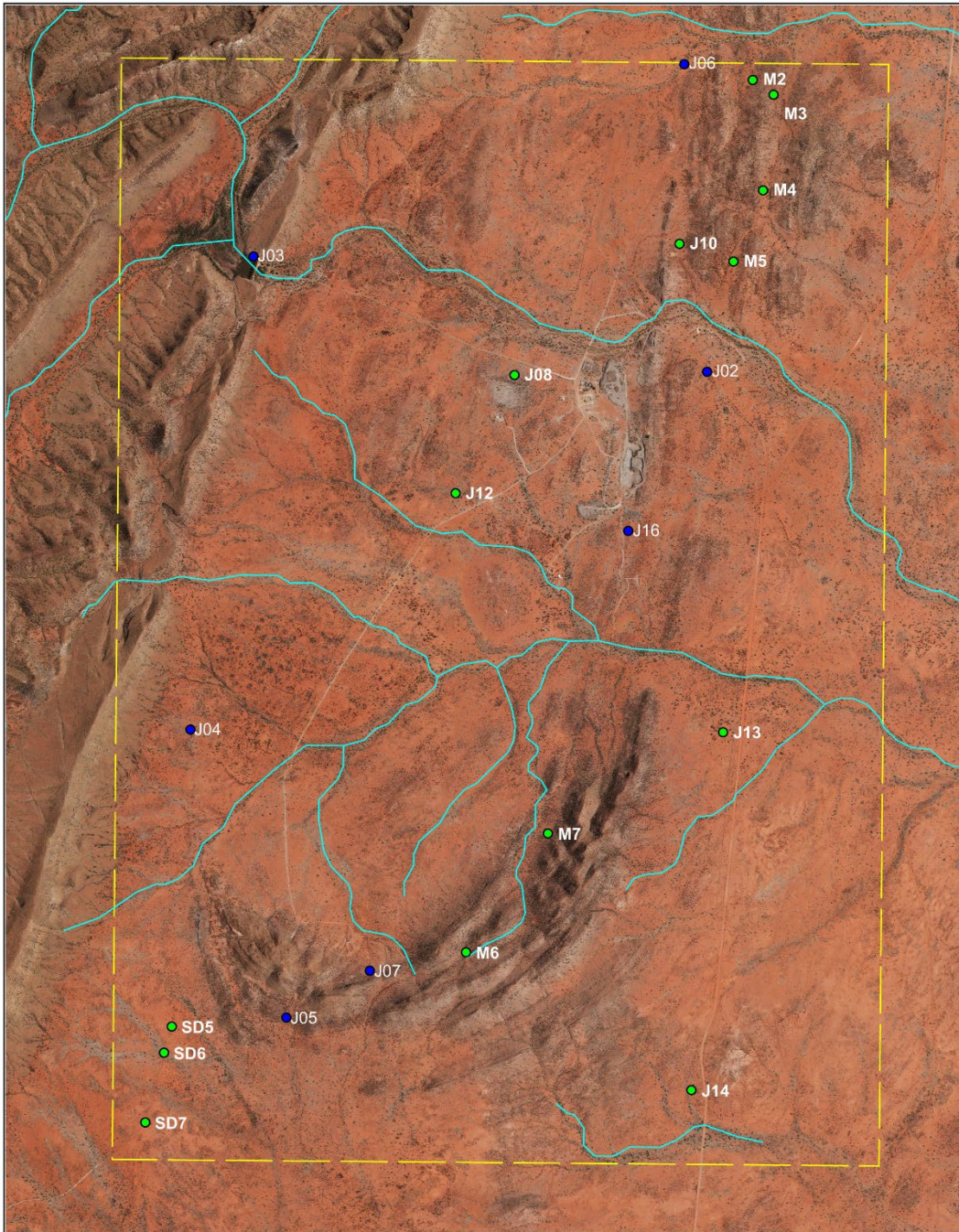
A patch of *E. cordatisepala* was located at Site P05 within the borefield which was found to be abundant within a 1 km<sup>2</sup> area as shown in Figure 23. Two isolated plants were also found at Site P03. The patch located at Site P05 has been impacted by an existing cleared station track. Other than trenching activities for the pipeline, the remaining areas of *E. cordatisepala* will undergo minimal clearing as the infrastructure will be located within the existing road easement, existing tracks and on previously disturbed areas.

A single record of *S. rigens* was identified at survey site J03 in the north west area of the Project EL downstream of the Jervois Dam during the 2017 and 2018 field surveys. Future works on the Jervois Dam will consider management options for the near threatened *S. rigens* which is located approximately 90 metres to the east. Whilst not observed during the field survey of the borefield area, *S. rigens* has a high likelihood of occurring in the area.

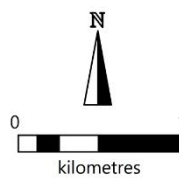
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<sup>2</sup> The 2018 Landscape, Flora and Fauna Assessment Report text incorrectly references site J13 rather than J14 for the presence of *E. cordatisepala*.





- Legend**
- Site Description
  - Trapping sites
  - Project area



**Jervois Base Metal Project**  
ENVIRONMENTAL IMPACT STATEMENT

Field Survey Sites

**Figure 22 – Project EL Field Survey Sites**



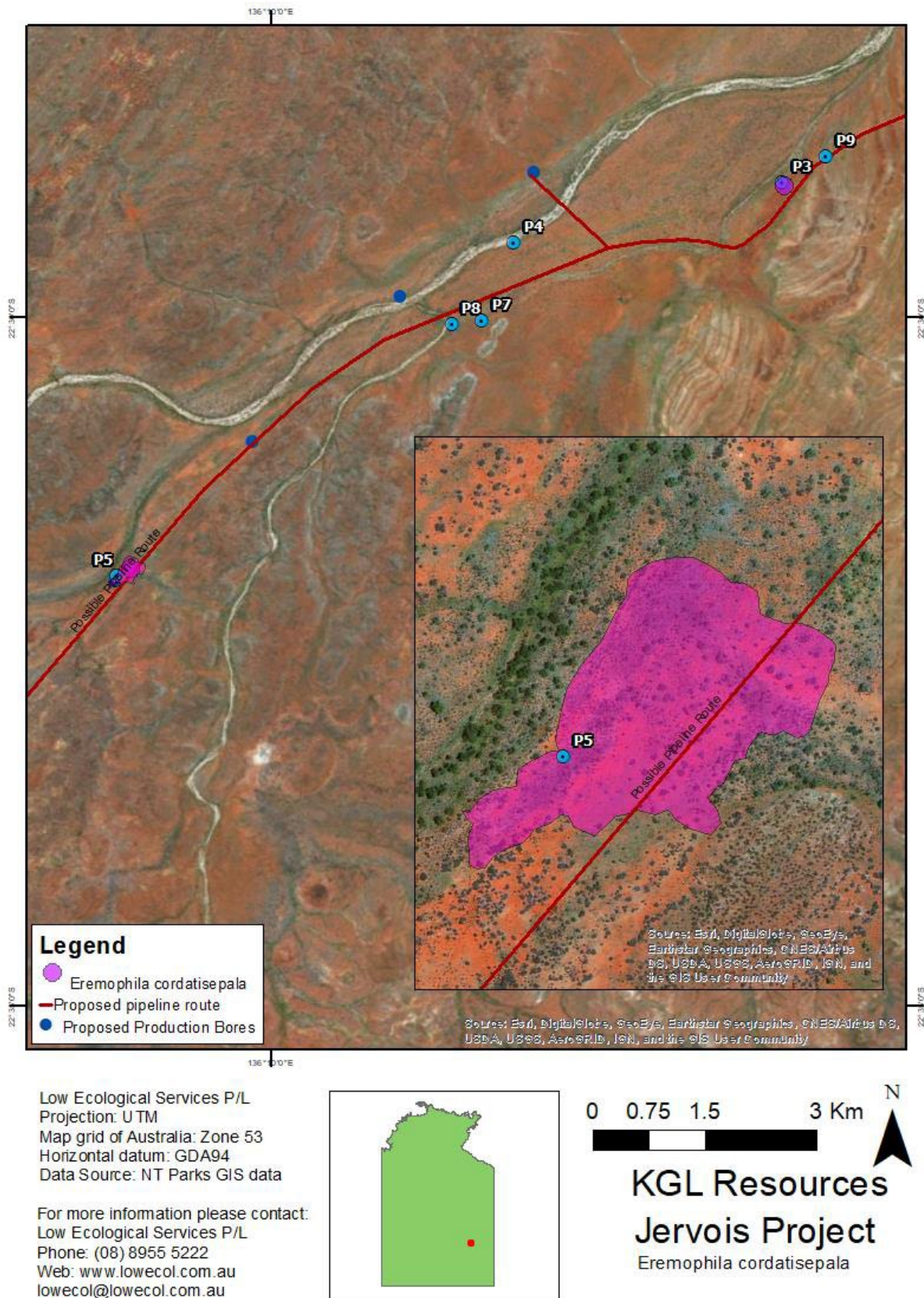


Figure 23 – Borefield *E. cordatisejala* Locations

**Groundwater Dependent Species**

Even though there is little information on their groundwater dependencies in Central Australia and some species would be considered facultative GDE species, the 2019 Low Ecological Landscape, Flora and Fauna Assessment identified *Eucalyptus camaldulensis* (River Red Gum) and some *Corymbia* species to be dependent

on groundwater. River Red Gums are reported to be dependent on shallow groundwater (up to 10 metres) while *Corymbia* species tend to be deeper rooted from 8 – 20 metres. In addition to these species which are found in the Project EL area, *Corymbia Apperrinja* (Ghost Gum) and *Erythrina vespertilio* (Bean Trees) (Note: the 2019 Landscape, Flora and Fauna Assessment incorrectly identified these as *Vigna lanceolate*) were observed throughout the borefield and pipeline area. These two species are deep rooted species which tap into ground water and would be considered facultative GDE species.

While two sites drilled within the Project EL area in 1972 reported groundwater levels less than five metres below ground level, these have been interpreted to be associated with alluvium associated with Unca Creek. As both of these bores were completed to less than 15 metres and given the low permeability of the underlying rocks, it suggests that this feature may be perched and possibly disconnected from the regional groundwater systems. Generally, groundwater levels in the Project EL area are greater than 20 metres below ground level. As a result, drawdown in the fractured rock aquifer is expected to have limited effect on groundwater availability to riparian vegetation as the long-term health of the trees is related to the maintenance of the surface water flow regime in the creeks.

The depth to groundwater in the borefield area is greater than 10 metres and the closest sites that recorded water levels within 15 metres are to the west of the Lucy Creek homestead approximately 10 kilometres east of the borefield area. Whilst riparian vegetation in this area may be accessing regional groundwater, it is more likely it is reliant on water stored in alluvial sediments associated with the larger creeks. As a result, riparian health is more dependent on surface water flows within the creek systems.

### Declared Weeds

Declared weeds in the NT are classified as:

- Class A: To be eradicated.
- Class B: Growth and spread to be controlled.
- Class C: Introduction into the Territory is to be prevented.

Field surveys recorded the presence of a variety of introduced flora, including two declared weeds and Weeds of National Significance (WoNS) species as follows:

- Buffel grass (*Cenchrus ciliaris*);
- Coral cactus (*Cylindropuntia fulgida var. mamillata*) – WoNS, Class A & C;
- Couch grass (*Cynodon dactylon*);
- Spiked Malvastrum (*Malvastrum americanum*);
- Athel pine (*Tamarix aphylla*) – WoNS, Class A & B; and
- Prickly mimosa (*Vachellia farnesiana*).

An assessment of the NT Weeds Database by the DENR Rangelands Division for ML 32277 identified that the following declared species have been previously recorded in surrounding areas of the Project:

- Thornapple – longspine (*Datura ferox*) – Class A;
- Noogoora Burr (*Xanthium strumarium*) – Class B;
- Caltrop – terrestris (*Tribulus terrestris*) – Class B;
- Castor oil plant (*Ricinus communis*) – Class B;
- Parkinsonia (*Parkinsonia aculeata*) – Class B;
- Senna – coffee (*Senna occidentalis*) – Class B; and
- Sida – flannel weed (*Sida cordifolia*) – Class B.

#### 2.1.4 Fauna

Numerous fauna surveys of the Project area have been completed by Low Ecological Services Pty Ltd between 1985 and 2019. Fauna surveys of the Project identified a total of 118 species within the Project EL area (Appendix 5 of the 2018 Landscape, Flora and Fauna Report) and 43 species in the borefield and pipeline area (Appendix 3 of the 2019 Landscape, Flora and Fauna Supplement Report). The 118 species recorded in the



Project EL area included 79 birds, 22 mammals, 14 reptiles and three amphibians. Of the mammal species recorded, six were bats recorded with bat detectors.

The 43 species recorded in the borefield and pipeline area were made up of 34 birds, 6 mammals, 2 reptiles and 1 amphibian. Four of the bird species had not been recorded in previous surveys of the Jervois Project EL area: *Ardeotis australis* (Australian Bustard), *Calyptorhynchus banksia* (Red-tailed Black-cockatoo), *Corvus bennetti*, (Little crow) and *Haliastur sphenurus* (Whistling kite). The two native mammals trapped during the survey were *Pseudomys hermannsburgensis* (Sandy inland mouse) and *Sminthopsis macroura* (Stripe-faced dunnart). The only amphibian recorded was *Litoria rubella* (Desert tree frog). Bats were observed around the mine camp area.

### Broad Habitat Types

Six broad habitat types have been identified within the Project EL area based on geology, vegetation structure and complexity, and characteristic species as detailed in Table 17 and Figure 24. The borefield and pipeline area consists of a wide variation of vegetation communities as discussed in the previous section with the most common being “Low open woodland”. There are no areas of essential habitat listed under the TPWC Act in the Project area.

**Table 17 – Broad Habitat Types**

No.	Broad Habitat Type	Refined Vegetation Communities	Amount in Project area (ha)
1	Hummock grassland	Hummock ( <i>Triodia basedowii</i> , <i>Triodia pungens</i> ) grassland with sparse shrubs and low trees (VC1).	345.7
2	Low <i>Acacia sp.</i> shrubland	Sparse, low <i>Acacia siberica</i> shrubland over short grasses and forbs (VC2). Sparse low <i>Acacia</i> woodland over hummock grasses (VC6). <i>Acacia georginae</i> (Gidgee) dominated woodland. Sparse grass and forb understorey (VC8).	1,322.6
3	Tall <i>Acacia sp.</i> woodland	<i>Acacia estrophiolata</i> tall, open woodland over short grasses with sparse shrubs (VC3). Tall <i>Acacia aneura</i> woodland over short grasses in fire protected valleys and upper reaches of drainage lines (VC4).	151.3
4	Tall <i>Corymbia sp.</i> and <i>Acacia sp.</i> woodland	Tall, open woodland with <i>Corymbia</i> and <i>Acacia siberica</i> over short grasses and forbs; on floodplains and at the base of ranges (VC5).	1,843
5	Tall <i>Eucalyptus sp.</i> woodland on drainage lines	<i>Eucalyptus camaldulensis</i> tall woodland over sparse grasses in drainage channels and rocky creek beds (VC7).	116.5
6	Jervois Dam	Large artificial lake on Unca Creek, created by the presence of a dam.	6.7



Figure 24 – Broad Habitat Types within the Project EL Area

**Conservation Significant Species**

Surveys of the Project EL area recorded two species of conservation significance listed as near threatened under the TPWC Act – *Dromaius novaehollandiae* (emu) and *Rattus villosissimus* (long-haired rat). The near threatened *Calyptorhynchus banksia samueli* (Red-tailed Black-cockatoo) and *Ardeotis australis* (Australian Bustard) (TPWC Act) were recorded within borefield area. While *Falco hypoleucos* (Grey Falcon), which is listed as vulnerable (TPWC Act) has a high likelihood of occurring in the borefield area due to the availability of suitable habitat along Arthur Creek, this species was not recorded during field surveys. The nomadic

*Conopophila whitei* (Grey honeyeater) which is recorded as data deficient in the NT also has a high likelihood of occurring in the Project area due to the availability of suitable mulga woodland and acacia scrubland habitat.

Given that the area of occupancy of long-haired rat varies greatly throughout time in response to rainfall, the species is highly likely to occur in the Project area again during population irruptions. This species was last recorded in the Project EL area in 2012.

The red-tailed black cockatoo inhabits wooded areas and grasslands throughout central Australia, and scattered populations occur through the riverine areas surrounding Jervois mine area. Whilst not recorded in previous surveys of the Project EL area, the red-tailed black cockatoo was recorded during the 2019 field survey of the borefield and pipeline area.

The Australian bustard is irruptive and dispersive in response to high rainfall events with subsequent insect population flushes. Given it has been recorded in field surveys and there is suitable habitat for the Australian bustard in the area (open habitats from grassland to open woodland), it is likely to be present at low densities throughout the region and there remains a high likelihood that it will occur in the Project area.

The desktop assessment of the Grey Falcon indicates it was recorded within a 20 km buffer of the Project area and has a high likelihood of occurring in the pipeline and borefield area and a moderate likelihood of occurring in the Project EL area. Suitable habitat for this species was identified along Arthur Creek and in grassland in the borefield area. Within the Project EL area, sites along Unca Creek provide potentially suitable habitat but of a lesser quality. Whilst habitats for the Grey Falcon occur throughout the Project area, field surveys did not locate this species.

The nomadic Grey Honeyeater can be found in mulga woodland and acacia scrubland which is habitat occurring within the Project area. Although not recorded in any of the field surveys, it is highly likely that this species will be present in the area.

Even though not recorded during any of the Low Ecological field surveys, *Rostratula australis* (Australian painted snipe – listed as endangered under the EPBC Act and vulnerable under the TPWC Act) has been identified as having a high likelihood of occurring in the Project area due to the presence of the Jervois Dam which provides a suitable habitat for this species. A single female snipe was unofficially recorded in March 2012 at the Jervois Dam. The Project is unlikely to directly impact populations of the Australian Painted Snipe particularly due to the nomadic nature of the species. Their presence at the Jervois dam is irregular and they are unlikely to be present along the Pipeline area due to a lack of suitable habitat (Low Ecological Services, 2019).

Despite targeted surveys, no threatened fauna species listed under the EPBC Act or TPWC Act were recorded within the Project area.

### **Migratory and Marine Species**

The numerous desktop assessments identified 17 migratory and marine species as occurring or potentially occurring within 20km of the Project area (Table 11 of the 2018 Landscape Flora and Fauna Report). Only *Merops ornatus* (Rainbow bee-eater), which is a widespread summer migratory species which is listed as a marine species under the EPBC Act and was recorded previously near the Jervois Dam during field surveys but has not been recorded in more recent years.

### **Aquatic Species**

The desktop assessments did not identify any records of aquatic fauna such as fish, and freshwater invertebrates as occurring or potentially occurring within 20 km of the Project area. As aquatic systems are not well studied in arid Australia, it is likely that fish and aquatic invertebrates occur in the watercourses of the area following good rainfall. Burrows of freshwater land crabs (*Holothuisiana transversa*) have previously been found in Arthur Creek.



### Stygofauna

The 2018 Groundwater Impact Assessment determined that stygofauna are not likely to be an environmental factor within the EL area as the habitat suitability is poor as the lithology of metamorphosed rocks is fine grained and will not provide the pore spaces required to support stygofauna (CloudGMS, 2018). The 2019 Stygofauna Pilot Study investigated the presence of stygofauna in the borefield area of the Project. This study found that the geology and hydrology of the borefield area was considered suitable for providing habitat for stygofauna whilst the water quality was assessed as potentially suitable. Of the ten bores sampled, only one contained stygofauna: a single copepod, a stygoxene. Stygoxenes facultatively use groundwater ecosystems but are not dependent on groundwater to complete their lifecycle. Overall, the stygofauna community of the borefield area was assessed as having low environmental value based on the limited occurrence of a single taxon and the groundwater quality being only potentially suitable on the basis of total dissolved solids (frc environmental, 2019). As a result, the potential impact to stygofauna from groundwater drawdown within the Project area is considered low.

### Introduced Fauna

The Project area contained four introduced fauna species – *Felis catus* (feral cat), *Oryctolagus cuniculus* (rabbit), *Mus musculus* (house mouse) and *Bos taurus* (domestic cattle). Domestic cattle were widespread across the area while one single house mouse was recorded in the 2019 survey of the borefield area.

While rabbits were recorded in 1999, they have not been recorded in subsequent surveys with the exception of one inconclusive recording in 2017 and appear to be in decline or absent from the Project area (Low Ecological, 2019).

## 2.2 Sacred, Archaeological and Heritage Sites

The Plenty Basin region has a rich Indigenous cultural environment which includes a long history of Eastern Arrernte, Alyawarra and Anmatyerre occupation and a recent past of that includes contact with European explorers, miners and pastoralists from the 1880's onwards. Aboriginal people hunted and gathered across Central Australia, including within EL 25429 with their activity potentially leaving archaeological sites and artefacts throughout the landscape.

The Jervois Project also has a long history of exploration and mining. Base metals were first discovered in the Jervois Range area in 1929 during the mustering of stray cattle on a track leading from Tobermorey on the Northern Territory/Queensland border. Small scale mining commenced and a small mining settlement was located at Jervois in the 1930s (Hodge-Smith 1932). In the 1950s, leases covering the area were acquired by Kurt Johannsen, who mined copper carbonate on a small scale for the fertilizer industry and later as a flux in the smelting process at Mount Isa. Since then, numerous companies have conducted exploration and mining activities across the site as detailed in the Project History in Section 1.3.2.

### 2.2.1 Archaeological and Sacred Sites

The Archaeological Database held by the Heritage Branch, NT Department of Tourism and Culture records only one site within a 50 kilometre radius of EL 25429. This site was recorded by Peter Thorley prior to 1996 when the NT Museum maintained the Archaeological Database. The site consists of a stone artefact scatter and rock art (petroglyph, or engraved rock art). The coordinates for the site match closely with a Sacred Site recorded during the 2018 Earthsea Pty Ltd archaeological assessment, and as such the details on their location and contents will remain confidential.

Within the Project EL area, five archaeological sites, four background scatters and 41 isolated artefacts of Aboriginal origin were recorded within the Project during the 2018 archaeological survey. Two additional sites were recorded by a previous site visit in 2017 by Everick Heritage Consultants (Sites 1 and 2). Archaeological Sites 1 to 5 were assessed as having low archaeological significance as they are very common in the NT and across Australia whilst sites 6 and 7 were assessed as having Low-Medium significance.

The 2019 field survey of the borefield and water pipeline area by Earthsea Pty Ltd recorded 16 archaeological sites and 99 isolated artefacts of Aboriginal origin. Of the 16 archaeological sites, 15 were classified as minor lithic scatters which were assessed as having low archaeological significance. All of the isolated finds are also considered as having low significance due to their local abundance and lack of potential for loss of valuable scientific information if they were salvaged. A complete list of the identified Aboriginal sites is provided in the CHMP and the list of 99 isolated artefacts is provided in Table 8 of the 2019 Archaeological Assessment report. Due to cultural sensitivities associated with these sites, their specific locations will remain confidential to be used for internal purposes only.

In August 2016 an AAPA Authority Certificate (C2016/155) was issued for EL 25429 for 'all operations, activities and incidental matters' of the Indigenous Land Use Agreement (ILUA) between CLC and Kentor Minerals (now Jervois Operations). This certificate provides the locations of several sites within EL 25429, one recorded sacred site and four burial places. The sacred site lies just outside of the far north western boundary of the Project. Two burial places are located in the central north area of the EL with the other two located on the eastern boundary of the EL. The two sites in the central north area have been fenced to provide protection of these sites. This certificate nominates a Restricted Works Area in the far north west corner of the EL where no works can be undertaken, and no damage shall occur. As this certificate shows the specific location of burial sites, the map is not provided within this MMP and will remain confidential. A copy of the certificate conditions are provided in the CHMP.

A separate Authority Certificate (C2021/068) has been issued for activities associated with the proposed borefield and the remainder of the pipeline route which lies outside of EL 25429. No sites were recorded within the proposed borefield or pipeline route however some Restricted Work Areas and Recorded Sacred Site Boundaries are located adjacent to the pipeline route. This Certificate contains numerous conditions regarding Restricted Works Areas. The sites recorded on this certificate as being likely Aboriginal Heritage Places will be avoided during the construction and operation of the borefield and pipeline. A copy of the certificate conditions are provided in the CHMP.

### 2.2.2 Heritage Sites

The 2018 archaeological assessment of EL 25429 identified 62 historical features which relate to past exploration and mining activities, and possibly pastoral activities. The majority of these historical features relate to early prospecting between 1929 and 1950, the Kurt Johannsen period of mining between 1950 and 1963 and activities by the Plenty River Mining Company Pty Ltd. These features are many and include mining equipment, vehicles and vehicle parts, mine infrastructure, generators, tanks, drums, mine pits and workings, a camp site, refuse sites, food cans, lamps, bottles and other bits and pieces associated with human occupation on site. A complete list of the historic features and their locations can be found in Table 16 of the 2018 Archaeological Assessment report. No historical features were recorded in the borefield and remaining pipeline area.

The archaeological assessment considered that these historical features were mostly of relatively low heritage significance and rated them all as low with the exception of an automobile and associated parts<sup>3</sup> which were rated at low-medium. The assessment did not believe any of the historical features were significant enough to be gazetted to the NT Heritage Register for permanent protection.

A search of the Northern Territory Heritage Register found that there are no declared heritage places within EL 25429. Two declared heritage places are located on Jervois Station which are European Launcher Development Organisation (ELDO) rocket shelters constructed during or after 1966.

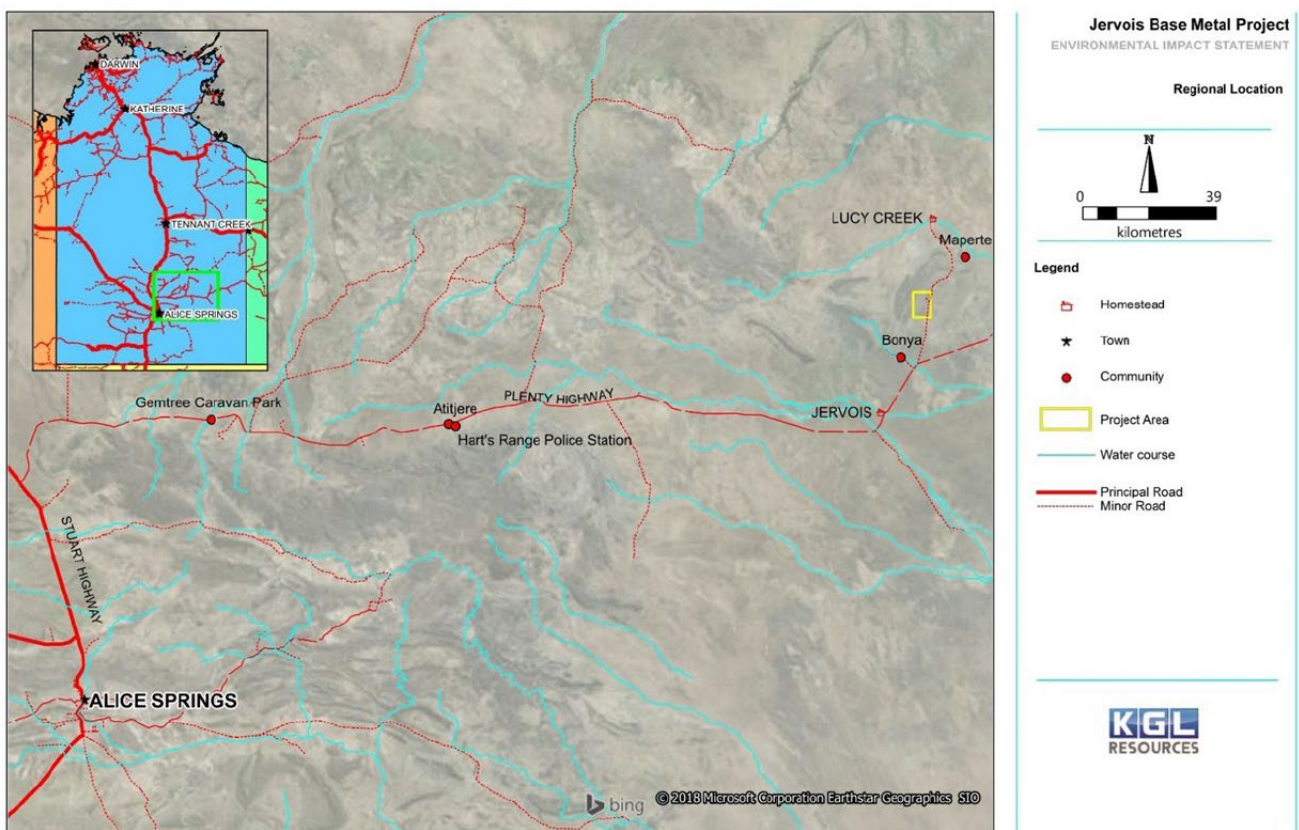
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<sup>3</sup> As recommended in the archaeological assessment, this Vulcan automobile and parts were relocated to a secure location adjacent to the exploration camp in July 2021.

A search of the National and Commonwealth Heritage Lists indicated that there are no heritage sites within the Project area. It has been reported that the Jervois Mine Dam was previously listed on the Australian Heritage Database as a wildlife sanctuary being the only source of standing water in the region. According to the Database, this dam was constructed in June 1972 by Petrocarb to supply water for copper sulphate processing.

**2.3 Socio-Economic Environment**

The Project is in the Central Desert Regional Council Local Government Area (LGA). The closest significant population centre to the Project is Alice Springs, approximately 380 km by road. Alice Springs is the major service centre in the region with a regional economy that consists of a traditional pastoral industry, tourism, sporadic mining activity, Indigenous communities and transport services. Alice Springs provides substantial employment in Government services, wholesale, storage and retail, business services, accommodation and tourism services. The estimated resident population of the Alice Springs Town Council LGA is 26,534 (.idcommunity, 2018).



**Figure 25 – Regional Location**

The local economy consists mainly of pastoral activities in the form of beef cattle grazing, mining and exploration, tourism and government support services. Local tourism is generated by the Outback Way which runs from Winton in Queensland to Laverton in Western Australia via Alice Springs. Tourism stops along the way include the Gemtree Caravan Park, Tobermorey Station, Jervois Station and Harts Range (Atitjere).

The region is home to Eastern Arrernte people and people of the Alyawarra and Anmatyerre (Aboriginal Areas Protection Authority, 2018). Indigenous people have traditionally lived in the area and continue to do so, mainly in small communities and homelands.

There are two Aboriginal communities within 20 km of the Project. The Bonyya Community (also known as Ortippa Thurra) is approximately 17 km to the south-west and the Maperte Community is approximately 16 km to the north-east. The Bonyya community functions as a resource centre for surrounding smaller homelands



and family outstations. There is a community store, community school, council office, health centre and women’s centre, and government personnel visit the community on a regular basis.

Atitjere community, also known as Harts Range, is located approximately 160 km by road west of the Project. The community has basic services including a school and crèche, police station, remote health clinic, Central Land Council office, Central Desert Council office, post office agency, airstrip, a shop with fuel and takeaway food, and limited aged care and disability services.

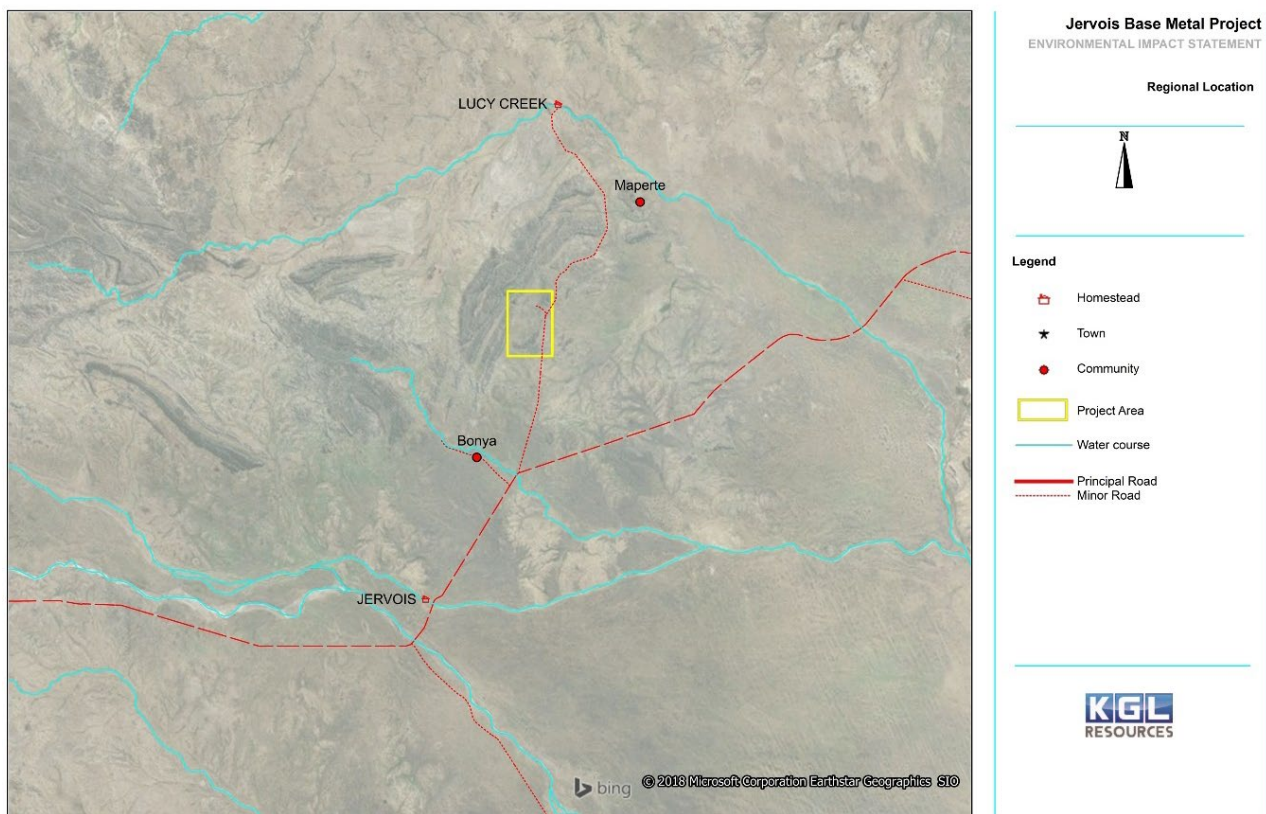
**2.3.1 Current Land Use**

The Project lies within an area of large pastoral leases. Lucy Creek Station to the north is a 405,522 hectare beef cattle station running about 10,000 head of beef cattle. The Lucy Creek homestead is about 24 km from the Project site (Figure 26) and has an airstrip which is capable of use for night landings.

The underlying property, Jervois Station is a 273,600 hectare beef cattle station. The Jervois Station is a regular stopover point for travellers along the Plenty Highway, consisting of local community residents and tourists driving between Alice Springs in the NT and Boulia in Western Queensland. The cattle station has an area for bush camping and ecolodges for passing travellers. Other facilities at the Jervois Station are fuel, a shop, an airstrip, public payphone, water, shower and toilet facilities.

As discussed in Section 1.3.2, the Project area has a long history of mining activity dating back to 1929.

Public infrastructure such as roads are also provided in Section 1.3 above.



**Figure 26 – Project Location**

**2.3.2 Identified Stakeholders and Consultation**

The Mineral Lease owner for the Project Area is Jinka Minerals Limited, which is 100% owned by KGL Resources Limited. The tenements are managed through Australian Mining and Exploration Title Services in Darwin.

The Project area is located on Jervois Pastoral Station and Lucy Creek Pastoral Station. Jervois Station is managed by Steven Broad (Manager), Jervois Pastoral Co. Pty Ltd. Lucy Creek Station is managed by Allan Fogarty (Manager), Lucy Creek Pastoral Company.

Other interested parties and key stakeholders likely to be associated with the Project as identified through the 2018 Social Impact Assessment include:

- Northern Territory Police, Southern Desert Division;
- Harts Range Police Station;
- Gemtree Caravan Park;
- Harts Range Community Store;
- Traditional Owners, the Arrernte people;
- Bonya Aboriginal community;
- Arramwelke Aboriginal Corporation;
- Atitjere community;
- Jervois pastoral leaseholders;
- Lucy Creek pastoral leaseholders;
- Central Australian Health Service;
- Central Desert Regional Council;
- Industry Capability Network NT;
- Tourism Central Australia;
- Outback Way Committee;
- Housing and Community Development;
- Arid Lands Environment Centre;
- My Pathway;
- Central Land Council;
- Chamber of Commerce NT;
- Member for Lingjari, Warren Snowdon;
- Central Australian Regional Economic Development Committee;
- NT Environment Protection Authority;
- Department of Environment and Natural Resources;
- Department of Primary Industries and Resources;
- Department of Aboriginal Affairs;
- Department of Trade, Business and Innovation;
- Department of Infrastructure, Planning and Logistics;
- Water Resources NT;
- Alice Springs/Central Australia Regional Economic Development Committee;
- Regional Coordination Group which includes representatives from all NT government departments in Central Australia;
- Minerals Council Australia, NT Division;
- NT Fire and Rescue;
- KGL Resources Limited shareholders;
- KGL, Jervois Operations and Jinka Minerals Employees (internal); and
- Lindsay Johannsen.

During the social impact assessment which was completed to inform the draft EIS for the Project, meetings, briefings and stakeholder interviews were held with those stakeholders marked with an asterisk in the above list. Numerous NT Government departments and non-government organisations were also consulted by the NT EPA during the draft EIS assessment process.

Since acquiring the Jervois Project in 2011, Kentor Minerals/Jervois Operations have formed and maintained a good working relationship with the Bonya community through regular and open communication. Kentor Minerals/Jervois Operations also keep in regular contact with the pastoral leaseholders from Lucy Creek and Jervois. In the lead up to the environmental assessment process, Kentor Minerals held discussions with the Traditional Owners, the Arrernte people and an Indigenous Land Use Agreement (ILUA) is registered with the National Native Title Tribunal (NNTT). Since the environmental assessment process commenced, Kentor Minerals/Jervois Operations has also been in contact with local emergency services to discuss potential traffic impacts and collaborative management strategies.

Issues raised and discussed with stakeholders include:

- Jobs and training opportunities for local indigenous people and Alice Springs residents;
- Potential for sponsorship funds and royalties;
- Local business opportunities;
- Impacts on tourism due to increased traffic on the Plenty Highway;
- Displacement of other sectors due to Project employment opportunities;
- Impacts on pastoral activities;
- Loss of local business opportunities due to lack of capacity or skills;
- Expected boost to the local economy not met;
- Effects on other sectors such as loss of staff;
- Uncontrolled fires;
- Lack of awareness of mine closure timing;
- Potential for the early sealing of the Plenty Highway;
- Dust and noise impacts;
- Impacts from an influx of people back to communities;
- Impacts to water resources;
- Reduced community or social cohesion;
- Rumours and misinformation;
- Increased pressure on local services (health, police);
- Drugs and alcohol;
- Disturbance to Indigenous and non-indigenous heritage items;
- Influx of a predominantly male workforce;
- Increased road trauma; and
- Cumulative impacts such as availability of workers, services and inflationary pressures.

In response to this feedback from stakeholders, the draft EIS and the associated management plans were designed to include management and mitigation strategies to alleviate and avoid potential impacts where possible. These management plans have been further refined throughout the environmental assessment process in response to recommendations from stakeholders and the NT EPA.

Kentor Minerals/Jervois Operations keep shareholders informed of the Project activities through regular (KGL) ASX announcements and their annual general meetings. The KGL website is kept up to date with all Project developments. All Jervois Operations employees directly involved in the Project are regularly updated on its current status through weekly staff meetings.

Social impact management for the Project will focus on community liaison, stakeholder engagement and proactive and open communications to provide updates, reduce community fears due to lack of knowledge and manage stakeholder expectations.



Ongoing arrangements to address stakeholder feedback and keep stakeholders informed will include:

- Incorporate feedback into Project planning processes, specifically in relation to the impacts of trucks on the Plenty Highway, local employment opportunities, capacity to manage health, safety and emergency responses on site, economic opportunities and water use;
- Continue to engage with key stakeholders to keep them informed through meetings, newsletters and the KGL website;
- Provide clear and up-front information to stakeholders and the wider community to avoid misinformation; and
- Implement and update the strategies in the Social Impact Management Plan (SIMP) throughout the life of the Project.

The commitments to keeping stakeholders informed and address issues raised as outlined in the SIMP include:

- Establish a community liaison committee;
- Establish and monitor a community complaints system;
- Establish relevant management strategies to address particular aspects including:
  - Traffic Management Plan;
  - Occupational Health and Safety Plan;
  - Local Industry Participation Plan;
  - Indigenous Employment and Training Plan;
  - Cultural Heritage Management Plan;
  - Environmental Management Plan;
  - Worker Codes of Conduct; and
  - Site Inductions.
- Processes for regular community consultation and Project updates including annual reports;
- Implementation of the Communication Strategy;
- Annual stakeholder surveys; and
- Direct lines of communication through email, the Project website and a telephone enquiry line.

In response to stakeholder feedback on the draft EIS, the original SIMP has been adapted to a community-friendly format. This SIMP will be made accessible to the community and stakeholders through the KGL website and the provision of hard copies to stakeholders such as the Bonya community and the local pastoralists. A copy will also be made available at the site administration office and the Brisbane office of Jervois Operations/KGL Resources.

### 2.3.3 Workforce Description and Demography

The existing site workforce is supervising the exploration drilling program, and the project permitting and feasibility studies. This small team comprises:

Project Manager	(x1)
Site Manager	(x1)
Geologists	(x3)
Field Technicians	(x5)
Kitchen Staff/Admin/Maintenance	(x4)
<u>Drilling Contractor</u>	<u>(Up to 11)</u>
<b>Total</b>	<b>(25)</b>

Once approved, the two phases of work that will commence will be the Construction phase and then the long term operational phase.

**Construction Phase**

It is expected that the construction phase of the project will be undertaken as an Engineer, Procure and Construct Contract. Although still in the final stages of detailed planning, it is expected that the construction crews will vary greatly over the expected engineering and construction period.

Only high level estimates of the workforce numbers are available at this time for the construction phase and these are shown in Table 18.

**Table 18 – Construction Phase Workforce Estimates**

CONSTRUCTION JERVOIS OPERATIONS PERSONNEL							
	On Site	Off Site	Total		On Site	Off Site	Total
<b>MINING</b>				<b>ADMINISTRATION</b>			
Mine Manager	1		1	Admin Manager	1		1
Mine Engineer				Accounts Clerk	1		1
Mine Surveyor	2	1	3	Payroll Clerk	1		1
Survey Assistant	2	1	3	Environmental Manager	1		1
Senior Mine Geologist				OH&SE Manager	1		1
Mine Geologist				Training Officer	1		1
Geological Technician				Supply Manager	1		1
<b>PROCESSING</b>				Purchasing / Stores Officer	1	1	2
Process Manager	1		1	Nurse / Paramedic	1	1	2
Maintenance Supt.	1		1				
Maintenance Planner	1		1				
<b>Total Personnel</b>			<b>10</b>	<b>Total Personnel</b>			<b>11</b>
<b>Grand Total Personnel</b>			<b>21</b>				

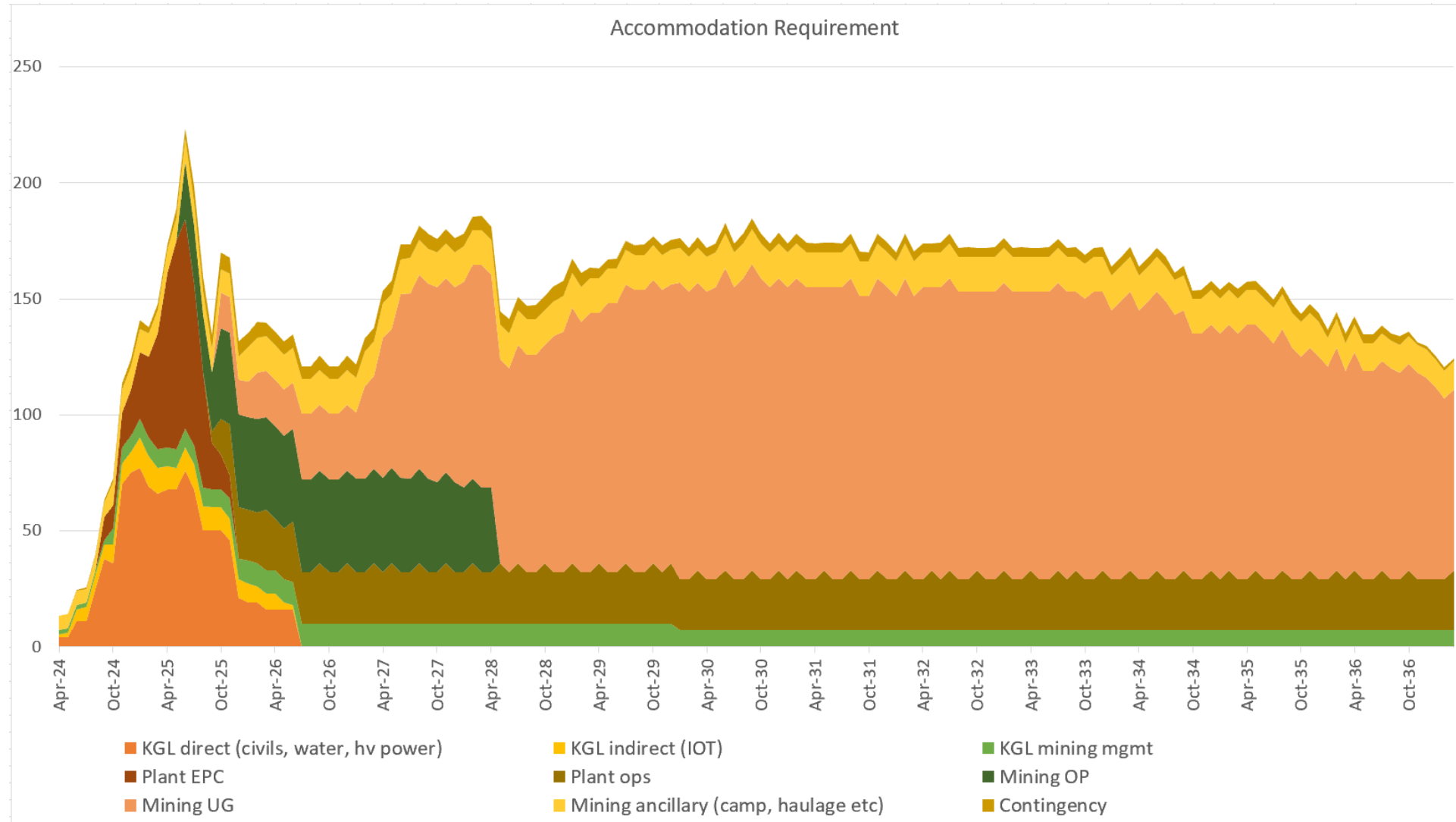


Figure 27 – Estimated Construction Workforce Numbers by Discipline



### Operations Phase

During the operations phase of the Project there will be three major parties on site:

- Jervois Operations;
- a major contractor for engineering and construction (including the plant operation); and
- a major contractor for mining.

The remainder of the workforce on site will be specialist contractors for aspects such as camp services, concentrate haulage, blasting, drilling and exploration. Other short-term or periodic roles, environmental monitoring and reporting, auditing, consultation and heritage, will generally be undertaken by specialist consultants.

Assessment of indirect jobs throughout the supply chain has been undertaken to estimate personnel and traffic movements as part of the Projects Traffic Management studies, these indirect personnel will cover operational roles as well as personnel employed by businesses who provide support and services to the Project and specifically will include the following:

Workforce numbers will also be boosted to site to meet critical construction and production deadlines if required.

Indigenous employment opportunities will be optimised and managed through the Indigenous Employment and Training Strategy which is provided in the SIMP. This Plan will address barriers to employment and include support mechanisms to address cultural and family obligations. This Strategy includes measures to address issues such as not meeting local job expectations and the low take up of jobs by local Indigenous people due to a lack of work-readiness and cultural issues. These measures include:

- Working with local employment and training providers;
- Open and regular communication on job availability;
- Consulting with the Central Land Council for potential employment and contract opportunities;
- Working through the MOU with Bonya;
- Workforce planning to address employment barriers such as:
  - support mechanisms to address cultural and family obligations;
  - Training courses to match jobs with individual skills and capabilities.
- Matching the work-ready skills to ensure successful employment;
- Collaboration with communities, the Territory and Federal Governments;
- Development of policies and procedures to include mentoring and provide a safe and welcoming workplace for Indigenous men and women; and
- Collaboration with other major resource projects on regional training and education programs and employment opportunities.

The Indigenous Employment and Training Strategy has identified 29 potential “Entry Level Opportunities”. These are defined as positions that can be made available specifically to Indigenous applicants, that only require applicants to fulfill basic “work ready” criteria. The Entry Level Opportunities are positions that will be available with Jervois Operations and the major contractors involved with the on-going operations of the Project so that employment is targeted at long-term, permanent employment. As the initial group of candidates move to long term positions opportunities in these 29 positions will then be made available again to local participants, so that the number of local indigenous employees is expected to grow in a series of stages over time.

#### 2.3.4 Community Affairs

As the mining construction phase of the Project has been delayed and no construction works commenced under the 2021/2022 MMP, there are no statistics for community affairs or complaints relating to works under the previous MMP. This section provides a summary of the community affairs initiatives Jervois Operations plan to implement over the term of this MMP.

Social impact management for the Project will focus on community liaison, stakeholder engagement and proactive and open communications to provide updates, reducing community fears due to lack of knowledge and management of stakeholder expectations. As outlined in the SIMP, the following strategies will be utilised:

- Development of a Communication Strategy which will include the following methods for proactive and open communications with relevant and affected stakeholders:
  - Community updates on the Project distributed by email to key stakeholders and placed on community noticeboards;
  - Posting regular updates and community reports on the KGL website;
  - Ongoing liaison with nearby pastoralists and Bonya community as needed;
  - Regular communication with the Gemtree Caravan Park and other tourism stakeholders during peak tourist periods;
  - Conducting annual stakeholder surveys with key stakeholders;
  - Maintaining a well publicised inquiry line and email;
- Establish a Community Liaison Group;
- Development of a sponsorship plan and communicating with the local community about Jervois Operations' initiatives to support the local community and events;
- Implement a community complaints system to include monthly reporting to management, Project operators and the workforce;
- Preparation of an Annual Report to include a summary of the company's social and environmental performance, community complaints, SIMP reports, sponsorship programs, Project incidents, Indigenous employment;
- Development of an Indigenous Employment and Training Strategy; and
- Implement environmental protection strategies outlined in the numerous management plans.

As suggested by the Department of the Chief Minister in their feedback on the draft EIS, Jervois Operations will liaise with, and take advice from the Department of Trade, Business and Innovation (now the Department of Industry, Tourism and Trade) in relation to aligning the Industry Participation Plan and the Territory Benefits Policy for local content and employment opportunities. The recruitment strategy will focus on locals and the encouragement of FIFO workers to relocate. Jervois Operations will also continue to work with ICN NT, NT Government departments, the Chamber of Commerce and the REDC to promote tenders which suit local capacity, boost skills, prepare businesses for an increase in competition and standards required by Jervois Operations.

Mining activities will be managed to protect the environmental values associated with the Project in accordance with the relevant sections of this MMP and the individual management plans provided within the EM Plan. These plans include measurable targets and objectives which will be further refined as the Project progresses.

Occupational Health and Safety issues associated with the Project will be addressed under the Work Health and Safety (National Uniform Legislation) Act and Regulations, overseen by NT Worksafe. These issues will be managed under the Occupational Health and Safety Management Plans in addition to on-site health and emergency response and implementation of an Emergency Response Plan in consultation with local Police and health service providers.

Road safety risks will be managed through the implementation of the Traffic Management Plan which addresses:

- Vehicle driver guidelines and procedures;
- Speed limits for workers and contractors;
- direct transport of workers to site;
- restrictions on the use of private vehicles to travel to site;
- Stakeholder liaison practices; and

- Road safety initiatives.

Jervois Operations will continue to work with the Outback Way Committee, Territory and Federal Governments to provide a case for the early sealing of the remainder of the Plenty Highway. Jervois Operations will also campaign the NTG for improved telecommunications in the region which would benefit the Project and the local stakeholders.

Social impacts on the local communities will be managed through cross cultural training of workers, liaison with the CLC to place limitations on cash payments in preference for education programs, community development and social infrastructure investments, and a worker Code of Conduct to address the requirements of the Bonya MOU, offsite behaviour and a requirement to remain on site at all times to avoid trespassing on culturally significant areas. Potential impacts on Aboriginal archaeological and cultural values will be further managed through the Cultural Heritage Management Plan for the Project.

### 3 Statutory and Non-Statutory Requirements

#### 3.1 Statutory Requirements

Federal legislation applicable to the Project activities may include:

- *Aboriginal Land Rights (Northern Territory) Act 1976;*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *National Greenhouse and Energy Reporting Act 2007;*
- *Native Title Act 1993; and*
- *Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2016.*

Territory Legislation applicable to the Project may include:

- *Aboriginal Sacred Sites Act 1989 and Regulations 2004;*
- *Biological Control Act 2011;*
- *Bushfires Act 2016;*
- *Bushfires Regulations 2018;*
- *Bushfires Management (Volunteer Bushfire Brigades) Regulations 2016;*
- *Dangerous Goods Act 1998 and Regulations 2012;*
- *Environmental Assessment Act 1982;*
- *Environmental Assessment Administrative Procedures 1984;*
- *Environmental Offences and Penalties Act 1996;*
- *Fire and Emergency Act 2016;*
- *Fire and Emergency Regulations 2017; and*
- *Heritage Act 2011;*
- *Mineral Titles Act 2010 and Regulations 2011;*
- *Mining Management Act 2001 and Regulations 2001;*
- *Northern Territory Aboriginal Sacred Sites Act 1989 and Regulations 2004;*
- *Public and Environmental Health Act 2011;*
- *Territory Parks and Wildlife Conservation Act 1976 and Regulations 2001;*
- *Traffic Regulations Act 1999;*
- *Waste Management and Pollution Control Act and Regulations 1998;*
- *Water Act 1992;*
- *Weeds Management Act 2013 and Regulations 2001; and*
- *Work Health & Safety (National Uniform Legislation) Act 2011.*



Other licences, agreements, codes and guidelines that apply to the Project include:

- Aboriginal Areas Protection Authority Certificate conditions;
- ANZECC & ARMCANZ. 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality - Volume 1 - The Guidelines. Artarmon, NSW: Australian Water Association;
- ANZECC / ARMCANZ. 2000b. Australian guidelines for water quality monitoring and reporting. National Water Quality Management Strategy Paper No 7;
- ANZECC / ARMCANZ. 2013. Guidelines for groundwater quality protection in Australia. National Water Quality Management Strategy;
- ANZECC, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality;
- AS/NZS 4801:2001 Occupational Health and Safety Management Systems;
- AS/NZS 1547:2012 On-site Domestic Wastewater Management 2012 (Standards Australia/Standards New Zealand);
- AS/NZS 1546.1 Australian Standard On-site domestic wastewater treatment units: Septic Tanks 2008 (Standards Australia/Standards New Zealand);
- AS1940-2004 - The storage and handling of flammable and combustible liquids;
- Australian guidelines for Water Recycling: Managing Health & Environmental Risks (Phase 2006 (Australian Government));
- Australia New Zealand Food Standards Codes;
- Australian Drinking Water Guidelines;
- Australian Groundwater Modelling Guidelines;
- Austroads Guide to Traffic Management;
- Austroads Guide to Road Design;
- Austroads Guide to Road Safety;
- Code of Conduct for Mineral Explorers in the Northern Territory of Australia (2002);
- DENR's Non-Urban Water Metering Policy and Non-Urban Water Metering Code of Practice for water extraction licenses;
- DENR Weed Management Plan for Athel Pine;
- Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites;
- Guideline on Environmental Offsets and Associated Approval Conditions (Northern Territory Environment Protection Authority (NT EPA), 2013);
- Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2013;
- Guidelines for Land Capability Assessment for On-site Wastewater Management 2014 (NT);
- Indigenous Land Use Agreement (ILUA) between Kentor Minerals (NT) Pty Ltd and Central Land Council;
- National Environmental Protection Measures (NEPM);
- NT Parks and Wildlife Conservation Masterplan (Baker, 2005);
- NT Weed Management Handbook (Weed Management Branch, 2015);
- NT Worksafe Codes of Practice;
- NT Land Clearing Guidelines;
- Threat Abatement Plan for Predation by Feral Cats (DoEE, 2008);
- Threat Abatement Plan for Competition and Land Degradation by Rabbits (DoEE, 2008); and
- Waste Management Guidelines for Small Communities in the Northern Territory (LGANT).

### 3.2 Non-Statutory Obligations

- Australian Department of Industry, Innovation and Science Handbooks on sustainable practice in the mining industry;

- Bonya Memorandum of Understanding between Arramwelke Aboriginal Corporation and Kentor Minerals (NT) Pty Ltd;
- IECA Best Practice Erosion and Sediment Control Guidelines 2008.

## 4 Construction and Operational Activities

### 4.1 Summary of Life of Mine Plan

The life of mine schedule has been developed based on information from several key project phases.

1. Approval
2. Construction
3. Operation
4. Closure

The life of mine plan is based on a geological model formed using current knowledge of Indicated and inferred mineral resources. Subsequent exploration drilling results have the potential to impact the overall life of mine schedule, in particular the mining, rehabilitation, decommissioning and closure scope and timeframes. The potential remains that the mine life will be expanded depending on exploration drilling results from other potential mineralised zones.

Current planning outlines the following sequence:

- EIS completed – 2019
- Construction – 2024-2025
- Commissioning – 2025
- Mining – 2025-2037
- Decommissioning and Closure – 2036-2038; and
- Final Rehabilitation \*– 2030-2039.

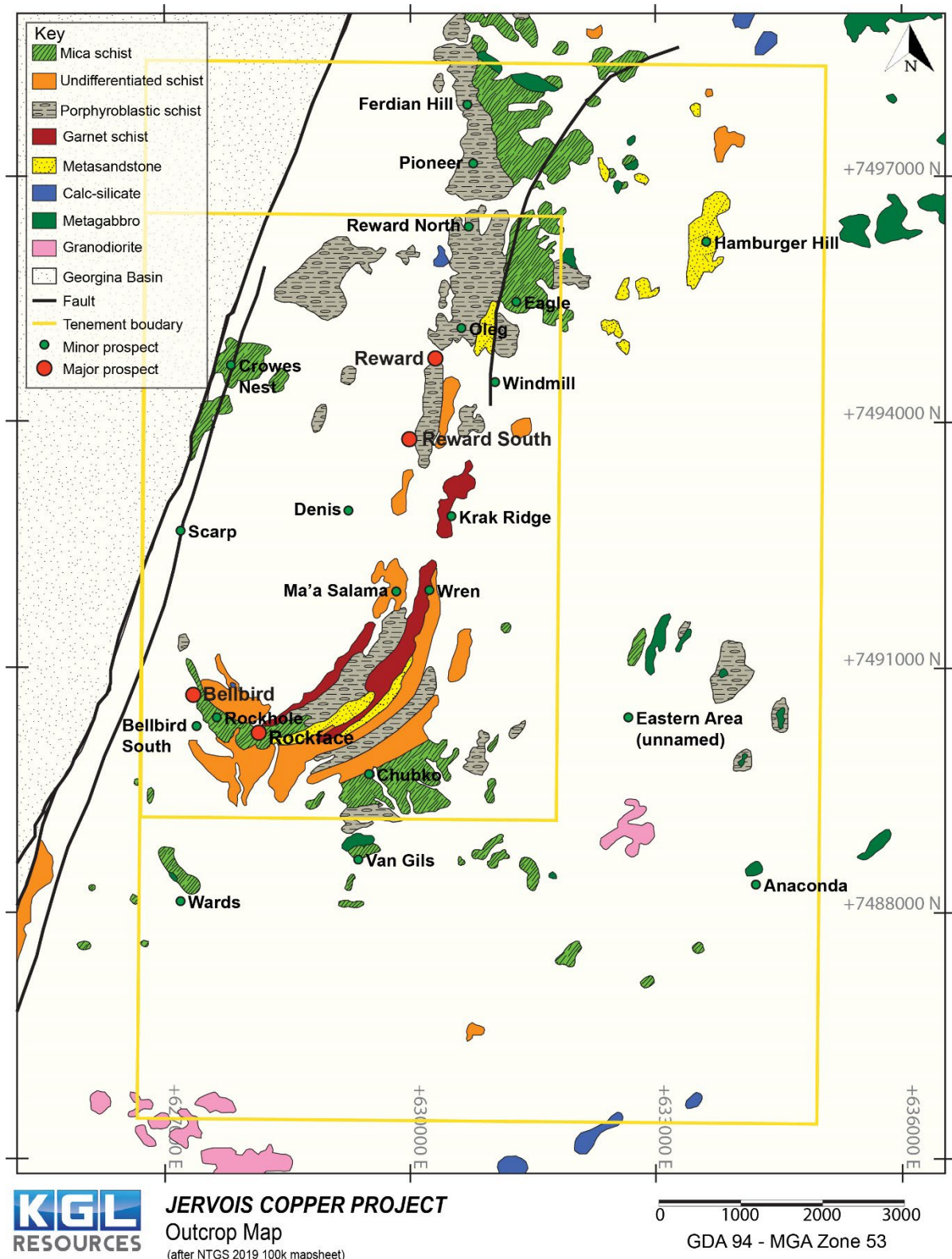
*\*Progressive rehabilitation will commence as areas become available throughout the life of the Project.*

Initially Jervois Operations will focus on mining Copper ore from the Reward Open Pit, then to Bellbird open pit. Mining then moves to the Reward / Marshall Underground, Rockface Underground and the Bellbird Underground.

Ore supply from the open pit provides an initial process plant throughput rate of 2.0Mtpa, moving to underground sources provides the process plant throughput rate of 1.6mtpa.

### 4.2 Mining Reserves and Geology

The Project comprises the mineralised deposits of Reward/Marshall, Reward South, Bellbird, Bellbird North and Rockface. Additional areas of mineralised zones are known on the site and potentially will become mine developments. (See Figure 28 Geological Overview of the Jervois Project).



**Figure 28 – Geological Overview of the Jervois Project**

Base metal mineralisation at Jervois is hosted by a lower-to-middle amphibolite grade metasedimentary sequence of the Bonya Metamorphics. The Bonya Metamorphics is a unit in the Aileron Province of the Palaeoproterozoic eastern Arunta Region that reached peak metamorphism during the regionally extensive high-T low-P Strangways Event. The base metal mineralisation at Jervois is stratabound and contained within steeply dipping lenticular bodies (lodes) of calc-silicate, garnet-chlorite-magnetite rock and garnet-magnetite quartzite, within a thick succession of spotted andalusite-cordierite schist and quartz-sericite-magnetite schist.



The mineralised sequence has a strike length of some 12 kilometres and a stratigraphic thickness up to about 600 metres.

The project consists of a series of complex, narrow, structurally controlled, sub-vertical sulphide / magnetite-rich deposits hosted by Proterozoic-aged, amphibolite grade metamorphosed sediments of the Arunta Inlier. Mineralisation consists of veinlets and disseminations of chalcopyrite in the fresh zone with malachite / azurite / chalcocite in the oxide zone. In addition, smaller scale lenses of high grade galena (and sphalerite) semi-massive to massive mineralisation occur in fresh rocks with oxide equivalents including cerussite and anglesite. Generally these lenses are associated with more carbonate-rich host rocks occurring at Reward, Reward and Bellbird North.

The current Resources identified at the Jervois Project are summarised in Table 19.

**Table 19 – Mineral Resources at September 2022**

Resource		Mineralised Mass (Mt)	Grade			Metal			
Area	Category		Copper (%)	Silver (g/t)	Gold (g/t)	Copper (kt)	Silver (Moz)	Gold (koz)	
Open Cut Potential > 0.5% Cu*	Reward	Indicated	3.84	1.8	39.4	0.31	69.1	4.9	38.2
		Inferred	0.65	0.92	9.2	0.07	5.9	0.2	1.5
	Bellbird	Measured	1.23	2.53	15.1	0.14	31.2	0.6	5.6
		Indicated	1.26	1.45	9.1	0.17	18.2	0.4	6.8
		Inferred	1.02	1.24	10.6	0.12	12.7	0.3	4
	<b>Sub Total</b>		<b>8</b>	<b>1.71</b>	<b>24.8</b>	<b>0.22</b>	<b>137.1</b>	<b>6.4</b>	<b>56.1</b>
Underground Potential > 1% Cu*	Reward	Indicated	4.78	2.12	42.6	0.45	101.6	6.6	69.2
		Inferred	4.32	1.56	19.6	0.2	67.3	2.7	27.8
	Bellbird	Indicated	0.33	2.33	19.8	0.14	7.8	0.2	1.5
		Inferred	2.84	2.09	12.3	0.11	59.1	1.1	9.7
	Rockface	Indicated	2.8	3.37	21.4	0.23	94.3	1.9	21.1
		Inferred	0.73	1.92	19	0.18	14	0.4	4.2
	<b>Sub Total</b>		<b>15.8</b>	<b>2.18</b>	<b>25.5</b>	<b>0.26</b>	<b>344.1</b>	<b>13</b>	<b>133.5</b>
Sub Totals		Measured	1.23	2.53	15.1	0.14	31.2	0.6	5.6
		Indicated	13.01	2.24	33.3	0.33	291	13.9	136.9
		Inferred	9.55	1.67	15.7	0.15	159	4.8	47.1
<b>Total</b>		<b>23.8</b>	<b>2.02</b>	<b>25.3</b>	<b>0.25</b>	<b>481.2</b>	<b>19.3</b>	<b>189.6</b>	

For the purposes of allocating open pit and underground extents for the Mineral Resource the Mineral Resource Estimate uses two different cut-off grades (CoG) which were applied as:

- Open Pit extent - above the 200 mRL - using a 0.5%Cu cut-off; and
- Underground extent - below the 200 mRL - using a 1.0%Cu cut-off.

As further work continues on the Project feasibility study, it is expected that proven and probable reserves will continue to change as results from exploration activities continue to improve levels of confidence in the Project Resource.

### 4.3 Project Construction

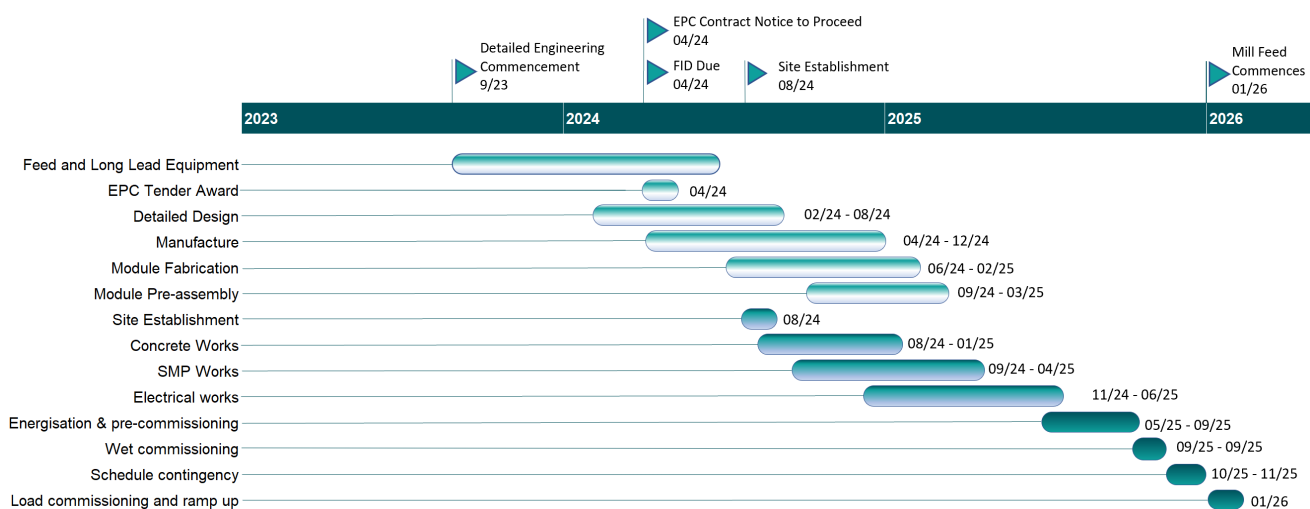
Construction of the Project will commence with installation of support infrastructure such as communications infrastructure, the accommodation village and the water supply system, all of which will be required to facilitate major aspects of construction.

Early works will require small scale earthworks to commence within the camp and water supply footprints as well as to tie these areas in with other infrastructure along routes that contribute to the final Project layout.

In terms of a general sequence, as support infrastructure is commissioned, a larger workforce will be mobilised to site in an iterative manner. As accommodation becomes available in the permanent village, additional people will be mobilised to site for the project. Permanent mining personnel will be mobilised to site as construction focussed people complete their work scopes and demobilise. Manning estimates identify similar work group sizes for the construction and operational periods.

In preparation for mining and processing activities, the mine will be constructed over a 2 year period. The delivery period for the construction project is driven largely by long lead items such as the mills which have a 12 month lead time (purchasing period). A summary project construction schedule is shown below.

**Table 20 – Project Construction Schedule Summary**



**4.3.1 Construction Input/Material Requirements**

Infrastructure construction inputs needed to support the construction of the processing plant and the Project in general have been refined through detailed mine planning and include those nominated in Table 21. Construction materials required will include modular water and fuel storage tanks, power station components, modular buildings for the accommodation village and associated administration offices. Construction materials for hardstand areas and mine roads will be sourced from onsite borrow pits and suitable waste rock material from mining pits.

**Table 21 – Project Construction Materials Estimate**

Description	Quantity	Unit
<b>Processing Plant</b>		
Structural Steel	4,700	tonnes
Platework	92	tonnes
Field erected tanks	51	tonnes
Mechanical equipment	192	each
Conveyors	584	metres
Piping	30,500	metres
Buildings - Plant	3,327	m <sup>2</sup>
Buildings - Mining	372	m <sup>2</sup>

Description	Quantity	Unit
Diesel Fuel	6,500,000	litres

#### 4.3.2 Removal of Land Contamination

The Jervois mine site is a brownfield/disturbed site being part of a historic mining district which has been mined sporadically for almost 90 years. Modern mining started in 1982, with open pit mining at Green Parrot and a newly commissioned treatment plant designed to treat Green Parrot lead-zinc-copper-silver ore. A combination of technical difficulties and a sharp decline of global metal prices, the plant was placed on care and maintenance in December 1983 and has not operated since. There is a substantial amount of existing disturbance at the Jervois Project site as a result of these historical activities within the area (Figure 8 in Section 1.3.2). Historic mining disturbance includes tailings storage facilities, waste rock dumps, decommissioned processing plants and equipment, pits, prospecting trenches, ROMs, water storages and evaporation ponds, an exploration camp, exploration disturbances, roads and tracks. Potential sources of land contamination include the TSF, ROMs, processing plant and the possible milled ore at the processing plant, pits, underground shafts, prospecting trenches and old plenty river mining camp.

Site contamination will be assessed in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 to ensure sound environmental outcomes are achieved and there is adequate protection of human health and the environment. Additional details for site assessment methodology are included in the Mine Rehabilitation and Closure Plan (MRCP).

To minimise further disturbance by the new mining operation, it is proposed that new infrastructure will be located over some of the existing disturbance area. Re-handling of the historic mine materials and potential contamination sources will be managed to demonstrate isolation from the receiving environment.

Placement of a waste dump to the south of the proposed Reward open pit will cover a significant area impacted by legacy mining. The area covered is currently impacted by an open pit, waste dumps, costeans and scrap materials.

Previous mining infrastructure such as steel and concrete will be removed from areas required to be developed for the Project. It is intended that old infrastructure is reduced in volume (crushed or cut up) where practical and encapsulated in the earthworks body that forms the ROM pad or the southern waste dump. Materials that have value or that cannot be practically encapsulated will be cut up and removed from site.

The ROM Pad landform is proposed to be constructed using non-acid forming (NAF) materials predominantly from early mining activity at Reward Pit and will form permanent storage for historic mining materials that can be readily encapsulated.

#### 4.3.3 Site Access

The site is currently accessed via Road 194 (also known as Lucy Creek Access), which meets the Plenty Highway approximately 18km south of the site. The existing site accesses are as follows:

- a formal 4-6m wide unsealed road, located 18km north of the Plenty Highway
- an informal 3m wide track, located 16km north of the Plenty Highway

Lucy Creek Access is a rural road which provides access to Lucy Creek Station and the Project site. The road is unsealed with a total carriageway width of approximately 20m, consisting of a single 6m wide lane with 7m wide shoulders.

The Plenty Highway forms a three-arm priority-controlled intersection with the Stuart Highway approximately 300 km west of Lucy Creek Access, where it forms the minor approach. To the east, the Plenty Highway intersects with Urandangi Road about 194 km from Lucy Creek Road. Once into Qld, the Plenty Highway



becomes the Donoghue Highway which terminates at its intersection with the Diamantina Developmental Road (Boulia Mt Isa Highway). Roads in Queensland have a 100 km/hr speed limit.

The Stuart Highway runs in a north-south direction from Adelaide to Darwin via Alice Springs. In the vicinity of the intersection with the Plenty Highway, the Stuart Highway has a posted speed limit of 130km/h and a carriageway width of approximately 12m, comprising two 3.5m wide sealed traffic lanes and 2.5m wide unsealed shoulders.

### Project Traffic

Vehicles accessing the Project (roads external to the Project) for Construction and Operational phases are shown in Table 22 below. Trips are counted one each for a single vehicle passing (in either direction), that is, a return trip of a single vehicle is counted as two.

**Table 22 – Traffic Estimates**

Construction Phase	Vehicle Type	Vehicles / Day	Vehicles / Hour
Input - Materials	Double Road Train	6	1
Input - Diesel	Double Road Train	2	1
Transport - Operational Staff	Bus	2	1
Transport - Administration and Camp Staff	Bus	2	1
Transport - management	Light Vehicle	4	2
Transport - Contractors	Light Vehicle	8	3
<b>Total</b>		<b>24</b>	<b>9</b>
<b>Operational Phase</b>			
Output - Copper Concentrate	Triple Road Train	14	2
Input - Materials	Double Road Train	2	1
Input - Diesel	Double Road Train	2	1
Transport - Operational Staff	Bus	2	1
Transport - Administration and Camp Staff	Bus	2	1
Transport - management	Light Vehicle	4	2
Transport - Contractors	Light Vehicle	6	3
<b>Total</b>		<b>25</b>	<b>10</b>

Copper concentrate produced by the Project may be sold within Australia or exported overseas. An offtake agreement has been made to sell Jervois copper Concentrate into the Mt Isa smelter. The currently preferred sale point is to Mt Isa, the concentrate being transported as follows, shown in red in the image below.

- East along the Plenty Highway,
- Turning North at Tobermorey along the Urandangi North Road
- Then turning North along the Diamantina Developmental Road to Mount Isa.



**Figure 29 – Mt Isa Concentrate Transport Route**

Progression of the Outback Way initiative in sealing the Plenty Highway is advancing easterly, it may be preferred for the concentrate haulage to follow the sealed road toward the Diamantina Developmental Road depending on local road conditions.

**Site Traffic**

Roadways will be constructed on an as needs basis to support other construction activities and development in areas around the Project. Land disturbance will be delayed if practical to provide access to infrastructure in a just-in-time strategy.

Pavement design for the Jervois project is broken into two distinct types; Light Vehicle Roads and Haul Roads used for ore haulage between the mining pit(s) to waste dumps or the RoM pad. The sections below detail the methods and inputs used to design these two pavement types.

Estimated construction traffic quantities including a breakdown of each vehicle type and number of loaded and unloaded trips expected during construction is shown in Table 23 below. Note the vehicle trips are calculated as a single direction.

**Table 23 – Design Traffic for Project Roads**

Vehicle Type	Trips during construction (return)
Short Vehicle / LV	676
Semi-Trailer Truck	68
Double Trailer Road Train	287
Triple Trailer Road Train	6
Oversized Loads	280

### Light Vehicle Road Pavement

All pavements designed to not be traversed by mining haul vehicles including the mine access roads have been considered light vehicle pavements. These pavements will be designed using recommendations in Austroads “Guide to Pavement Technology” or based on Queensland Mining’s “Recognised Standard 19” (Aug 2019) as this is the recognised industry best practice.

Naturally occurring subgrade materials will vary in nature along the length of the road and hence specific subgrade strength (CBR) will need to be confirmed by geotechnical material property testing prior to construction so that each section of road design can be adjusted based on insitu materials encountered.

Final designs will select the most efficient pavement which experienced a Cumulative Damage Factor (CDF) of less than 1 throughout its lifetime. This CDF is an indication of when a pavement reaches the end of its serviceable life and the pavement will begin to deform beyond acceptable limits.

Roads will be constructed along alignments in accordance with the agreed site layout, in typical sequence as follows:

1. Delineate the disturbance area using survey,
2. Strip topsoil and stockpile,
3. Rip, moisture condition natural ground in fill areas prior to fill being placed
4. Excavate as required in areas of cut
5. Form the road profile to subgrade level
6. Place granular material (site won) to form the running course,
7. Form safety bunds at the road edge as required,
8. Finalise local drainage and install road furniture
9. Commission and maintain,

The two main mine access roads to the Project are the processing plant and the accommodation village access roads which run from the Lucy Creek Access Road 194. These roads are approximately 3.5 km long and 0.3 km long respectively and are shown on Figure 6 Proposed Project Infrastructure. Based on the recommendations in the Traffic Impact Assessment (Appendix C-2), minimum 8.7 metre wide access roads to the Project will be provided, consisting of a single 3.7 metre wide unsealed lane with 2.5 metre shoulders.

### Haul Roads

Haul roads will link the open pit and underground production operations with the waste dumps and ROM pads. These haul roads will be for general vehicle and haul trucks with suitable design speeds and local speed restrictions in key areas including around site infrastructure.

Design vehicle for cross-section, pavement design, horizontal and vertical alignment for site haul roads will be a fully laden 90 tonne capacity haul truck. Minimum design standards for the haul roads will be dual width designed for this size haul trucks as detailed in the below table. Final design will take into consideration weather, ground conditions and drainage in each area, as well as availability of suitable material for construction and maintenance.

**Table 24 – Haul Road Design Standards**

Truck	Truck Width (m)	Tyre Diameter (m)	Bund Height (m)	Bund Width (m)	Drain Width (m)	Minimum Running Width (m)	Total Width (m)
90t Haul Truck	6.49	2.68	1.34	4.68	1	22.72	28.4

A larger suite of mining equipment has been proposed to improve mining economics, the design standards listed above would be adapted for the actual vehicle to be used, any variation to road geometry will be



incorporated into construction once the mine (haul) vehicles are ordered.

#### **4.3.4 Topsoil Stripping**

Topsoil will be removed from infrastructure areas and supporting infrastructure areas such as roads, waste rock storage footprints and building areas as soon as practical, prior to individual areas being required for construction or mining activities. Based on the Soil and Landscape Assessment undertaken for the project, topsoil will be stripped to a depth of between 0.05 m to 0.3 m and stockpiled in dedicated topsoil stockpiles, at convenient locations, to a height of not more than 3 m.

Topsoil will be stockpiled in locations that separate it from typical operational activities or from environmental influences such as flooding which may compromise the topsoils' value. Topsoil will be replaced over landforms as they are completed to final profile to support vegetation establishment across the Project site as part of erosion and sediment control.

#### **4.3.5 Earthworks Cut and Fill**

Earthworks will be undertaken on a continuous basis following establishment of support facilities such as accommodation, fuel storage, workshops and offices.

Earthworks will be undertaken area by area in as close to practical a localised cut to fill balance such that materials are handled once from excavation and being placed in their final position. Earthworks for the Project is scheduled to complete within 18 months of commencement.

Earthworks will use conventional heavy equipment such as scrapers, dozers, excavators, trucks and compactors. A support fleet including graders, water trucks and service vehicles will provide assistance to the earthworks fleet as required.

Disturbance areas will be identified using modern survey instruments and delineated using physical identifiers such as survey pegs and high visibility tape. Shrubs and trees will be removed only where need be and shredded for use as erosion control measures or on gardens to reduce evaporation rates. Topsoil will be stripped from areas only where required.

Quality assurance testing will be undertaken throughout the earthworks period, testing will confirm works comply with relevant work specifications. Geotechnical quality assurance testing will be undertaken in accordance with AS1289, specifically:

**Table 25 – Geotechnical Quality Assurance Testing**

Method Reference	Description
AS 1289.1.1-2001	Sampling and preparation of Soils—Preparation of disturbed soil samples for testing
AS 1289.2.1.1-2009	Methods of testing soils for engineering purposes - Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method
AS 1289.3.1.2-2009	Methods of testing soils for engineering purposes-Soil classification tests - Determination of the liquid limit of a soil
AS 1289.3.2.1-2009	Methods of testing soils for engineering purposes-Soil classification tests - Determination of the plastic limit of a soil - Standard method
AS 1289.3.3.1-2009	Methods of testing soils for engineering purposes-Soil classification tests - Calculation of the plasticity index of a soil
AS 1289.5.1.1-2016	Determination of the dry density/moisture content relation of a soil using standard compactive effort
1289.6.1.1-2009	Determination of the California Bearing Ratio of a soil – Standard laboratory method for a remoulded specimen
AS 1289.5.4.2-2007	Compaction control test - Assignment of maximum dry density and optimum moisture content values
AS 1289.5.7.1-2016	Determination of the relative compaction of a soil

Erosion control measures largely feature around prevention, by undertaking earthworks susceptible to erosion outside the wet season. In preparation of rainfall and runoff, land rehabilitation including establishment of vegetation will be undertaken where practical, during dry months of the construction period. Vegetation establishment will utilise local and native species to the project area, establishment of vegetation is key to erosion control.

Gullies and other similar natural topographic features within the disturbance footprint make ideal locations for installation of sediment traps. Where earthworks are ongoing up to rainfall occurring, erosion control measures will be put in place to capture sediment close to the sediment source.

An Erosion and Sediment Control Plan is being prepared for the site and will be completed prior to ground disturbance.

#### **4.3.6 Water Supply Pipeline**

The Project water supply pipeline route will be installed between the groundwater borefield to site. The borefield is located around 20km (as the crow flies) to the NW of the project area, or around 45 km by road. The pipeline shall be installed parallel to existing roads and tracks; adjacent to site access tracks, alongside the Lucy Creek Road until Bore RN019950 thence directly west until it meets the main borefield area where it will follow Lucy Creek station tracks. The position of the pipeline can be locally altered within the allowable corridor alignment to bypass trees, isolated rock outcrops or other obstacles to excavation.

The pipeline and pumping system will be installed during the dry season to support the main body of construction works and to reduce the potential for erosion along the pipeline which is more likely during rainfall and associated runoff events. The pipeline area disturbed, will be reshaped to conform with the surrounding areas, vegetation will be established as a priority once pipe laying has completed. Vegetation establishment works will be undertaken sequentially with pipelaying.

The pipeline will be buried along its entire length except within each fenced bore enclosure and where the pipe approaches the raw water tank. Generally, exposures of the piping system will be limited to air scour valves and drain valves, installed typically at high points and low points respectively. Air scour points are to be protected using capped steel collars to enclose the valves and protect against damage or vandalism. Pipeline burial will be deeper than other areas, within waterways and where the pipeline crosses roads.

Following commissioning of the water supply system, the pipeline route will be rehabilitated to reinstate the pre-disturbed land condition and ensure no material change to any waterway occurs. All reasonable and practicable measures will be taken to re-establish surface drainage lines, reinstate the top layer of the soil profile and promote establishment of vegetation of the same species and density of cover to that of the surrounding undisturbed areas. Rehabilitation will aim to ensure maintenance requirements are no greater than that required for the land prior to disturbance. Rehabilitation monitoring will be conducted in accordance with the MRCP for three years after completion of pipeline construction, or until it can be demonstrated by an independent suitably qualified person, that rehabilitation objectives have been met.

#### **4.3.7 Camp Facility**

The camp facility will be formed using demountable/portable light weight buildings for accommodation, recreation and messing requirements. It is currently proposed that steel screw footings are used to support individual buildings, verandas and the like. Screw footings will reduce topsoil stripping requirements and localised earthworks is largely negated for buildings.

Screw piles will be spun into the ground to form low steel columnar supports for buildings to rest upon. The steel supports will be cut to level accordingly. Buildings will be lifted into position using either a heavy forklift or a crane with buildings being fastened to the steel supports via bolting or welding.

Verandas will be placed at each building in accordance with the camp layout, verandas will also be founded on screw piles. Walkway alignments through the camp will be cleared of vegetation and topsoil with walkways formed using either concrete, pavers or granular material. Level variation between verandas and walkways will be accounted for generally using steps except in all-access areas.

Services will be laid either above ground or below depending on the successful vendor bid. Wastewater septic systems and/or the treatment plant will be positioned downslope and downwind of the camp facility.

The sewage treatment facilities will be installed and maintained in accordance with the provisions of the Territory Health Services *Code of Practice for On-site Wastewater Management*. The relevant approvals will be obtained for all septic tank installations. Approvals will be in accordance with the *Draft Guidelines for Wastewater Works Design Approval of Recycled Water Systems 2014* and *Guidance for Completion of Wastewater Works Design Approval Applications*. Installation will be carried out by licensed installers in accordance with regulations under the *Public Health Act* and the system will be serviced and desludged at nominated intervals by appropriately trained maintenance contractors. Plumbing and drainage works will be in accordance with the *National Plumbing and Drainage Code, AS 3500 Part 2, Sanitary Plumbing and Sanitary Drainage* and any NT amendments to this Code.

Accommodation will be complete with ensuite for all rooms, sufficient laundries will be located throughout the camp allowing residents to launder their own clothes. Recreation and gym facilities will be provided for residents as well as a shop for basic items required.



The camp facility will provide a limited number of car parking spaces for buses and small vehicles. The parking and local roads at the camp will include a loading dock and turn around area for delivery trucks servicing the camp.

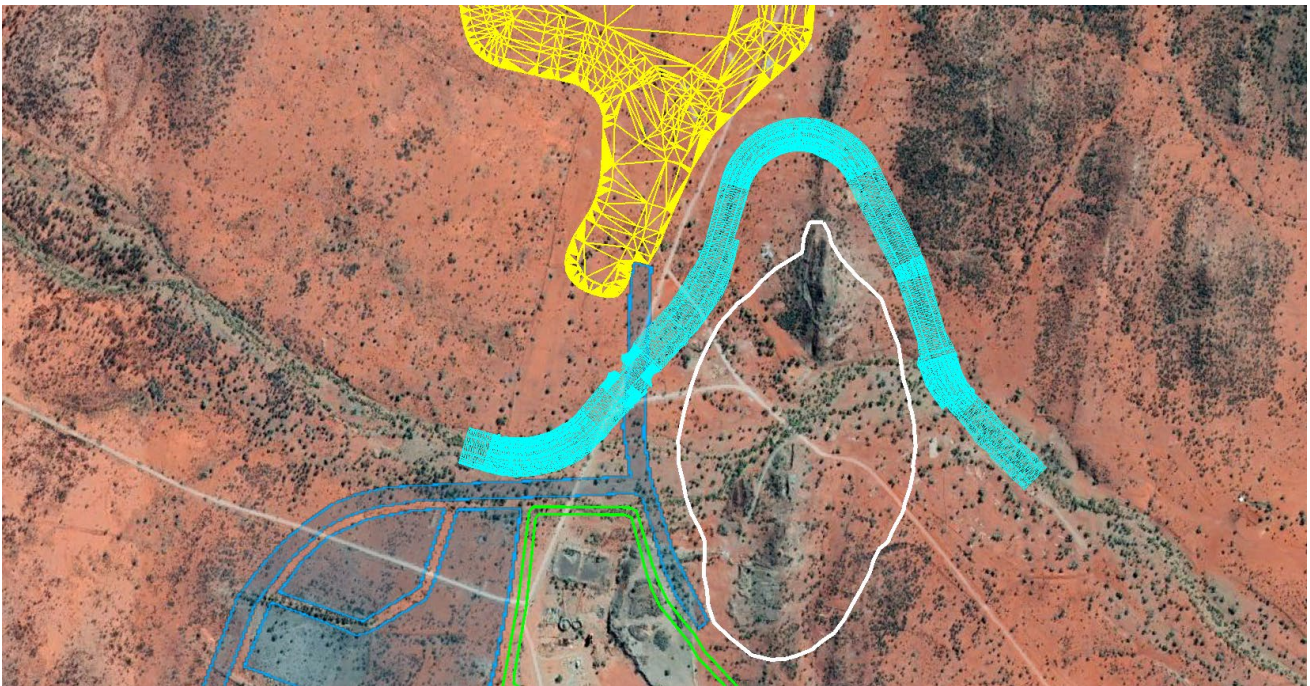
Personnel will commute to and from the camp facility generally by bus. On arrival, residents will be allocated accommodation on a permanent basis during operations, hoteling style accommodation is likely during construction due to variability in the workforce.

Personnel will be shuttled between the camp and the Project area generally by bus each day (unless a company owned light vehicle has been provided). Meals will be served morning and evening in the camp mess, mid shift meals will be taken from the mess at the pre-shift meal time and consumed in crib rooms within various areas of the Project site.

#### **4.3.8 Unca Creek Diversion**

The Reward Pit is located within the channel and floodplain of Unca Creek to the north of the process plant. It is proposed to permanently divert Unca Creek north around Reward Pit.

The creek diversion will ensure that the Reward Pit is protected from flows from the upstream catchment (including overflows from Jervois Dam) for events up to and including 0.1% AEP (1,000 years ARI). The final landform between the Reward Pit and the creek diversion will ensure that the final void is protected from inundation for all flood events up to and including the Probable Maximum Flood (PMF) event.



**Figure 30 – Unca Creek Diversion (light blue) between the proposed Reward Open Pit (white) and Northern rock dump (yellow)**

The Unca Creek diversion is provided in detail in the Unca Creek Diversion Design Report (WRM, 2020). The detailed diversion design will be submitted for approval prior to these construction works commencing.

#### 4.3.9 Tailings Storage Facility

The tailings storage facility will consist of a single cell and will be constructed using mine waste sourced from mining pre-strip, diversion drain excavation and locally borrowed soil materials. The TSF containment basin will include a continuous impermeable HDPE liner to achieve an appropriate level of seepage control and an underdrainage layer to capture seepage which would then be returned to either the TSF or the Process Water Dam.

The floor of the TSF will be shaped using conventional earthmoving machinery, excavated to increase impoundment volume and to provide construction materials for the confining embankment. A drainage layer will be placed over the base materials, shaped to direct through flow seepage to a low point where a pumping system will be located.

Extensive geotechnical investigation was undertaken as part of the TSF design to identify the range of materials available at site for use in landform construction. Test pitting and borehole drilling did not identify sufficient fine grained soils to be able to form a layer of sufficiently low permeability. An alternative was sought that incorporated blending of bentonite into the confining layer however this proved to be impractical due to the cost of transporting and blending bentonite for the confining layer.

Fine grained materials identified during geotechnical investigation shall be won and carefully segregated from coarse materials. Fine materials will be moisture conditioned and well compacted, used in various locations around the project where low permeability materials are required.

The TSF embankments allow for a containment freeboard of 0.5 m between construction phases which provides sufficient storage volume exceeding volume resulting from a 1 in 100 year rain event.

The anticipated TSF capacity will be approximately 17.4 Mt over the Project life at a rate of around 170 dry tonnes per hour. Tailings will be discharged into the facility by means of spigots located at regular intervals along the external embankments. Via close management, spigots will discharge tailings to 'push' the supernatant pond centrally around the active decant tower. The active tailings beach will be regularly rotated to promote de-watering of the tailings and volume minimisation of the supernatant pond.

The design objectives for the tailings storage facility included several aspects being:

- Permanent and secure containment;
- Maximisation of tailings densities through sub-aerial deposition;
- Removal and re-use of excess water;
- Seepage control;
- Storage capacity to retain a 1 in 100 year recurrence interval, 72 hour duration storm event throughout the life of the Project;
- Ease of operation;
- Rapid and effective rehabilitation.

A basin underdrainage system will be incorporated to control seepage, increase tailings densities and improve the geotechnical stability of the TSF. The underdrainage system drains by gravity to a collection tower located at the lowest point in the TSF basin. Supernatant water will be removed from the TSF via a central decant tower extraction system which acts like a large groundwater well. Solution recovered from the decant system will be pumped back to the Process Plant (typically via the Process Water Pond) for re-use in the process circuit.

Erosion protection will be placed around the toe of the TSF confining embankment where there is risk of significant water flow which may erode the embankment. Ground outside the confining embankment will be shaped to shed water away from the embankment where practical.

The TSF is designed following the ANCOLD "Guidelines on Tailings Dams" which are summarised in Table 26.

Table 26 – TSF Design Parameters

Guideline Requirement	Description of requirements	Guideline Reference
Extreme storm storage	1 in 100 year AEP 72 hour duration storm with no release, evaporation or decant.	ANCOLD 2012 Table 4
Contingency freeboard	Wave run up associated with a 1:10 AEP wind velocity and an additional freeboard of 0.5 m	ANCOLD Table 5
Spillway Capacity	1:100,000 year Annual Exceedance Probability (AEP) design flood with freeboard allowance to suit wave runup for 1:10 AEP wind velocity	ANCOLD Table 6
Design Earthquake loading	OBE – 1 in 1,000 year MDE – 1 in 10,000 year Post Closure – MCE	ANCOLD Table 7
Stability Minimum Factor of Safety	Long Term Drained – 1.5 Short Term undrained Downstream – 1.5 Upstream – 1.3 Post Seismic – 1.0 to 1.2	ANCOLD Table 8
Dam safety / inspection frequency	Inspection by Dam Designer or equivalent qualified Engineer – Annual Inspections Routine inspections – daily to 3 times per week	ANCOLD 2012 Tables 8 and 9

Tailings pipelines will be located generally within open trenches which are able to drain to points where in case of pipeline rupture, tailings would be able to be captured and readily reclaimed by conventional machinery. Reclaimed tailings would be placed in the TSF. Tailings pipelines will be monitored as part of Short Interval Control work methodology to ensure that any issues are identified in a reasonable time and acted upon promptly to reduce any negative effect.

#### 4.3.10 Process Facility

The Projects process facility has been designed in accordance with relevant Australian Standards, international standards and other design guidelines as appropriate to current industry practices. The process facility will be assembled using conventional construction machinery and will comprise items made of conventional materials such as concrete, steel, plastic, fiberglass and rubber etc.

On the completion of process facility earthworks, foundations will be formed of steel reinforced concrete onto which steel framework, tanks or other infrastructure will be installed.

As much as practical, the process plant will be assembled off site, in modules. Modules will be brought to site and assembled in a specific sequence to suit bottom-up construction. Assembly of items will be concurrent in various areas in order that support machinery such as cranes and work platforms, are efficiently utilised.

Tank shells will be rolled off site and assembled at site, other steel work will be fabricated as much as possible off site to simplify installation and to expedite construction. Conveyors will be fabricated entirely off site and assembled at site.



Motor Control Centres and electrical switch boards for the process plant and infrastructure areas will be fabricated off site, transported individually and installed by crane. Where practical, instrumentation will be pre-installed off site as well as valving, local control stations and piping.

Electric cable will be supplied to site and site run using conventional methodologies. Termination of cables at local control stations, equipment and into the MCC will be undertaken at site.

#### **4.3.11 Electricity Provision**

Power to the Project will be supplied by a Hybrid Power generation facility consisting of a wind farm, a solar (PV) array and a traditional diesel powered power plant. Most recent design refinement in the project power supply has been to include a wind farm. This has enabled a reduction in both the number of diesel powered units as well as the solar (PV) array.

The various components of the Hybrid Power Plant are managed by interfacing the wind farm, solar array and diesel powered units via a Power Station Controller. The system will monitor and control the overall energy and power flow between all primary generating components to support system stability, reliability and power quality.

Analysis has shown that the optimum capacity for the solar PV array is 10 MWp. A single axis tracking array will be installed as it provides for increased energy generation and improved generation profile throughout the day. An 18MW windfarm has been proposed based on available data, wind monitoring is underway at the time of writing to confirm wind resources available at the site. The 18MW would most likely be provided by four turbines each of 4.5MW capacity, this may change however, to be confirmed following engineering based on outcomes of the wind study.

PV DC capacity will be installed in excess of what is needed such that panel degradation would have less of an impact over the lifetime of the panels. Voltage will be stepped up from the PV array to transfer electrical power closer to the centralised Power Station Controller.

The solar power array will be mounted on clip-together footings affixed to the ground, east of the sites' process facility. Diesel engine powered generator units will be placed on pre-cast foundations and contained within silenced containers.

Power network will be installed between key electrical nodes and key infrastructure such as Bellbird portal, the processing facility, accommodation. High Voltage power lines will span between the centrally located power station and peripheral infrastructure such as at Bellbird and Rockface where power will be stepped down to locally required medium and low voltages.

#### **4.3.12 Communications and Data**

Communications facilities for the Project will consist of microwave links between site and Atitjere as well as a redundant satellite system for periods when the microwave link based system is offline.

The microwave link to Atitjere will connect into the National Broadband Network which is currently operating there at a nameplate speed of 500 mbps up and down.

Data system around the site will rely on a 24 core fibre optic backbone which will service the process plant Scada system as well as linking the site wide VHF radio network and groundwater supply system.

The VHF network will be used aboveground as well as in the underground application with repeaters for all-area radio connectivity.

The VHF radio system will be the sites primary communication system in case of emergency.

#### **4.3.13 Administration and Maintenance Areas**

Support infrastructure including administration and maintenance facilities will be installed adjacent to the process facility. The administrative area will be around 300 m<sup>2</sup> in floor area, the HV and LV maintenance areas proposed are 600 m<sup>2</sup> and 150 m<sup>2</sup> respectively. Both the HV and LV workshops have small administration areas.

Infrastructure will comprise transportable buildings connected to form sufficient interior open space. Transportable buildings will be mounted on screw piles in the same manner as the camp facility. Screw piles will limit earthworks requirements in the building areas.

Maintenance of machinery and light vehicles will be undertaken at site, maintenance workshops and offices to be constructed in positions easily accessible from the main haul road connecting the processing area and the Bellbird/Rockface area.

Maintenance areas for both HV and LV equipment will have concrete slabs and will be covered. Slabs will be washable and will drain to oil water separators prior to the water being reused.

The administration and workshop areas will be serviced with lavatories with pump systems that transfer waste to a septic system and evaporation trenches.

Administrative and workshop areas will have adjacent car parking (separate to HV areas) and connecting gravel paved walkways delineated by low earthen bunds.

#### **4.3.14 Stores and Logistic Areas**

Stores and Logistic areas total around 10,000 m<sup>2</sup> and will support inventory storage, receipt and issue for all logistic activities at site. The stores area will be separated into user defined spaces, for the process plant, open pit mining equipment, underground mining equipment and administrative equipment.

Stores area will have some concrete hardstand but will be level (water shedding) and covered in a granular all weather surface.

Stores and logistic personnel will utilise the main administration area, an issues office will be placed at the logistic area, adjacent the workshops.

Stores and logistic areas will be used to locate hazardous goods which will be separated in accordance with relevant regulatory guidelines as detailed in the Hazardous Goods Management Plan. Additional details are contained within Appendix A2.

#### **4.3.15 Fuel Storage**

The Projects main storage facility proposed, will be located east of the Power Station, which is south of the process facility. The fuel facility will be designed and constructed in compliance with AS1940 or applicable regulations in consideration of contained materials. Additional details are contained within Appendix A2.

The fuel storage facility will consist of either a single large tank (assembled at site) or many equally sized tanks of 100,000 litres each. If a large tank is utilised, it will be contained within a lined and bunded area, complete with sufficient containment freeboard to allow for a 1 in 10 year rain event.

Smaller tanks would be containerised and double skinned. Each tank has a footprint of 14.5 m by 2.5 m. Allowing for operational space between tanks, a total area of 2 Ha has been allocated for the fuel farm.

Self-bunded tanks reduce the risk of spillage from the tanks which will be interconnected and computer controlled. Fuel will be transferred from delivery road trains with levels being balanced throughout the fuel farm automatically. Each delivery of fuel will be able to be isolated if required.

Fuel will be transferred to the Power Station day tank as required. All fuel movements will be metered.

#### 4.4 Mining

The Project will involve the extraction of ore from several deposits by open pit and underground mining methods, haulage of the ore to an on-site processing plant, processing to a concentrate which will be transported off site for further processing / smelting.

Detailed descriptions of the mine construction, mining operations, ore processing, tailings and waste rock management and other ancillary processes and activities proposed for the life of the Project are provided in the following sections.

##### 4.4.1 Open Pit Mine Construction Methods

Conventional open pit mining techniques will be applied to the Project development. The main mining activities will include:

- Vegetation and topsoil removal and management - optimising disturbed areas and with progressive rehabilitation where practicable, using excavators, bulldozers, loaders, graders and trucks.
- Connecting to access roads and haul roads using similar construction equipment.
- Drilling and blasting waste rock and ore, generally on five metre high benches, using top-hammer diesel hydraulic drill rigs, with ANFO and emulsion explosives.
- Loading waste rock and ore using 250 & 120 tonne class excavators, hauling using 150 tonne and 90 tonne dump trucks. Ore will be hauled to the ROM crusher area adjacent to Reward Pit, and waste rock hauled to waste dumps adjacent to each pit.
- Geological grade control sampling will be undertaken prior to blast hole drilling and will be undertaken using RC drills. Grade control drill spacing will be determined following a trial prior to mining and calibrated during the mining process.
- Stockpiling of different ore types at the ROM or within waste dump areas (in case that ore mining rates exceed plant throughput) as temporary stockpiles.
- Open pit waste rock management and waste dump construction.
- Surface water and groundwater management.

##### 4.4.2 Open Pit Design Details

Conceptual open pit designs are computer-generated optimised pit shells with overall wall slopes derived from base case geotechnical design parameters, allowing for in-pit haul roads suitable for haul trucks. For the likelihood the site will operate two different class trucks, two-lane roads would be a minimum of 33 metres wide and single lane roads 20 metres wide, both using a maximum gradient of 1V in 9H. The geotechnical design parameters are predicated on depressurised wall rock conditions and are summarised in the table below.

Further geotechnical and hydrogeological assessment is near completion to confirm that depressurisation of wall rocks can be practicably achieved.

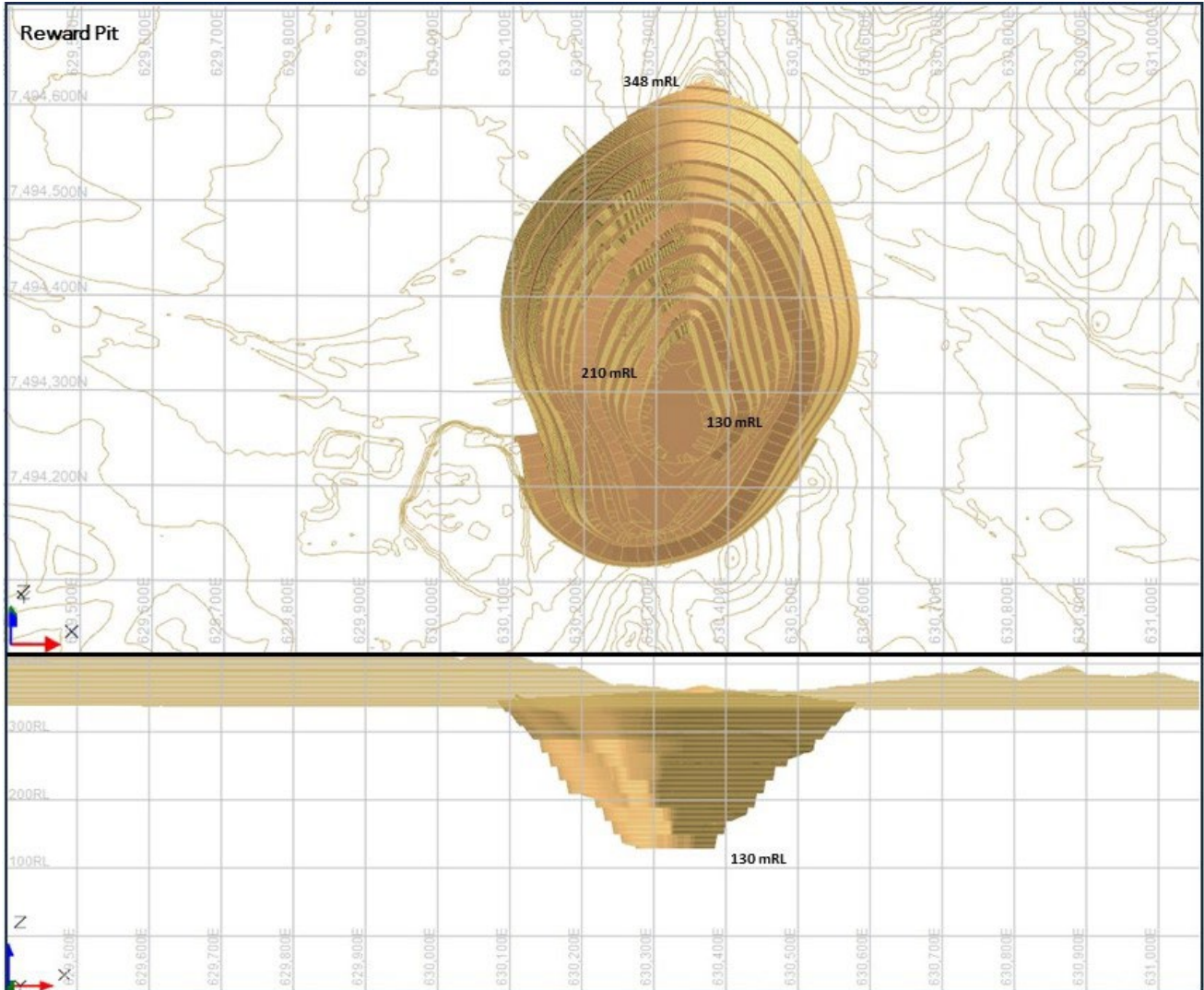
**Table 27 – Open Pit Geotechnical Parameters**

Pit	Elevation	Bench Face Angle (°)	Bench Height (m)	Bench Width (m)	Inter Ramp Angle (°) (excl ramps)
Reward	Surface to 340 mRL	55	20 (or less)	5	46.5
	Below 340 mRL	80	20	10	55.9
Bellbird	Surface to 340 mRL	55	20 (or less)	7	43.6
	Below 340 mRL	80	20	10	55.9



The refined mine plan for the Reward mining area incorporates the Reward open pit, Reward South open pit, Reward underground, two waste rock dumps and one topsoil stockpile. Reward underground will be developed using a single decline, commencing from a portal either north of Reward open pit or from an in pit portal following cessation of open pit mining at Reward.

Reward South open pit and associated waste rock dump have been omitted from the current mine plan as the Project focusses on copper mining.



**Figure 31 -Reward Open Pit Design in plan and cross section (East to the right)**

The Bellbird operation consists of Bellbird open pits, Bellbird underground, a WRD and a topsoil stockpile. Bellbird underground will be developed using a single decline, commencing from a portal to the north of the main Bellbird open pit.

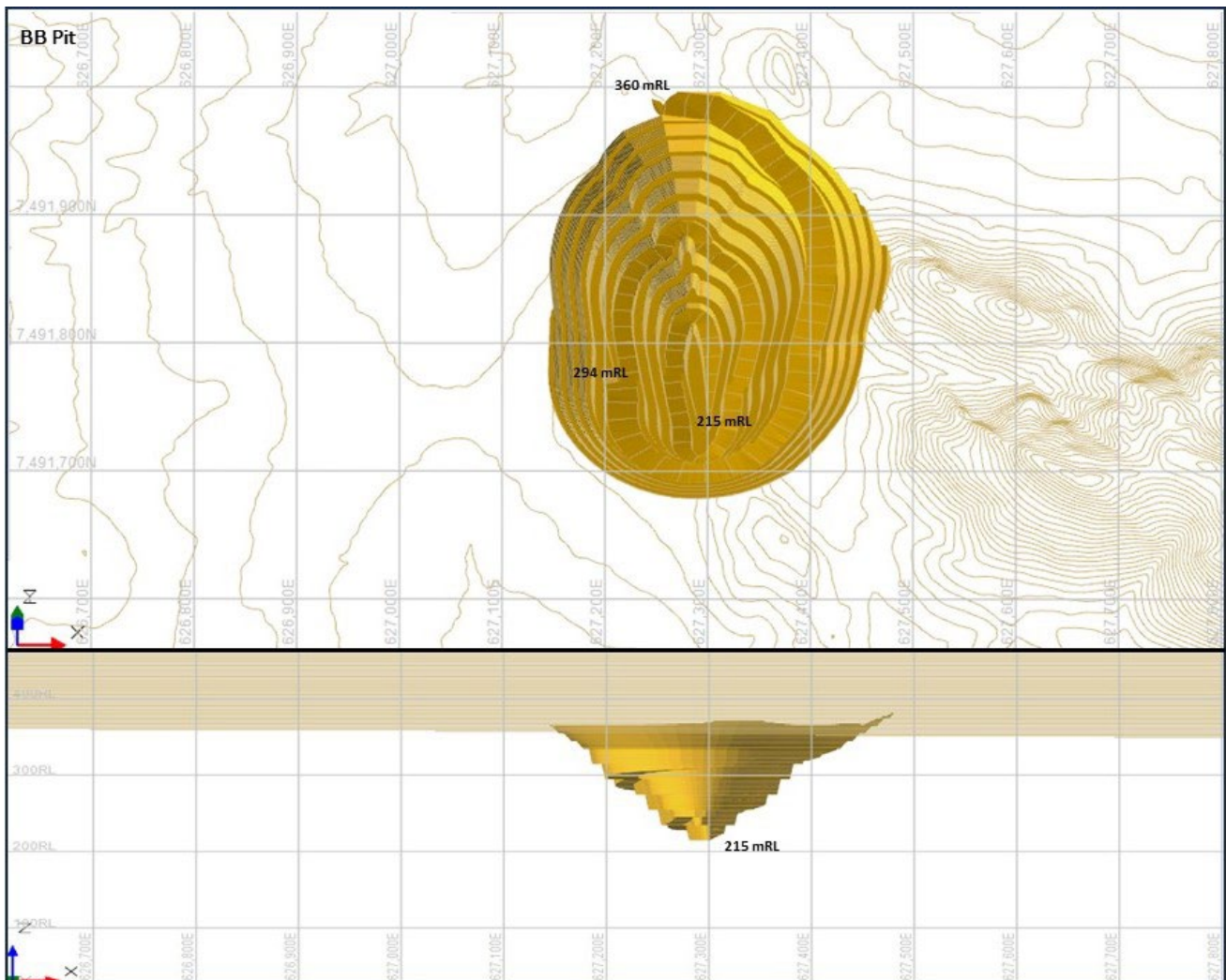


Figure 32 – Bellbird Open Pit Design in plan and cross section (East to the right)

#### 4.4.3 Underground Mine Design Details

Access declines will be developed with 1V in 7H gradients, with a minimum 30 metre stand-off from the orebody for stability. The Reward and Bellbird portals will be developed in the open pit batters in fresh rock. Current preliminary designs for the underground mining incorporates 30 metre level from floor to floor.

Ground control in stopes will be a combination of cable bolts, pillars being left in narrower or lower grade areas of stopes and backfill. Backfill design continues with optimisation of the stoping design and sequence. Backfill is likely to include cemented and uncemented rock fill, using development and open pit waste rock. Paste fill, using tailings, is being considered for Reward Underground, located adjacent to the processing plant.

The Rockface underground operation will be established with the intake and exhaust ventilation shafts located part-way up the overlying ridge to assist with water management during the wet season.

The Rockface underground mine will be developed using a single decline that it shares with Bellbird underground mine, with footwall drives established on 30 m sub-levels across the width of the orebody to the exhaust ventilation shaft. The second means of egress will be established through development of longhole raises between sub-levels within the decline footprint.

The Bellbird underground mine will be developed from the Rockface decline, commencing from a boxcut to the north of the Bellbird open pit. The decline and access drive provides an efficient approach to upper and lower stoping zones. Footwall drives will be established on 30m sub-levels across the width of the orebody to

the exhaust ventilation shaft. The second means of egress will be established through development of longhole raises between sub-levels from the footwall drives.

The Reward underground mine will be developed using a single decline, commencing from a boxcut to the north of the Reward open pit, the decline will provide efficient access to upper and lower stoping zones of the Reward UG orebodies. The second means of egress will be established through development of longhole raises between sub-levels within the decline footprint in the lower stoping zone, connecting into the footwall drives in the upper stoping zone.

#### **4.4.4 Underground Mine Construction Methods**

Longhole stoping will be used to mine underground mineral reserves. Longhole stoping is an underground mining method often used in metalliferous mines which uses a production drill to drill holes to a pattern determined during the mine design phase of a project. Longhole stoping can cater for ore reserves which vary in thickness and gradient and is a highly selective and productive method of underground mining.

Access for equipment and personnel will be by decline, excavated by conventional drill and blast. Rockface decline will be developed from a boxcut in fresh rock, north of the Bellbird Pit.

Currently the detailed underground designs are being reviewed and optimised with the assistance of the preferred contractor. Included in this optimisation is inclusion of recent comprehensive geotechnical studies.

Waste material mined underground will remain underground and be used as stope backfill when possible. Waste mined during early stage development at Reward and Bellbird will be dumped in the pit or trucked to the surface. Over the life of mine, more waste material is required as backfill underground, than is mined through waste development, it is likely that paste will be used as stope backfill.

#### **Underground Mine Design Details**

The Reward and Bellbird portals will be developed in boxcuts of sufficient depth to have exposed fresh rock. A wire mesh curtain will be suspended from the berm directly overlying each portal to cover the batter to within close proximity of the ramp floor at these locations. The mesh will extend laterally to at least 10 metres either side of the portal. The batter within 5 metres of the portal will be supported by 75mm thick fibrecrete and 3.0 metre long cement or resin grouted rockbolts.

The first 10 to 20 metres of decline development will include:

- 75mm fibrecrete applied down to 1 metre above the floor, and rings of 2.4 metre long friction bolts installed at 1.5 metre spacing.
- Rings of three or more 6 metre bulbed twin strand cablebolts will be installed in the backs at 2.0 metre to 2.5 metre spacing, with plates and post-tensioning.

Beyond this initial section of decline, development may be supported to a minimum standard of at least 2.4 metre long friction bolts and mesh installed over the backs and sidewalls.

Ventilation shafts will be raisebored except for the uppermost 20 to 40 metres which may need to be conventionally sunk, ground conditions to be verified during raiseboring.

Current preliminary designs for the underground mining incorporates 30 metre level from floor to floor. With 5m x 5m ore drives and stope widths up to 20 metres, maximum blasthole lengths will be approximately 35 metres.

Ground control in stopes will be a combination of cable bolts, pillars being left in narrower or lower grade areas of stopes and backfill. Backfill design will be completed in the next phase of project development in conjunction with optimisation of the stoping design and sequence. Backfill is likely to include cemented and uncemented rock fill, using development and openpit waste rock. Paste fill, using tailings, may also be an option for Reward Underground, located adjacent to the process plant. However, this will require careful



economic assessment considering the significant cost for a paste fill plant, and relatively small production tonnage.

### Rockface Underground

The Rockface conceptual development lengths are listed in the table below. The decline will be developed from the north west of the orebody, from within fresh rock within the Bellbird Satellite Pit, with central footwall drives providing multiple points of access to the orebodies. Exhaust ventilation raises are located on the east side of the orebody, and escapeway raises will be established on the west side.

To maximise production, multiple stoping areas will be established by breaking the levels into panels, with five panels established in the main lode, and three panels established in the hangingwall lodes.

**Table 28 – Rockface Underground Design Development Quantities**

Development	Length (m)
Main Decline (including stockpiles)	5,227
Access	440
Escapeway	1,023
Main Access	250
Ventilation Drive	682
Level Stockpile	425
Sump	102
Ore Drive	5,013
Ventilation Rise	710
Escapeway Rise	492
Total	13,924

### Reward Underground

The conceptual Reward Underground mine development lengths are listed in the following table. The decline will be established from a boxcut north of the Reward Open Pit. Footwall drives to the west of the orebody will provide multiple points of access.

The upper zone will be ventilated with fresh air from the decline, and a central exhaust ventilation raise. The lower zone will be ventilated with fresh air from the decline and a raise located on the south end of the zone, while a raise on the north end of the zone will carry exhaust air to the surface.

**Table 29 – Reward Underground Design Development Quantities**

Development	Length (m)
Main Decline (including stockpiles)	5,822
FAR Access	329
RAR Access	80
Main Access	4,667
Stope Development	3,928
Stope Access	1,032
Fresh Air Raise	686
Return Air Raise	946
Total	17,490

### Bellbird Underground

The conceptual Bellbird Underground mine development lengths are listed in the following table. The decline will be developed from a boxcut north of the Bellbird Open Pit. The decline and footwall drives are located to the west of the orebody.

To maximise production multiple stoping areas will be established by breaking the sub-levels into panels. The upper zone will be mined in two panels, and the lower zone mined as a single panel.

**Table 30 – Bellbird Underground Design Development Quantities**

Development	Length (m)
Main Decline (including stockpiles)	3,387
FAR Access	169
RAR Access	147
Main Access	1,692
Stope Development	1,976
Stope Access	596
Fresh Air Raise	315
Return Air Raise	426
Total	8,708

#### 4.4.5 Waste Rock Dumps

Total amount of waste rock to be produced will be up to 106 million tonnes over the life of mine. Waste rock dumps will be designed with 25 degree slopes with 20 metre lifts and a 10 metre berm left before each subsequent lift, providing an overall slope angle of 18 degrees. The dump heights will be kept below a height of 60 metres above the natural ground surface.

Waste is to be placed in each waste dump to form a profile suited to the type of waste material being dumped. In general, a preliminary conceptual cover design for surface placed tailings storage facility and waste rock dumps (Figure 33) is proposed that will comprise the following:

- Coarse rock such as pegmatite or similar non mineralised material on the top;
- Silty barrier layer;
- NAF coarse waste material at the base; and
- PAF waste rock placed in short lifts (typically less than 5m) with traffic compaction rather than high end-tipped lifts to prevent development of rubble and chimney zones (tailings placed as usual).

Such design would aim to ensure that:

- vegetation growth is promoted and erosion minimised by placing the pegmatite coarse rock on the surface, protecting the cover system;
- infiltration is limited due to the silty layer that would form the capillary barrier;
- upward migration of salts from PAF materials into the cover system is limited due to the isolation of PAF materials from the cover system with the lower coarse waste rock layer; and
- development of convective cells and rapid sulphide oxidation and high ARD loads is prevented during operations through placement of PAF waste rock in short and compacted lifts.

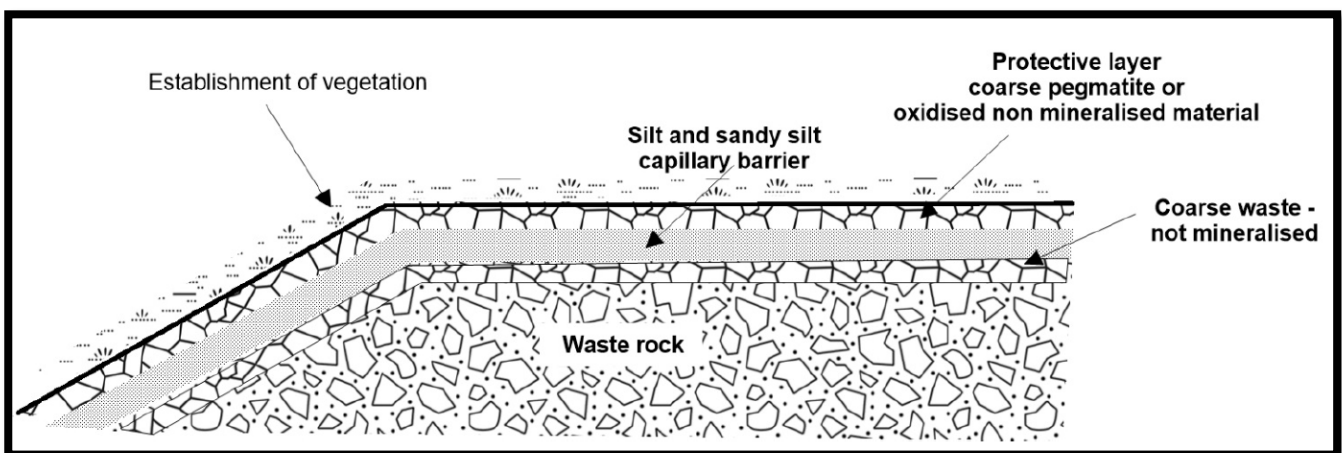


Figure 33 – Provisional Waste Rock Dump Profile (EGi 2019)

Runoff from Waste Dump areas will be captured in dedicated sediment control ponds. Ponds proposed are to be constructed using materials locally available to each sediment pond. The pond volumes are based on runoff that would report to the ponds from the catchment area. Clean water is diverted away from the sediment ponds and disturbed ground where practical. This strategy underlies the Projects Key Water Management Objectives (Water Management Plan, Section 4.3, WRM 2020) to keep unaffected water away from disturbed areas so reducing the amount of water needing treatment (for sediment for example).

Sediment within runoff water captured within these sediment ponds will be allowed to settle, water will be then pumped to the Process Water Pond for use within processing activities.

Sediment Pond volumes (in the final stage or largest capacity) are shown in Table 31.



**Table 31 – Sediment Laden Water Storages**

Storage name	Catchment area (ha)	Full supply Volume (ML)
Sediment dam SD1	11.2	5.5
Sediment dam SD2	30.1	14.8
Sediment dam SD3	20.5	10.1
Sediment dam SD4	1.2	0.6
Sediment dam SD5	70.0	34.4

Erosion control within the waste dump areas is based around minimising the disturbed footprint at any one time. An Erosion management and Sediment Control Plan is being developed and will be finalised prior to ground disturbance for Project construction.

#### 4.4.6 Estimated Waste Dump Design Volumes

Estimated waste dump design volumes for the pits are detailed in Table 32.

**Table 32 – Estimated Waste Rock Dump Design Volumes**

Waste Dump	Volume
Reward	20 M lcm
Reward South	20 M lcm
Bellbird	4.2 M lcm

The Reward waste dumps have been designed to a height of approximately 60 metres above the natural surface. The Bellbird waste dump has been designed to a height of 40 metres above surface. A swell factor of 1.3 has been used to calculate the required volume for each waste dump in loose cubic metres (lcm) based on the pit designs. Waste rock characterisation and management is discussed in the Acid and Metalliferous Drainage Management Plan.

#### 4.4.7 ROM Product Stockpiles

The main ROM area will be positioned between the Reward Open Pit and the Process Facility to enable ore feed into the processing plant crusher using a front end loader (FEL). The ROM will encapsulate the area formed as ROM by the Plenty River Mining company.

It is planned to stockpile ore in cells of around one months' plant feed which will allow the plant to operate on stable parameters for the duration of each stockpile feed and so improve recoveries. Separate ore stockpiling will be required prior to processing according to mill feed ore classifications. Where geological domains provide stable ore feed mineralogy, ore will be directly tipped into the plant to reduce double handling cost.

Additional stockpiles may be required to allow blending down of impurities such as bismuth, and any lead/zinc in copper ore. Ore stockpiles are also likely to be required from time to time at the Bellbird and Rockface areas. Ore to be hauled over a considerable haulage distance to the ROM area will be campaigned from time to time to improve haulage efficiency.

Detailed design for the ROM area has been undertaken with parameters listed in Table 33 below.

**Table 33 – ROM Stockpile Design Parameters**

Item	Unit	
Ore throughput Rate	tpa	up to 2 Mtpa
Swell Factor	%	30
Density	tm <sup>-3</sup>	2.4
Number of fingers	No.	4
Finger capacity	m <sup>3</sup>	55,500
Storage Capacity (per stockpile)	Days processing	28
Ramp Width	m	30
Ramp Gradient	%	12

Side slopes of the ROM will be formed at angle of repose on the southern side and at 1V to 2H on the north and incorporating a ramp. An operational set back from the slope crest adopted based on a Factor of Safety of 1.3. The set back will be controlled using a safety bund with machinery not to operate outside this bund. The main body of fill to construct the ROM Pad will come from early mining activities at the Reward Pit and potentially from other local excavations required for construction. Fill material type (NAF, PAF) will be confirmed via site based NAG testing to ensure NAF materials are used to construct the ROM.

In general, ore will be hauled to the ROM pad adjacent the process facility and stockpiled in lots of around one months' processing capacity. Primary ore feed size is a maximum of 600 mm. Ore that is larger than 600 mm in size will be moved from the ore bin grizzly and stockpiled to a position on the ROM where it can be reduced using a rock breaker.

Ore stockpiles will be formed using simple truck dumping techniques when required. A dozer will be used to maintain the tip head and keep the floor trafficable.

There is sufficient space on the ROM pad to allow for a working ore stockpile as well as a stockpile that is being built while the working stockpile is being depleted. The ROM is accessible from either the South or North depending on the ore origin.

Runoff from the ROM area will potentially be acidic and it will be captured in a sediment pond that provides capacity for runoff resulting from a 1 in 10 year rain event. Captured water will be transferred into the Plant water supply via pumping to the Process Water Pond.

#### **4.4.8 Explosives Magazine**

The explosives and detonator magazines and storage for security sensitive dangerous substances (SSDS) will be located between the Bellbird mining area and the main ROM area on the western side of the haul road between the ROM and the Bellbird Deposit. A level (draining) pad will be formed for the magazine and bund walls constructed to suit building infrastructure (typically containerised) mobilised by the blasting contractor. Specific infrastructure will be fenced in accordance with applicable governmental requirements.

Minimum design standards for storage and handling of explosives and SSDS will be according to levels defined by relevant Australian and Northern Territory regulations, codes, guidelines and standards, including:

- Australian Standard AS 2187 Explosives storage, transport and use.
- Australian Standard AS 4326 The storage and handling of oxidizing agents.
- Australian code for the transport of explosives by road and rail (Australian Explosives Code).

- Australian code for the transport of dangerous goods by road and rail (Australian Dangerous Goods Code).

The location proposed for the explosives magazine and SSDS storage is shown in Figure 6. The position of the magazine has taken account of required exclusion distances as well as access for transportation.

Access to the magazine will be strictly controlled.

#### **4.4.9 Mining Operations**

Jervois Operations intends to selectively mine the deposits by conventional open pit mining and decline access underground mining. The preliminary mine plan incorporates the following sequence to achieve the target production:

1. Mining will commence with the development of the Reward Open Pit mine,
2. Ore feed will then come from Bellbird open Pit mine while access to the Reward Underground Mine is developed.
3. Mining of Rockface Underground Mine will commence following completion of the Bellbird Open Pit mine,
4. Bellbird underground commences as production from Rockface declines, completing at the tail of the mine life.
5. The final stages of mine life for the initial plan will comprise production from Reward underground and Bellbird Underground mine.

#### **4.4.10 Mining Performance against Previous MMP**

As Project construction works have been delayed and no works were undertaken under the original MMP, there is no performance data for the previous reporting period.

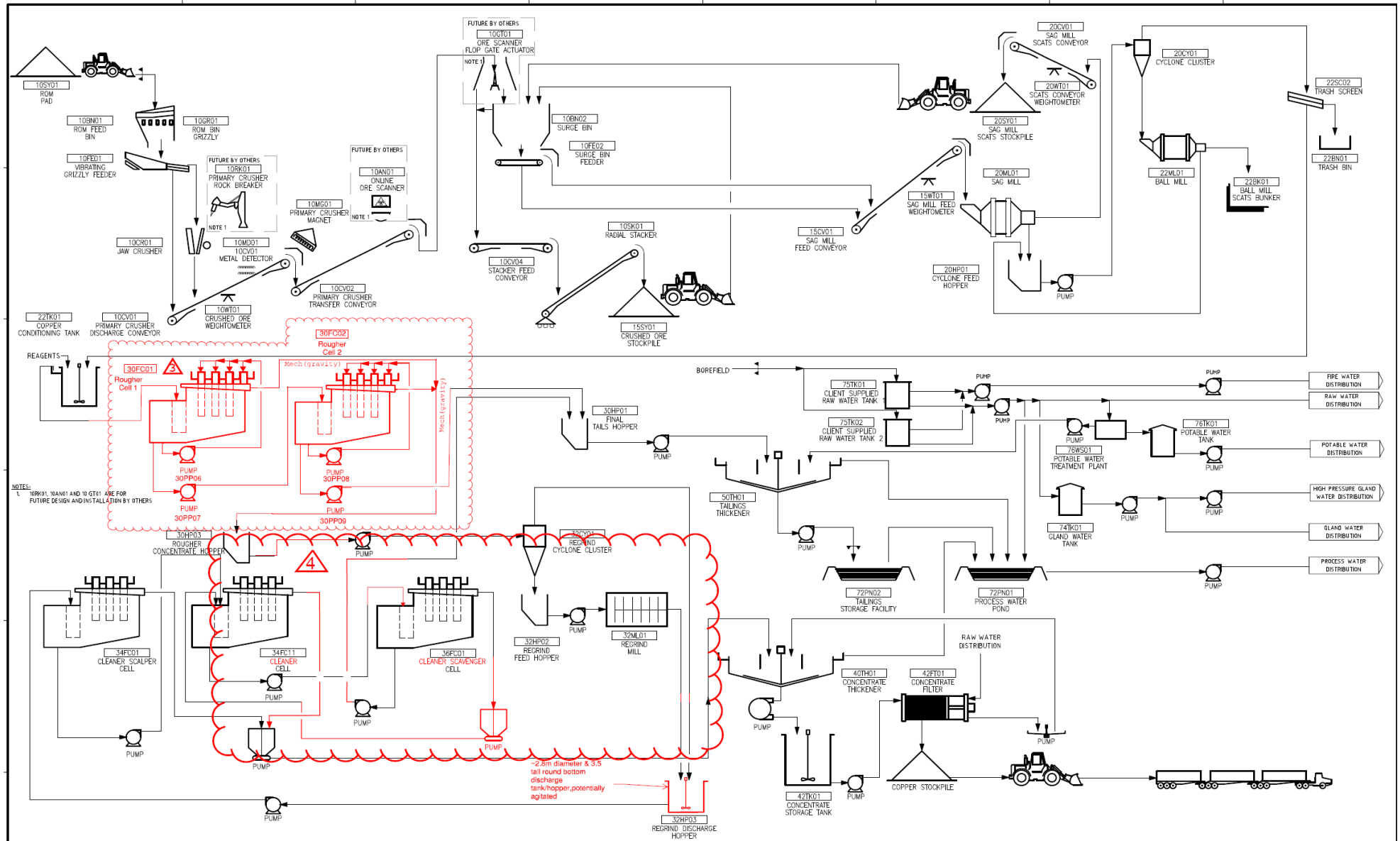
#### **4.5 Processing Activities**

The Project processing facility will process up to 2.0 Mt/a of copper sulphide ore which will produce a copper concentrate cake for sale and a tailings stream that will be permanently stored in a specially designed and constructed tailings facility at the site.

The processing facility will consist of a single stage crushing circuit with a conventional SAG and ball mill (SAB) grinding circuit. A flotation circuit downstream of the grinding circuit will consist of roughing, regrinding, cleaning, and re-cleaning stages. The tailings will be de-watered in a thickener before being pumped out to the TSF where further water recovery will occur.



Figure 34 – Process Plant Flow Diagram



#### 4.5.1 Crushing

The crushing plant will operate on a 75% utilisation (forecast maintenance) and maximum feed rate of 305t/h. A wheel loader will transfer run of the mine (ROM) ore, from the ROM pad, over a static grizzly screen in to a 70 m<sup>3</sup> capacity ROM bin. Any oversize material screened by the grizzly will be removed from the front of the grizzly by the wheel loader for secondary reduction via a rock breaker.

The crushed ore is conveyed into a 70 t capacity SAG mill feed bin. A variable speed feeder under the SAG mill feed bin will feed the crushed ore onto a SAG mill feed conveyor at 200 t/h, then into the SAG mill. The excess (overflow) crushed ore from the bin will be stacked to a 2000 t capacity, emergency dead stockpile to allow SAG mill feed to continue while the crushing circuit is unavailable.

#### 4.5.2 Grinding

The conventional SAB circuit will operate at a nominal 200 t/h throughput with the SAG operating in open circuit and the ball mill operating in closed circuit with hydrocyclones. Some capacity to increase throughput has been included in the grinding circuit, an increase to 250 t/h is achievable by increasing power to mill motors.

The SAG mill will be operated at variable speed, with a ball charge of 15% v/v, and an expected discharge density of 70% w/w solids content. The screened slurry is fed into a 16 m<sup>3</sup> cyclone feed hopper where it is diluted to a 55% w/w solids content with the addition of process water.

The slurry is pumped from the cyclone feed hopper to a cluster of 660 mm cyclones. Two (2) cyclones will be in operation with one as a redundant spare. The cyclones will separate the coarse, dense ore from the fine ore. The grind size will be 80% (P80) of 125 micron with fine materials reporting to the cyclone overflow and then onto the flotation circuit. The coarse, dense ore will report to the cyclone underflow and will be directed to the ball mill for further grinding.

The 2,200 kW ball mill will operate with a 36% v/v ball charge at a fixed 75% critical speed. Discharge from the ball mill will be at a density of 72% w/w and gravity flow through a 25 mm aperture trommel then into the cyclone feed hopper.

Steel grinding media balls will be charged to both the SAG mill and ball mill to maintain a setpoint power draw. The balls will be charged using a davit hoist and kibble.

#### 4.5.3 Flotation

The flotation circuit can be divided into the following three (3) groups.

##### **Copper Rougher Flotation**

The copper rougher circuit consists of a conditioning tank and two rougher Jameson cells. Overflow from the hydrocyclone cluster will have a slurry density of 36% w/w and product size of P80 of 125µm. The overflow will pass through to a conditioning tank fitted with a 3 kW agitator.

Reagents are added into the conditioning tank to cause the mineral to become hydrophobic (water repellent), allowing the copper mineral to adhere to air bubbles produced when air is added to each flotation tank.

The conditioned copper mineral is attracted to air bubbles which float to the surface, separated from the slurry, and collected at launders located within the tank cell. The material collected at the launders is referred to as concentrate. The remainder of the slurry in the tank cell gravity flows to the next tank in series.

Slurry discharging the rougher tank cell gravity flows to the first of the three (3) rougher scavenger Jameson cells. These tank cells operate in a series configuration and the concentrate from each tank cell is combined and transferred to the regrind circuit. The flotation tailing slurry discharges from the last scavenger train and gravitates to the final tailings hopper. From the tails hopper the slurry is pumped to the tails thickener.

### Copper Regrind

The copper regrind circuit grinds concentrate produced from the rougher scavenger tanks and the copper cleaner scavenger tanks to a P80 of 53  $\mu\text{m}$ .

Rougher scavenger and cleaner scavenger concentrate is combined in the regrind circuit hydrocyclone feed hopper and process water is added to regulate the slurry density. The mixed concentrate slurry is pumped to the regrind cyclone cluster, consisting of two (2) operating and one (1) standby 660 mm cyclones. The fine fraction reports to the cyclone overflow and the overflow gravitates to the cleaner conditioning tank. The regrind cyclone underflow at a slurry density of 72% w/w gravity flows to the vertical regrind mill. The regrind mill contains 25 mm grinding balls and is fitted with a 485 kW drive. A portion of the regrind mill discharge is returned pumped back into the regrind mill and the remainder discharges into the hydrocyclone feed hopper for further size classification in the regrind cyclones.

### Copper Cleaner Circuit

The copper cleaner circuit consists of a conditioning tank, four 20 m<sup>3</sup> tank cells each with a 22 kW agitator and two 20 m<sup>3</sup> cleaner scavenger tank cells also with 22 kW agitators.

Following pH and consistency modification, the slurry gravity flows to the cleaning circuit. There are four 20 m<sup>3</sup> cleaner tank cells each with a 22 kW agitator, operating in series. Concentrate from the four cleaner cells are combined with the concentrate from the first rougher cell. This is referred to as the final concentrate. Slurry from the last cleaner cell gravity flows to the first cleaner scavenger cell. The concentrate from these cells is combined and pumped back to the regrind circuit.

Slurry discharging the last cleaner scavenger cell can be pumped to either the final tails hopper and combined with the rougher tail or pumped to the first rougher scavenger cell.

#### 4.5.4 Concentrate Thickening, Filtration and Loadout

The final concentrate from the flotation circuit is pumped to a 12 m diameter concentrate thickener via the concentrate thickener feed hopper where a flocculant is added. Concentrate is at an anticipated solid concentration of 32% w/w solids. The concentrate thickener feed hopper de-aerates the concentrate slurry prior to thickening in a filter press.

Solids are compacted at the base of the thickener and discharged at an anticipated solid concentration of 63% w/w. The thickened concentrate is pumped to the filter feed tank. The solution separated from the solids reports to the thickener overflow launder where it gravity flows to the process water storage tank.

The thickened concentrate slurry is pumped from the filter feed tank to the vertical plate and frame filter press. The filter consists of 30 x 3.6 m<sup>2</sup> plates, each with a filter cloth. The filter produces a concentrate cake by reducing the concentrate moisture content to approximately 10 % w/w. The filter is sized to treat 14.9 wet t/h of final concentrate. Filtrate from the filter is pumped to the process water tank and recirculated into the process.

The concentrate cake discharges the filter into a bunker where it is picked up by a wheel loader and either tipped into half (½) height shipping containers or conventional side tippers and hauled in a road train configuration. The prime mover is weighed then passes through a wheel wash before leaving the processing plant area. The concentrate will be sent either to Alice Springs or another transshipment point for export or sold within Australia for smelting.

#### 4.5.5 Tailings

Tailings from the rougher scavenger and cleaner scavenger cells are pumped to a 25 m diameter thickener at an anticipated solid concentration of 32% w/w where they are thickened to approximately 62% w/w solids. The thickened tails are pumped approximately 800m to the tailings storage facility where the solids settle and solution from the tailings is recovered back to the process plant via the process water dam.

#### 4.5.6 Reagents

Reagent consumption in the process plant is confined to the floatation circuit and the two thickeners. Additions of the reagents is summarised below in Table 34. All reagents will have spare onsite provision of 28 days/yr to allow for limited site access due to weather conditions.

Reagents will be requisitioned from the warehouse on a daily basis and moved around the site using a tele handler. The tele handler will be used to place bulka bags into position for hoists to lift the bags onto bag splitters within splitting cupboards.

**Table 34 – Processing Reagents and Consumption**

Reagent	Delivery and Storage	Location	Function	Consumption
Collector 1 (Aerophine 3418A)	Delivered in IBC tanks and stored in the Warehouse	Floatation Circuit	Lead and Zinc Floatation agent	5 g/t
Collector 2 (Aero 3477)	Delivered in IBC tanks and stored in the Warehouse	Floatation Circuit	Copper, Zinc and Nickel floatation agent	5 g/t
Frother	Delivered in IBC tanks and stored in the Warehouse	floatation circuit	Accelerates the development and prolongs life of bubbles in the floatation circuit.	10 g/t
Hydrated Lime	Delivered in 1 tonne bulka bags and stored in the Warehouse	floatation circuit	milk of lime for the flotation circuit for pH modification	1 kg/t
Flocculant	Delivered in 100 kg bulka bags and stored in the Warehouse	Concentrate and tailings thickeners	Accelerate particle flocculation and solids thickening	20 g/t

#### Plant Control System

Processing plant control will be a PLC based system. The main control room is located between the milling and floatation areas, with a subsidiary control room in the crushing area. Both control rooms will be at ground level and upwind of the crusher based on the prevailing SE wind direction.

A philosophy will be adopted to rationalise automation, allowing monitoring and stop/start control from the control room. Where appropriate or required for safe operation, additional controls will be included.

An on-stream analyser will be installed to ensure suitable floatation control. One visual display unit (VDU) will be installed within the control room to provide operator interface. The VDU will present the operator with graphical process information in the form of trends, mimic pages, alarm summaries, logs and reports. This interface will also enable the operator to start and stop equipment, control variable speed drives and alter process set-points.

#### 4.5.7 Water Requirements

Process make-up water will be required throughout the operation although the quantity will vary between the wet and dry seasons.



An estimated high-level water balance is defined in Figure 35.

Average make-up water supply of 55 t/h is estimated for a required mill throughput of 1.6 Mt/a.

In the first 3 to 6 months of the Project, no tailings return water has been assumed, the maximum make-up requirement will be 94.7 t/h. Water inventory for commissioning and the initial processing period will be stored in the process water dam and the TSF.

A reverse osmosis (RO) plant package will be installed at the processing plant. This will include the potable water storage, and distribution system to supply process plant safety showers, administration block, workshop, laboratory plant control rooms. The potable water system will be supplied from the raw water tank at the process plant.

Effluent from the RO plant will be pumped to the process water tank.

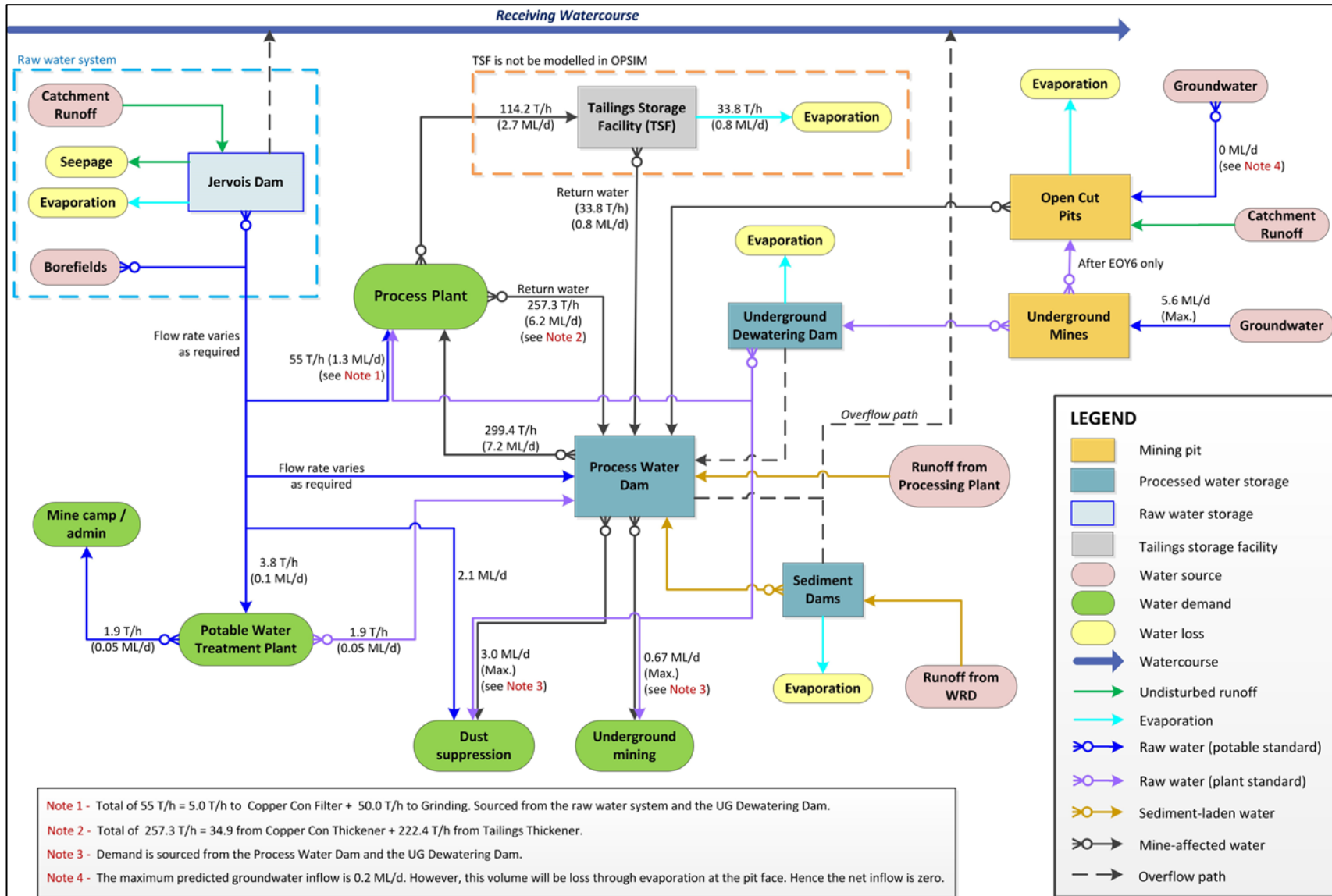


Figure 35 – Water Supply Water Balance

#### 4.5.8 Process Water Dam

A process water dam (PWD) will be constructed between the process plant and the TSF. The process water dam is the Projects primary storage pond for mine affected water and receives inflows from the following sources:

- Return decant water from the tailings facility (TSF),
- Catchment runoff from the mine affected water catchment that includes the process plant and ROM and product stockpiles, as well as the existing ROM pad and tailing storage dam;
- Pumped transfers of captured runoff water from the waste rock dump sediment dams or temporary ore stockpile area sediment dams;
- Pumped transfers of mine affected water from the open cut mining pits; and
- Overflows of raw water (plant standard) from the underground dewatering dam;
- Effluent from the potable water treatment plant,
- Top up water (when required) from the raw water supply system,

The PWD accepts supernatant liquor from the TSF as well as runoff from the process plant area. As such, the PWD has been designed similarly to the TSF to contain mine affected water.

The process water dam in its initial form will have a capacity of around 50 ML and will have an emergency spillway. Water excess to the storage capacity of the PWD will be pumped to the TSF and be fed back to the plant as a priority to reduce water volume held in circuit.

As most site wide water demands are supplied via the PWD, a minimum operating storage level of 9.5 ML was set for the PWD. When the storage level in the PWD drops below 15 ML, water is pumped from the raw water system (Jervois Dam and the groundwater borefields) to the PWD so the minimum operating storage level is maintained. The minimum storage level provides a buffer should any issues be encountered with the water supply system.

The following is of note:

- The PWD is not intended to empty at any time throughout the LOM and will be maintained by the supply of water from groundwater borefields and mine dewatering. The external water supply will, maintain a minimum operating storage level in the dam of 9.5 ML.
- Pumping systems that are designed to transfer mine affected water from storage nodes of the project have been sized to exceed water inflow rates.

Analysis undertaken as part of the Water Balance Modelling was used to investigate the potential frequency and volume of uncontrolled releases (spillway overflows) from the process water dam and the waste rock dump sediment dams. Analysis indicates that no uncontrolled releases of mine affected water are predicted to occur from the process water dam in any year of Project life;

For unforeseen emergency situations, a spillway will be formed within the wall of the PWD to direct any overflow safely from the PWD. Results of the water balance model show that no uncontrolled releases are predicted from the process water dam in any of the water balance model simulations.

#### Design and Construction

The PWD design is based on operational requirements and a geotechnical investigation. Sound geotechnical engineering and specific ANCOLD guidelines form the basis of the design. These guidelines are preferred as they are current Industry practice.

The PWD will be designed using the following parameters:

Item	Parameter	Comment
Floor and Wall Lining Materials	Liner and leak detection system	(i) Floor and embankment areas must be stripped and grubbed of unsuitable materials prior to fill placement. (ii) Underdrainage / leak detection system installed beneath the plastic liner. Leakage reports via a pipe network to a capture point and seepage is pumped to the PWD, (iii) Impermeable liner system incorporating a 1.5 mm double side textured HDPE membrane,
Batter Slopes and batter protection	Constructed batter angles	(i) Based on material properties. Typically use 2.5H to 1V internal and 3H to 1V external. (ii) May steepen based on material SG, $\phi$ , cohesion and other properties and whether the external embankment also forms part of Unca Creek Diversion training wall. (iii) Batters must be protected using rip rap where potentially exposed to erosion,
Crest Trafficability	Width and surface type	(i) Clear width of 4 m. (ii) Operational controls should limit traffic along the crest to maintenance (not inspection) activities. (iii) Inclusion of a granular layer to protect the embankment from tyre damage,
Embankment Stability	Factor of Safety	(i) ANCOLD guidelines to be adhered to for typical pond structure accounting for containment water quality, downstream risk and embankment height, (ii) Relevant seismicity to be incorporated into the design.
Overtopping risk	Freeboard	(i) 1 in 10 year rain event (ii) Controlled by emergency spillway

The process Water Dam will be constructed using conventional earthmoving techniques approximately as follows:

- Clearing and Grubbing – following survey delineation, removal of vegetation as well as removal and collection of any remnant mine infrastructure will be completed, vegetation will be taken to stockpile and any remnant infrastructure materials will be buried within the ROM Pad landform.
- Topsoil gathering – topsoil will be stripped to expose natural non-organic containing material, topsoil will be stockpiled within approved locations and delineated to prevent contamination,
- Excavation and filling – soil and friable rock will be removed using conventional machinery to expose a surface of competent material on which fill can be placed. If the level of competent material exposed is above the design level of the PWD floor, further excavation may be required which could include drilling and blasting.
- Filling to form perimeter embankments of the pond will be undertaken, the filling process will be monitored and materials placed will be subject to Quality Assurance testing to confirm adequate compaction has been achieved and that material properties meet requirements of the specification.
- A double lining of HDPE liner shall be placed to form a confining barrier for the pond containment, the lower HDPE layer forming a leak detection via sandwiched piping.



- An emergency spillway shall be formed that protects the PWD from overtopping. Current engineering assessment shows the PWD will not overtop however sound engineering practice includes provision of an emergency spillway to prevent overtopping of the wall in an uncontrolled manner.

The PWD will operate as a contained system, according to the following inflows and outflows:

- Receives surface water runoff from the Process Plant area
- Receives pumped water from the following sources:
  - Raw water system
  - Open cut pits
  - Sediment dams (as an alternate to directing sediment laden flows to the TSF)
- Receives pumped return water from the following sources:
  - Process Plant at a rate up to 257.3 t/h (6.2 ML/d); and
  - Tailings Storage Facility (TSF) at a rate of 33.8 T/h (0.8 ML/d)
- Supplies the following site demands:
  - Process Plant
- The dam was set with a maximum operating storage level of 50 ML and a minimum operating storage level of 9.5 ML. Water is pumped from the raw water system to the Process Water Dam to maintain its minimum operating storage level. The supply from the raw water system to the process plant is limited to 0.85 ML/day, which is sufficient to supply the process water demand to the plant, and the underground mining equipment demand.

#### **4.5.9 Processing Performance against Previous MMP**

As Project construction works have been delayed from 2021 to 2022 and no works were undertaken under the original MMP, there are no statistics available for processing performance.

#### **4.6 Water Supply Borefield and Pipeline**

The Project requires a maximum water supply of around 45 L/s predominantly for ore processing and dust suppression for a projected mine life of 10 years. Water is to be sourced largely from groundwater bores and from dewatering pits and underground workings as mining activities progress.

Ground water will be drawn from wells within the Georgina Basin, located around 20 km to the north of the mine site. Two areas have been drilled for ground water supply:

- Area 1 situated 20 km north-west of the JBMP mine along Arthur Creek to the south-west of the Lucy Creek Homestead, and
- Area 2 situated 20 km north-east of the JBMP mine along Arthur Creek to the south-east of the Lucy Creek Homestead.

Groundwater will be drawn at a rate to maintain a minimum water body within the Process Water Dam (PWD) adjacent the process facility. The PWD will be preferentially topped up by water from mine pit(s), underground dewatering activities and rainfall. The PWD will operate within maximum and minimum water levels during operations.

The main impact of drawing water from the Georgina basin in these two areas is the drawdown of groundwater levels around the process water supply borefield as well as dewatering activities at the mine site during mining activities.

The proposed extraction at the water supply borefield is within the capacity of the aquifer and removes a very small fraction of the immense volume in storage. Water table drawdown impacts at the nearest sensitive receptors (Lucy Creek domestic water supply and stock watering bores) are unlikely to

exceed 3 m. This drawdown will not reduce water availability for these user's due to the very significant available drawdown at each site. There are no mapped Groundwater Dependant Ecosystems identified within the zone of drawdown.

The groundwater impacts associated with mine dewatering are relatively localised around the mining activities and forecast drawdowns do not propagate to the identified closest existing users.

#### **4.6.1 Groundwater Wells**

Groundwater production and monitoring wells have been installed at locations recommended by groundwater hydrologists, positions of production wells are listed below along with tested yields and recommended yields for continuous pumping.

Table 35 –Groundwater Levels and Yield Rates

Reg No	Bore ID	Elevation	Stick-up	Standing Water Level (mBGL)	Recommended Draw (ls <sup>-1</sup> )	Bore
RN019782	LCP1	TBA	0.5	14.21	10	Test Production
RN019774	LC1	TBA	0.4	11.82		Monitoring
RN019776	LC3	TBA	0.5	11.31		Monitoring
RN019775	LC4	TBA	0.4	20.3		Monitoring
RN019793	LC5		0.5	14.46		Monitoring
RN019781	LC6		0.5	21.27		Monitoring
RN019794	LCP2		0.7	12.04		Test Production
RN019778	LC9		0.5	9.58		Monitoring
RN019779	LC14		0.4			Monitoring
RN019780	LC15		0.5	12.34		Monitoring
RN019950	LC21			12.63	10	Production
RN019951	LC22					Abandoned
RN019949	LC23					Abandoned
RN019948	LC24			35.47		Monitoring
RN019957	LC25					Abandoned
RN019952	LC26			14.47	5	Production
RN019953	LC27			20.64	5	Production
RN019954	LC28			17.28	5	Production
RN019955	LC31			12.62		Monitoring
RN019956	LC32			14.2		Monitoring
RN019958	LC33			12.75	10	Production

The groundwater extraction borefield is located on Lucy Creek Station.

Pumps and power supply systems for these production pumps will be developed specifically for each groundwater well. On approval to proceed, systems will be designed, purchased and installed as a priority to support early works, transitioning later to operational requirements.

Installation of a water supply pipeline will be a priority task and would be undertaken in parallel with the pump systems design and installation.

The pipeline will be constructed using PVC-O for its' full length of around 40 km. The main trunk of the line will be 300 mm diameter and will be buried for the majority of its length.

From the project site, the water pipeline follows generally parallel with the Lucy Creek Access Road, crossing the road occasionally to avoid hilly areas or RWP's identified in Project related AAPA clearances. Around six kilometres south of Lucy Creek Station, the pipeline deviates from the access road alignment and heads west in a direct route to the main groundwater borefield area.

Once buried, the pipeline route will be profiled such that naturally occurring overland flows are not interrupted, then vegetation rehabilitated. Scour valves will be necessary at locations of elevation peaks in the pipeline where air within the pipeline can accumulate. Scour valves will be maintained during the life of the pipeline.



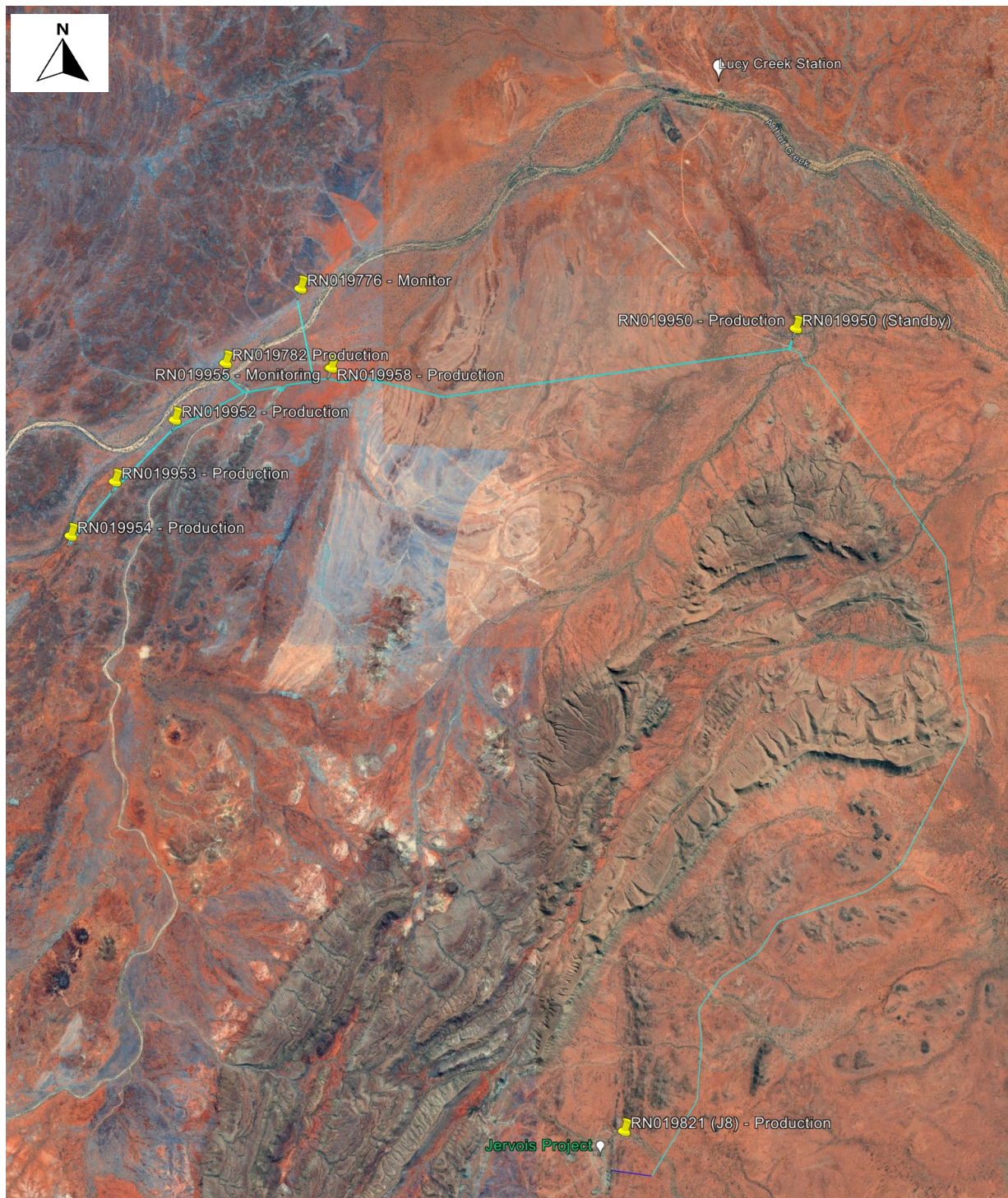


Figure 36 – Lucy Creek Borefield Bore Locations

## 4.7 Jervois Fresh Water Dam

### 4.7.1 Current Condition

Jervois Dam, located on Unca Creek near the western boundary of the Project, was constructed for previous mining operations and is the largest and most permanent surface water body in the Jervois Region (MBS, 2013).

Jervois Dams' confining embankment is in relatively poor condition with obvious under-wall seepage issues and limited retention capacity. A rough spillway (at 367.4 m AHD) on its northern abutment

appears to have been excavated to reduce the dam's capacity, a higher spillway exists through a saddle on the southern side of the impoundment, away from the confining embankment, a much more preferable location.

Jervois Dam currently has a storage capacity of 279 ML below the existing (lower) spillway level, and a catchment area of approximately 17.1km<sup>2</sup>.

The structural stability of the dam wall is unknown however it stands without visible instability, sloughing or significant erosion. The wall is unusually steep in its' construction however, with wall slopes of about 1.5H to 1V estimated. The wall area now supports many trees (to about 30 cm diameter) which are growing upstream and downstream of the wall, and within the wall fill material.

#### **4.7.2 Jervois Dam Rehabilitation**

It is intended to refurbish the Jervois Dam later in the Project life rather than during initial Mine Development. The following text is provided for information.

The Jervois Dam is proposed to be rehabilitated after year four by constructing a buttress on the downstream side that would increase the global stability of the confining wall and reduce seepage losses beneath the wall. The existing rough spillway would also be partially filled to raise the impounded water level. An alternative spillway located to the south of the confining wall would be reprofiled to required level.

The objective of these dam rehabilitation works would be to increase the retention capacity of the wall, providing a water storage alternative to the site should reliability issues be incurred with the borefield ground water supply.

A stage-storage relationship has been developed for the Jervois Dam (Surface Water Impact Assessment (WRM) Fig 3.16). The current crest level is 371.5 m AHD and using the southern spillway, a storage capacity in the dam of 1,500ML appears achievable.

Earthworks to construct the embankment would be undertaken in a conventional manner with the dam wall incorporating a sand chimney to prevent a rise in internal phreatic level within the confining embankment. Any seepage that reported to the chimney would be discharged on the downstream side of the embankment. The construction methodology would be undertaken approximately as follows:

- Allow (pump) the impounded water level to fall below or approximately to, bottom of keyway level of the buttress.
- Clearing and Grubbing – following survey delineation, removal of vegetation as well as removal and collection of any remnant mine infrastructure will be completed, vegetation will be taken to stockpile and any remnant mine infrastructure materials will be buried in an appropriate landfill.
- Topsoil gathering – topsoil will be stripped to expose natural non-organic containing material, topsoil will be stockpiled within approved locations and delineated to prevent contamination,
- Excavation and filling – soil and friable rock will be removed using conventional machinery to expose a surface of competent material on which fill can be placed.
- A cut off trench would be excavated downstream of the existing wall toe and backfilled with locally available cohesive materials, if cohesive materials are unavailable, bentonite or other soil modifier may be required,



- As the embankment is constructed, progressive layers of the sand chimney are installed to form a continuous permeable lens through the embankment to dissipate pore pressure and relieve seepage.
- The wall embankment would be trimmed to form a stable profile and shallow rooted vegetation would be established to reduce erosion potential.

## 4.8 Exploration Activities

### 4.8.1 Previous Reporting Period

For ML30180, 30182 and 30829, during the period January 1, 2023 until the date of writing (September 20, 2023) the following drilling has been carried out using 2 universal drill rigs, one is capable of both reverse circulation (RC) and diamond core drilling, the other is diamond core drill rig only.

Prospect	No. of Holes	RC Meters	Diamond Meters	Total Meters
Cox's Find	1	200.6	301.2	501.80
Ferdian Hill	1	251.5	598.3	849.80
Bellbird South	1		676.8	676.80
Marshall Deep	10	1542	3005.91	4547.91
Reward	22	354	3741.18	4095.18
Rockface	12	484	4154.73	4638.73
Muscle Mountain	5	327	476.30	803.30

Eight drillholes were candidate to be survey with downhole electromagnetic (DHEM) methods at Bellbird south, Rockface, Cox's Find, Marshall Deep and Ferdian Hill. As of today (20 Sep. 23) five of the holes have been completed and survey continues with Marshall Deep and Ferdian Hill holes.

Prospect	Hole_ID	Status
Ferdian Hill	KJCD563	Awaiting
Cox's Find	KJCD536	Complete
Cox's Find	KJCD537	Complete
Bellbird South	KJCD172X	Complete
Rockface	KJCD556D4	Complete
Rockface	KJCD575	Complete
Marshall Deeps	KJCD577	Awaiting
Marshall Deeps	KJCD578	Progressing

A remodelling of gravity data 2017 was carried out, which was constraint with the gravity data collected from drill core over 5 years. This new gravity inversion model identified a potential deep sited feeder for the rockface mineralisation. One of the rigs currently drilling this newly identified gravity anomaly.

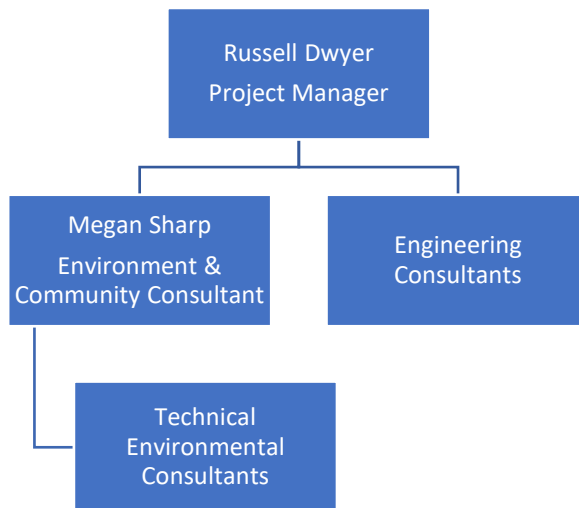
### 4.8.2 Proposed Exploration Activity

It is proposed that exploration will continue with two or three, multipurpose drill rigs during the next reporting period. The program will depend on final assay results being received and geological interpretation, review of then any alteration to the resource models for each of the prospect areas.

Additionally, depending on the ongoing DHEM survey findings and number of targets generated as result. The new hole drilled at Rockface feeder could potentially generate further targets to follow up. Jervois Operations will continue to endeavour to follow each work program with rehabilitation of all drill holes, drill pads, tracks and other disturbed areas within the same reporting period.

## 5 Environmental management

### 5.1 Environmental Management Structure



Appropriately qualified site based environmental personnel will be employed to manage site activities, monitoring and reporting as the Project develops. This will include Environmental Technicians and Environmental Trainees.



## 5.2 Environmental Policy



### Purpose

KGL Resources (KGL) believes environmental stewardship is an integral part of its business and is committed to minimising potential environmental impacts and risks associated with its activities at every stage of the process, from planning through exploration, development, production and eventually through mine closure.

We recognise the strong cultural links of our local communities to the surrounding environment and acknowledge their role in our environmental procedures.

Sound environmental management is a fundamental part of our business and business priorities must support appropriate environmental protection.

### Environmental Objectives

#### KGL is committed to and accountable for:

- Ensuring environmental considerations are integrated into all aspects of our planning and operational decisions.
- Working with the Traditional Owners of the lands to ensure their specific environmental requirements are considered.
- Ensure risks to the environment are managed to avoid or minimise environmental harm.
- Ensuring the effective use of natural resources by minimising our environmental footprint, reducing waste, efficiently generating and using energy, using water and other raw materials efficiently.
- Developing a comprehensive system of controls and audits to meet our environmental objectives.
- Ensure that our compliance with environmental legal requirements is minimum standard for the company.
- Setting robust objectives and targets to improve environmental management and performance in line with stakeholder expectations.
- Securing stakeholder confidence through regular, open and honest communications and taking into consideration their feedback in our decision-making processes.
- Seeking to understand and manage our activities, products and operations to align with global efforts to move towards more sustainable use of resources associated with limiting climate change and reduction of greenhouse gases.
- Providing for mine closure and ensuring a comprehensive plan for site rehabilitation is sufficiently resourced.

# ENVIRONMENTAL POLICY



**KGL employees and contractors are accountable for:**

- Ensuring that they comply with the Company's policies and procedures in relation to environmental protection.
- Report any concerns they have about the environment to their Manager or another senior staff member.
- Ensuring that environmental protection is a consideration in any activities that are undertaken.
- Ensuring that staff, contractors and other persons at the workplace understand their obligations in relation to this Policy.
- Individually working efficiently and identifying ways to reduce their energy footprint.
- As Managers, to promote this Policy within their area of responsibility and take steps to ensure that any breaches or potential breaches of this Policy are identified, taken seriously and acted upon immediately.
- Understanding this policy and seeking clarification from management where necessary.



**Denis Wood**  
Managing Director

8 September 2023



 <p><b>INTEGRITY</b> We do what we say</p>	 <p><b>ACCOUNTABLE</b> We own our actions</p>	 <p><b>RESPECTFUL</b> We act with dignity</p>	 <p><b>SUSTAINABLE</b> We achieve robust outcomes</p>
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### 5.3 Environmental Commitments

#### 5.3.1 Commitments Contained in the MMP

Project commencement was delayed from 2021 due to COVID related interruptions and the Projects focus on continued exploration activities, finalisation of the Feasibility Study, detailed design works and pre-final investment decision optimisation work.

As construction works were delayed, no construction or operational works under the original MMP have commenced and many performance results are not yet available. This table has been updated to indicate the progress of those commitments which could be met in accordance with the original MMP.

**Table 36 – Performance Against MMP Commitments**

Commitment	Due Date	MMP Section	Performance Against Commitment
Every worker and contractor on site will receive training on the environmental management system through the site induction process	Upon commencement of construction	5.4	As construction has been delayed, these commitments will be activated when construction commences and employees and contractors are on site.
This MMP and the site management plans will be made readily accessible to the workforce	Upon commencement of construction	5.4	
The site inductions will be conducted by the site Occupational Health and Safety Manager	Upon commencement of construction	5.4	
Fact sheets and notices will be placed on notice boards	Upon commencement of construction	5.4	
Specific training will be provided to personnel who are responsible for activities which have the potential to impact the environmental values of the Project area	Upon commencement of construction	5.4	
Training records will be maintained on site by the Occupational Health and Safety Manager and include details of attendees, content, trainer and dates of inductions and training.	Upon commencement of training	5.4	
Emergency response personnel will undergo regular training and simulations to ensure their skills remain up to date.	Upon commencement of construction	5.5	

Commitment	Due Date	MMP Section	Performance Against Commitment
A record of dangerous goods, chemicals and fuels stored onsite will be maintained.	Upon commencement of construction	5.5	
A separate Health and Safety Emergency Management Plan which focusses on the protection of workers, visitors, contractors and members of the community will be developed in accordance with the NT WorkSafe legislative requirements of the Work Health & Safety (National Uniform Legislation) Act and Regulations.	Upon commencement of construction	5.5	
Management and mitigation strategies which apply to the individual management plans.	Postponed	5.7	
This EM Plan and the subordinate plans will be continually monitored throughout the Project life	Continually upon commencement of construction	5.7	Monitoring of the Management Plans will commence once they are put into practice upon the commencement of construction
Key environmental activities for the oncoming period	Postponed	Section 5.8	Postponed due to delay in construction
Reporting requirements in accordance with the NT EPA Assessment Report	Numerous as outlined below	5.8	Refer Appendix A3
Surface water monitoring program	Continually upon commencement of construction	6.2.2	As construction has been delayed, monitoring will commence in full when there are qualified staff and equipment on site to conduct monitoring
Fill surface water information gaps: Information gaps associated with the surface water investigations include: <ul style="list-style-type: none"> <li>No filtered metal concentration available for background water quality</li> </ul>	Continually as they apply to site activities	6.2.2	To commence when the Project becomes operational and there are qualified staff and equipment on site to conduct monitoring



Commitment	Due Date	MMP Section	Performance Against Commitment
monitoring sites, which means the data cannot be compared against 95%ile ecosystem protection WQOs; <ul style="list-style-type: none"> <li>• Quality of waste rock dump runoff is unknown;</li> <li>• Quality of groundwater is unknown; and</li> <li>• Insufficient data is available to calibrate Unca Creek flood models.</li> </ul>			
Groundwater management strategies	Continually as they apply to site activities	6.2.2	To commence once they are put into practice upon the commencement of construction in
Fill groundwater information gaps: Information gaps associated with the groundwater investigations include: <ul style="list-style-type: none"> <li>• Lack of timeseries data to understand the dynamics of the groundwater system, which will give insights to recharge and storage parameters; and</li> <li>• How the system will respond to the stresses that will be imposed on the groundwater system via the dewatering of the pits and the process water supply as these stresses are considerably greater than the stresses associated with pumping from stock and domestic bores and community/outstation water supply bores.</li> </ul>	Continually as they apply to site activities	6.2.2	To commence when the Project becomes operational and there are staff and equipment on site to conduct monitoring.  To commence when dewatering activities commence.
Management of mine water in accordance with the Water Management Plan	Upon commencement of construction	6.3.2.1	To commence once they are put into practice during construction

Commitment	Due Date	MMP Section	Performance Against Commitment
Management of mine water in accordance with the Groundwater Monitoring and Management Plan	Upon commencement of construction	6.3.2.2	To commence once they are put into practice during construction
Remedial and corrective actions to address water impacts	Immediately when adverse trends are identified	6.5.1	To commence when adverse trends are identified
Key environmental activities for the oncoming period	Postponed	6.6	Postponed due to delay in construction
Groundwater Management Report	Within six months of commencement of construction	6.6	Due date now second half of 2024
A compliance report on the Jervois Mine Dam spillway upgrade	Post construction of the spillway	6.6	The spillway upgrade works have not yet commenced
Results of AMD investigations and testing	Within six months of commencement of the Proposal	6.6	Due date now second half of 2024
Water Management Report	Within six months of commencement of construction	6.6	Due date now second half of 2024
Regular independent audit reports to confirm the construction and management of the waste rock dumps and tailings storage facility is in accordance with the endorsed design and design objectives	Pre-construction and during construction	6.6	The waste rock dumps and tailings storage facility have not yet been constructed.

### 5.3.2 Environmental Impact Assessment Commitments

*Note – These tables have been relocated to Appendix A3.*

### 5.3.3 NT EPA Assessment Report Recommendations

*Note – This table has been relocated to Appendix A3.*

## 5.4 Environmental Training and Education

In accordance with the general obligations for every person on a mining site to take care of the environment, every worker and contractor on site will receive training on the environmental management system through the site induction process. The environmental management module of the site induction will include:

- Protection of Aboriginal archaeological sites and Aboriginal culture and history;
- Cross cultural training;
- Flora and fauna protection including vegetation clearing and injured fauna;
- Weed and pest management;
- Fire prevention;
- Use of spill kits;
- Water management;
- Erosion and sediment control;
- Acid mine drainage;
- Social values and impacts including worker behaviour and human rights obligations;
- Driver responsibilities and traffic management;
- Occupational health and safety;
- Emergency response; and
- Waste management.

Induction attendees will be informed of their obligations under the Mining Management Act including compliance with this MMP and their responsibilities to report environmental incidents and activities that may pose a risk to the environment to the Project Operator. This MMP and the site management plans will be made readily accessible to the workforce.

The site inductions will be conducted by the site Occupational Health and Safety Manager. The site Environmental Manager will be responsible for updating the site induction as required to ensure it remains consistent with any updated management plans. In addition, fact sheets and notices will be placed on notice boards to provide workers with regular updates on specific environmental management activities and warnings.

Specific training will be provided to personnel who are responsible for activities which have the potential to impact the environmental values of the Project area. This will include personnel and contractors who will be responsible for activities such as vegetation clearing, firefighting and emergency responses such as hazardous spills, dam failures and traffic accidents.

The site Environmental Manager will have the appropriate tertiary qualifications and several years experience working in the mining industry. Environmental trainees will be provided with on site training in environmental monitoring and management.

Training records will be maintained on site by the Occupational Health and Safety Manager and include details of attendees, content, trainer and dates of inductions and training.

## 5.5 Environmental Emergency Preparedness and Response

The Project Environmental Emergency Management Plan includes emergency procedures to ensure that the potential for emergency situations are minimised and if they do occur, that the appropriate planning has been put in place to manage the emergency in an organised and timely manner to minimise their impact. The plan addresses specific emergencies such as uncontrolled fire, hazardous material spills, dam failures and uncontrolled water releases. Emergency response personnel will undergo regular training and simulations to ensure their skills remain up to date. The plan includes an emergency contacts register which will include names and contact details of key Project personnel and off-site emergency services.

A record of dangerous goods, chemicals and fuels stored onsite will be maintained. In addition, all Materials Safety Data Sheets will be stored at the main site office and, where appropriate, at specific locations where those substance(s) are being stored or used.

A separate Health and Safety Emergency Management Plan which focusses on the protection of workers, visitors, contractors and members of the community will be developed in accordance with the NT WorkSafe legislative requirements of the Work Health & Safety (National Uniform Legislation) Act and Regulations.

Additional information on the storage, transport and handling of dangerous goods is provided in Appendix A2.

## 5.6 Implementation, Monitoring and Review

### 5.6.1 Identification of Environmental Aspects and Impacts

The key environmental factors identified by the NT EPA that may be significantly impacted by the Project as nominated in their Assessment Report are provided in the following Table. A complete list of the potential environmental impacts is provided in the risk assessment tables provided in Appendix A1 and summarised in the following section.

**Table 37 – Key Environmental Factors**

Aspect	Key Environmental Factor	Objective
Water	Inland water environmental quality	Maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected.
	Hydrological processes	Maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
Land	Terrestrial flora and fauna	Protect the NT's flora and fauna so that biological diversity and ecological integrity are maintained.
	Terrestrial environmental quality	Maintain the quality of land and soils so that environmental values are protected.
People and communities	Social, economic and cultural surrounds	Protect the rich social, economic, cultural and heritage values of the Northern Territory.



A risk assessment (Appendix A1) was completed to identify activities that may impact the environment, and these include:

- Vegetation clearing;
- Construction and operation of infrastructure (processing plant and mine infrastructure area facilities, workshops, laydown areas, explosives magazine, offices, haul and access roads, borefield and pipeline, water management and storage facilities, tailings storage facility and accommodation village);
- Development and operation of mining areas (pits and undergrounds);
- Storage and spillage of hazardous materials (chemicals, fuel, tailings; process water dam);
- Waste and ore stockpiles;
- Traffic;
- Diversion of Unca Creek;
- Groundwater extraction; and
- Social and economic changes.

The Project risk assessment identified and rated the potential risks associated with these activities associated with the Project. A summary of the outcomes of this risk assessment is provided in the following section.

The risk assessment was used to guide the environmental management activities, monitoring and corrective actions for each of the individual management plans provided in the EM Plan.

### 5.6.2 Risk Assessment

A total of 118 risks in relation to the environment, social and economic, human health and safety were identified. The residual risks were determined based on the assumption that the proposed mitigation measures were implemented effectively. The majority of risks (85) resulted in very low to low risk ratings with 33 having medium to high ratings. The residual risk ratings provide a good understanding of the Project risks and identifies key risks which will require more focus.

**Table 38 – Risk Assessment Summary**

Risk Levels	Environment		Social and Economic		Human Health and Safety		Total Residual Risk Ratings
	Initial Risk Rating	Residual Risk Rating	Initial Risk Rating	Residual Risk Rating	Initial Risk Rating	Residual Risk Rating	
Very Low	5	29	3	17	1	6	52
Low	14	14	19	14	2	5	33
Medium	21	2	6	11	7	16	29
High	5	0	17	3	18	1	4
Extreme	0	0	0	0	0	0	0
<b>Total</b>	<b>45</b>		<b>45</b>		<b>28</b>		

The potential events with significant (Moderate to High) residual risk ratings include:

- Project traffic;
- Distribution of sponsorship funds and royalties to local community (opportunity);

- Direct and indirect jobs and training for local Indigenous people and residents in Alice Springs (opportunity);
- Local business awarded contracts from the Project (opportunity);
- Flooding;
- Uncontrolled fire;
- Vegetation clearing; and
- Groundwater drawdown.

## 5.7 Environmental Management Plans

The Project EM Plan contains management plans to address the environmental values associated with:

- Biodiversity;
- Bushfires;
- Dust;
- Water;
- Groundwater;
- Erosion and Sediment Control;
- Acid Mine Drainage;
- Waste;
- Cultural Heritage;
- Social Impacts;
- Traffic;
- Mine Rehabilitation and Closure; and
- Environmental Emergencies.

Each of these subordinate plans contain strategies for the regular monitoring and measurement of the management strategies and the environmental values to which they apply. Specific targets have been designed to satisfy each of the environmental objectives.

The environmental values to be protected include:

- The conservation status, diversity, ecological integrity, geographic distribution and productivity of terrestrial flora and fauna;
- The health and wellbeing of the local community, the Project workforce and visitors;
- Qualities of local surface water features;
- Beneficial use of groundwater;
- Items and areas of cultural heritage significance; and
- Aboriginal culture, traditions and spiritual connections to country.

Management and mitigation strategies which apply to the management plans include:

- The employment of suitably qualified environmental personnel;
- Workforce training and inductions;
- Mine planning to include the consideration of the environment;
- Internal permitting systems;
- Regular and open stakeholder communication;
- Worker Codes of Conduct; and
- Regular review and updates to management plans to address changes in site conditions, non-compliances and changes to legislation.

This EM Plan and the subordinate plans will be continually monitored throughout the Project life to determine the effectiveness of the control strategies in meeting targets, to ensure they accurately reflect site activities and are updated in accordance with regulatory changes. Generic monitoring strategies to be applied to the plans include:

- Review of incidents to measure the success of the management and mitigation strategies;
- Reporting of unauthorised activities in the Annual Report;
- Annual audits to ensure strategies have been fully complied with including a review of performance against the objectives and targets;
- Inclusion of audit outcomes in the Annual Report; and
- Regular site inspections.

External auditors will also be engaged on a regular basis to determine the level of compliance with the requirements of the EM Plan.

### **5.8 Key Environmental Activities for the Oncoming Period**

As Project commencement was delayed from 2021 for the reasons described in Section 5.3.1, these key activities have been postponed.

Key activities for the oncoming period will include:

- The employment and training of site environmental personnel;
- Training of contractors and the workforce;
- Development of site-specific monitoring procedures;
- Construction of detailed cultural heritage registers;
- Pre and post clearing surveys;
- Implementation of the vegetation clearing permitting system;
- Native seed collection;
- Vegetation health monitoring;
- Demarcation of exclusion zones;
- Seasonal flora and fauna surveys;
- Weed and pest management;
- Selection of Voluntary Offset sites;
- Dust and water quality monitoring;
- Engagement of an independent, suitably qualified and experienced auditor to inspect and approve works are undertaken according to the ESCP (NT EPA Recommendation 14);
- Engagement of an appropriately qualified and experienced independent technical expert, approved by the relevant regulator, to oversee the design, construction and management of the waste rock dumps and tailings storage facility (NT EPA Recommendation 15);
- Finalisation of the ESCP in accordance with finalised detailed mine designs;
- Informing stakeholders of Project news and developments;
- Publication of the community complaints telephone contact number and email;
- Development of templates for newsletters, databases, stakeholder surveys and environmental reports;
- Establishment of the Community Liaison Committee;
- Publication of the Groundwater and Water Management Reports, waste rock and tailings independent reviews; and
- Reviews of management plans to ensure they are practical and accurately reflect site activities.

Reporting requirements in accordance with the NT EPA Assessment Report will include:

- Providing a Groundwater Management Report within six months of commencement of construction which will include a schedule for reporting of all water monitoring data and an assessment of the impacts on groundwater hydrology (Recommendation 4);
- A compliance report on the Jervois Mine Dam spillway upgrade (Recommendation 8);
- Results of AMD investigations and testing within six months of commencement of the Proposal (Recommendation 9);
- A Water Management Report to be provided to the relevant regulator within six months of commencement of construction (Recommendation 12);
- Regular independent audit reports to confirm the construction and management of the waste rock dumps and tailings storage facility is in accordance with the endorsed design and design objectives (NT EPA Recommendation 15);
- Regular reporting including a detailed summary of vegetation health monitoring, analysis of results, contingency actions undertaken and an evaluation of the effectiveness of the program (Recommendation 19); and
- Submission and publication of a Social Impact Management Report prior to the commencement of construction (Recommendation 22).

Reporting requirements in accordance with Authorisation 1061-01 will include:

- Results of kinetic leach, batch water extraction and sulphur testing to the Department within six months of Project commencement and on an agreed reporting period thereafter for life of mine (Condition 20);
- Independent inspection and audit reports to demonstrate the status of construction, management and closure of the WRDs and TSF is in accordance with endorsed designs and design objectives (Condition 22(ii));
- An annual independent assessment report on the management of tailings and waste rock, based on performance monitoring results (Condition 22(iii));
- Independent assessment of QA and QC methods, procedures and tests to verify that technical specifications of waste storages are met during construction (Condition 22(iv));
- Annual rehabilitation monitoring reports for the water supply pipeline until rehabilitation objectives have been met (Condition 34);
- An "as constructed" report by an Independent Certifying Engineer post construction/repair of the Jervois Dam (Condition 35);
- A report by an Independent Certifying Engineer confirming construction of the PWD is within ANCOLD guidelines (Condition 36); and
- A Water Management Report within six months of commencement of construction (Condition 37(v)(j)).

## 6 Water Management Plan

### 6.1 Current Conditions

#### 6.1.1 Project Water Demand

Potential Impacts and risks on water resources that result from Project activities could occur as a result of site water demands. Site water demands include those for the process plant, dust suppression, underground mining equipment demands and potable and general use.

The Process Plant is projected to require a constant water demand rate of 86.1 T/h (2.05 ML/d) over the life of the Project, which includes 55 T/h (1.3 ML/d or 475 ML/year) of raw water (plant standard) and 31 T/h (0.75 ML/d or 274 ML/year) of process water (mine affected water or sediment laden



water). This demand has accounted for all internal recycling of processed water within the process plant and tailing storage facility. If insufficient mine affected or sediment laden water is available to supply the process water demand to the plant, raw water will be used to supply the plant demand.

Dust suppression demand rates were calculated based on the predicted surface area (waste rock dump, open cut pits, haul roads and access roads) to be wetted, and the average daily evaporation rate for during dry days.

Dust suppression demand will be supplied by both raw water as well as sources of lower water quality such as harvested surface runoff and groundwater dewatered from the underground mine provided they meet the water quality criteria. Table 39 provides a summary of the dust suppression demand for the life of the Project.

**Table 39 – Dust Suppression Demand**

Year	For Areas captured in the WMS		For Areas Draining Off Site	
	kL/day	ML/year	kL/day	ML/year
Start Year 1 to EOY3	1,902	694	2,094	764
EOY3 to EOY4	2,685	980	2,094	764
EOY4 to EOY5	2,685	980	2,094	764
EOY5 to EOY6	3,041	1,110	2,094	764
EOY6 to EOY7	2,624	958	2,094	764
EOY7 to EOY10	2,000	730	2,094	764

A maximum nominal underground mining demand rate of 100 kL/day was adopted when all three underground mines (Rockface, Bellbird and Reward) are operating, being the adopted underground mine demand of 33.3 kL/day for each operating underground mine. Table 40 shows the adopted underground mine demand rates over the life of the Project. It is assumed that underground mining equipment demands can be supplied from raw water (plant standard), mine affected water and sediment laden water if necessary. If insufficient water is available from the above sources, raw water will be used.

**Table 40 – Underground Mining Demand**

Project year	Reward operations	Bellbird Operations	Rockface operations	Underground mine demand (kL/d)	Underground mine demand (ML/yr)
EOY0 to EOY3	Open cut + underground	None	Underground only	33.3	12.2
EOY3 to EOY4	Open cut + underground	Open cut only	Underground only	33.3	12.2
EOY4 to EOY5	Underground only	Open cut + underground	Underground only	66.7	24.3

Project year	Reward operations	Bellbird Operations	Rockface operations	Underground mine demand (kL/d)	Underground mine demand (ML/yr)
EOY5 to EOY6	Underground only	Open cut + underground	Underground only	33.3	12.2
EOY6 to EOY7	Underground only	Underground only	None	66.7	24.3
EOY7 to EOY10	Underground only	Underground only	None	66.7	24.3

Based on the water mass balance process flow diagram for the Project, the predicted water demand rate to the Potable Water Treatment Plant is 3.8 T/hour (0.1 ML/day or 36.5 ML/year). Based on a plant yield of 50%, 1.9 T/hour (0.05 ML/day) of treated water from the Potable Water Treatment Plant will be used to supply potable water for use in the mine camp and the administration area. The remaining 1.9 T/hour (0.05 ML/day) waste stream from the potable water treatment plant will be pumped to the process plant for non-potable uses.

### 6.1.2 Water Balance

The water balance model (WBM) was updated by WRM in July 2019 and will be updated again prior to mining commencement. Fundamentals of the WBM are not expected to vary greatly. A summary of the updated long-term average annual inflows and outflows based on the model is provided in Table 41. The average external water supply requirements vary over the life of the Project. The following is of note:

- External water supply requirement is largest at the start of the Project (EOY0), reducing significantly towards EOY3 in conjunction with the increasing availability of groundwater from the underground mines to meet site demands. External water supply remains relatively steady after EOY3 until the end of the Project.
- The average annual raw water supply requirements from Jervois Dam is about 81 ML/yr to 86 ML/yr over the life of the Project.
- The average annual external raw water supply requirements from the groundwater borefields varies between 714 and 1,441 ML/yr over the life of the Project.
- There were no modelled uncontrolled releases (spillway overflows) from the Process Water Dam over the life of the Project.
- There are minor uncontrolled releases (spillway overflows) from the sediment dams (between 6.5 ML/yr and 11 ML/yr) over the life of the Project. The water balance model does not account for the potential controlled release of water from the waste rock sediment dams.

**Table 41 – Annual Site Water Balance (Average Annual Volumes)**

Component	Process	Volume (ML/yr)					
		Year 1 to EOY3	EOY3 to EOY4	EOY4 to EOY5	EOY5 to EOY6	EOY6 to EOY7	EOY7 to EOY10
<b>Inflows</b>	Rainfall runoff (exclude Jervois Dam)	84	85	84	88	96	61
	Groundwater inflows	1,037	1,299	1,841	1,350	1,776	1,036

Component	Process	Volume (ML/yr)					
		Year 1 to EOY3	EOY3 to EOY4	EOY4 to EOY5	EOY5 to EOY6	EOY6 to EOY7	EOY7 to EOY10
	Supply from borefields	1,527	1,261	1,123	1,190	798	1,238
	<b>Total</b>	<b>2,649</b>	<b>2,645</b>	<b>3,049</b>	<b>2,629</b>	<b>2,670</b>	<b>2,336</b>
<b>Outflows</b>	Evaporation (exclude Jervois Dam)	68	69	64	68	122	67
	Process Plant demand	767	755	755	755	755	755
	Dust suppression	1,772	1,746	1,888	1,747	1,520	1,459
	Underground mine demand	12	24	12	24	24	12
	Potable water demand	34	33	33	33	33	33
	Offsite discharge - Sediment Dams	9.4	10.0	9.5	10.3	11.0	6.5
	Offsite discharge - PWD	0.0	0.0	0.0	0.0	0.0	0.0
	<b>Total</b>	<b>2,663</b>	<b>2,636</b>	<b>2,761</b>	<b>2,638</b>	<b>2,465</b>	<b>2,333</b>
<b>Change in Site Water Inventory</b>		<b>-15</b>	<b>8</b>	<b>288</b>	<b>-9</b>	<b>206</b>	<b>2</b>

The water balance modelling indicates that with the planned water management measures in place, the water management system will be robust and provide an adequate storage capacity to manage surface water runoff for a wide range of possible climatic conditions, including extended wet and dry periods. Full details on the water balance are provided in the Water management Plan (WRM, 2020).

### 6.1.3 Surface Water

The Jervois Project area is in the upper catchment of the Hay River Basin, part of the Lake Eyre basin, which ultimately feeds into Lake Eyre in the north of South Australia (Figure 37). The Hay River rises in the Harts and Dulcie Ranges and flows south-east towards the Simpson Desert. The Plenty River drains roughly parallel to the Hay River, about 50 kilometres apart, and the two converge at the southern edge of the Simpson Desert before feeding into Lake Eyre. The Plenty River usually seeps into the ground in the eastern part of the Simpson Desert after about 340 kilometres, however in particularly wet years, it flows into the Hay River. The total catchment area of the Hay River basin upstream of Lake Eyre (including the Plenty River catchment) is approximately 100,000 km<sup>2</sup>.

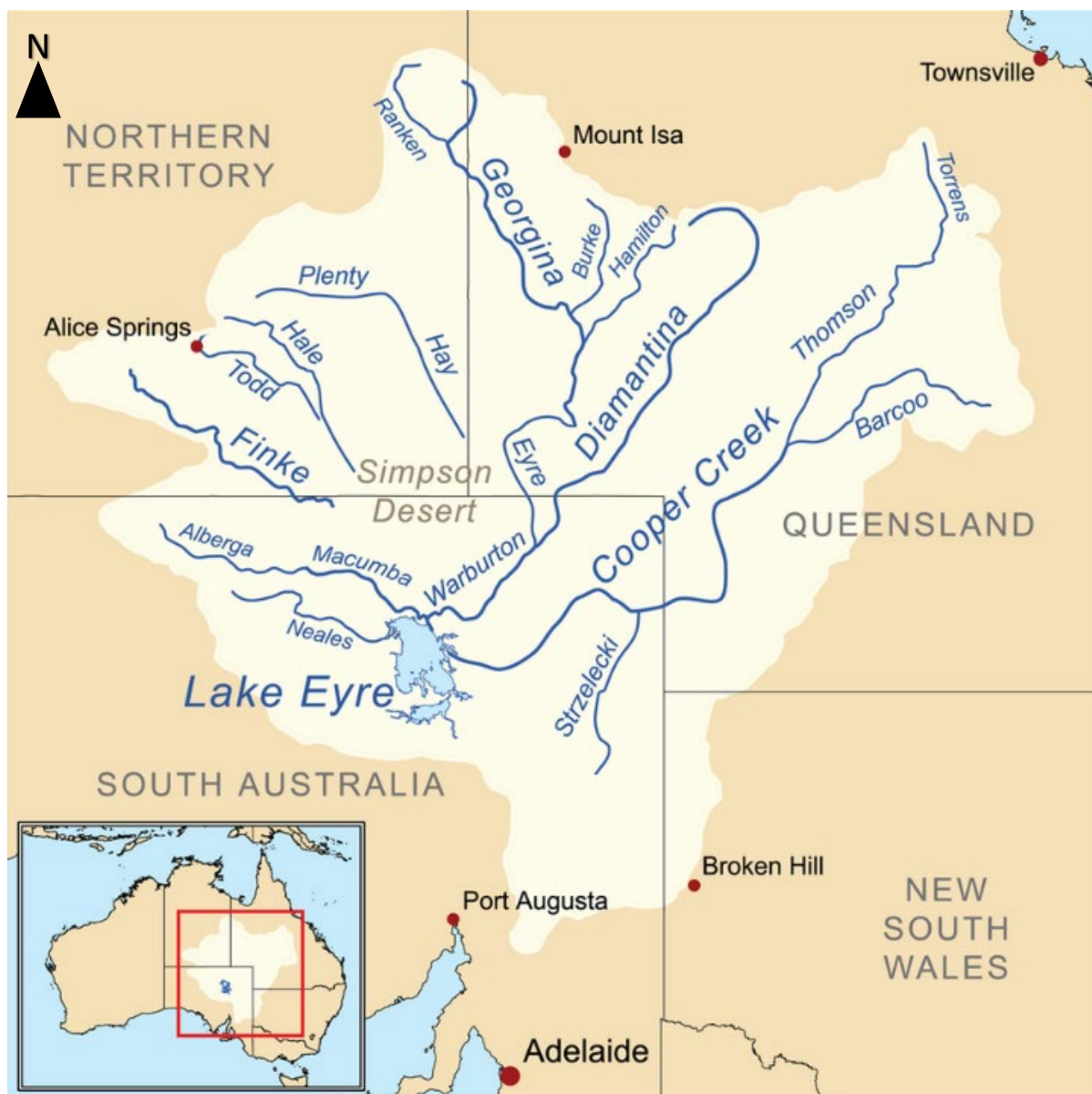


Figure 37 – Lake Eyre Basin

The Hay River catchment is bounded by the Georgina River catchment to the north and northeast, and by the Todd and Finke rivers catchments to the west. Figure 38 shows the drainage network of the Hay River catchment and its major tributaries, including the Plenty River, the Marshall River and Arthur Creek. The catchment is sparsely populated with isolated communities. Land use is typically rural throughout the catchment.

The Project is located adjacent to Unca Creek, a tributary of Arthur Creek in the upper headwaters of the Hay River catchment. Arthur Creek and the Marshall River converge into the Hay River approximately 60 kilometres southeast of the Project.

The drainage lines that intersect the Project area feed into the Marshall River to the south and Arthur Creek to the north, which in turn converge into the Hay River, approximately 60 kilometres south-east of the Project area.



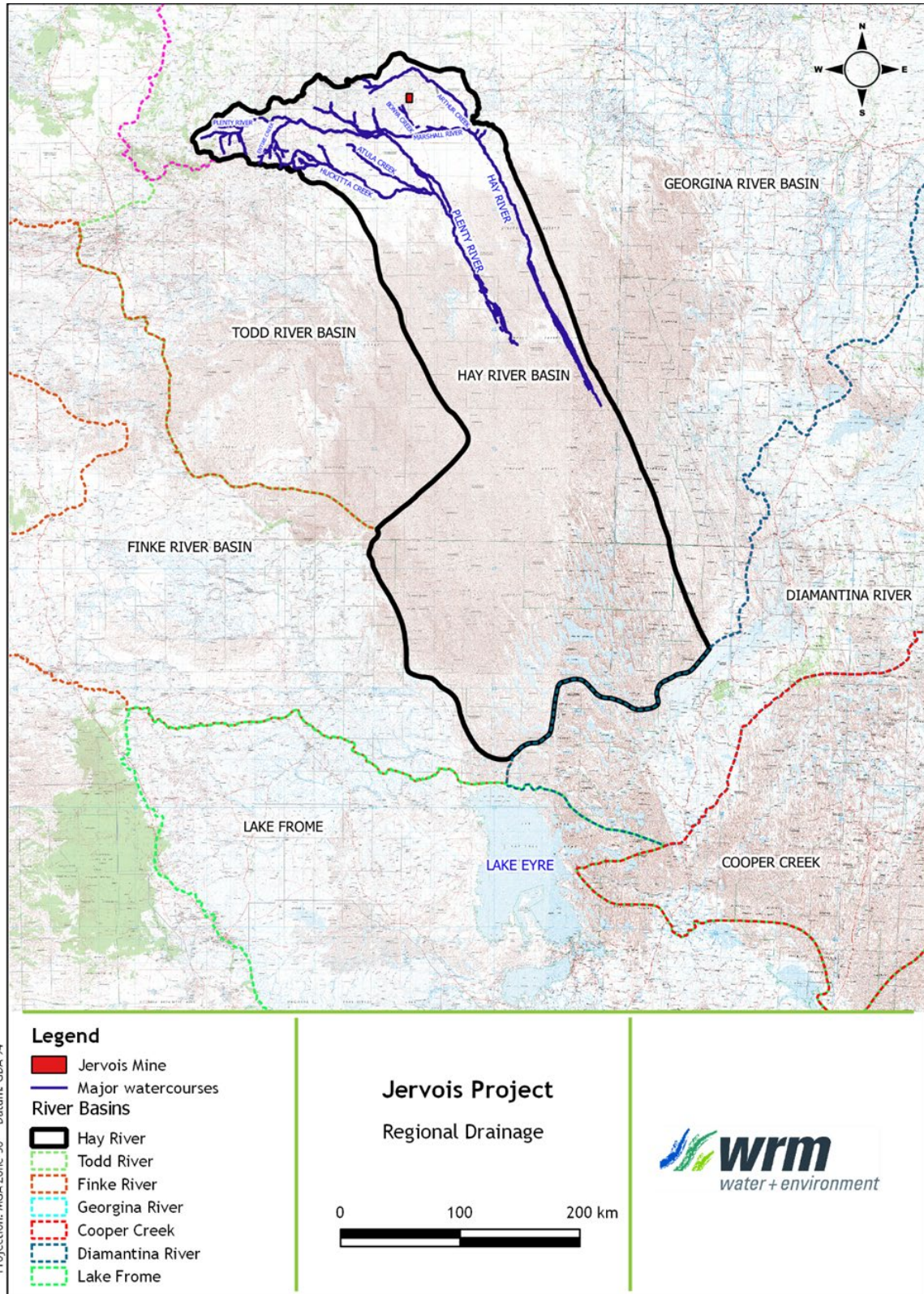


Figure 38 – Hay River basin drainage network

### Local Drainage Characteristics

The hard rock catchments of the Jervois Range are high yielding. The Project area is incised by a number of ephemeral streams that generally flow only during runoff-producing rainfall events. Major creeks include:

- Unca Creek, which flows through the mine site;
- Bonya Creek including tributaries Daylight Creek;
- Arthur Creek in the borefield area; and
- Many unnamed creeks.

The only watercourse of note in the vicinity of Project EL is Unca Creek which originates about nine kilometres upstream of the Project and joins Arthur Creek approximately 45 kilometres southeast of the Project. Unca Creek has a catchment area of 21.8 km<sup>2</sup> upstream of the Project area, with 17.1 km<sup>2</sup> (78%) of this catchment being captured in Jervois Dam upstream of the Project area.

The Unca Creek floodplain upstream of Jervois Dam is bounded by steep hills but the main channel is generally poorly defined. Downstream of Jervois Dam, the Unca Creek floodplain is characterised as relatively flat and open, with the main channel generally poorly defined. The Unca Creek channel downstream of Jervois Dam is generally about ten metres wide and less than one metre deep, with a sandy bed that would become mobile during flood events. Loose rock is evident in the bed of the Unca Creek channel at locations where depths and flow velocities increase (i.e. at constrictions or bends in the channel). The Unca Creek channel and floodplain is sparsely vegetated, with only scattered bushes lining the channel banks.

Jervois Dam located about two kilometres upstream of the Project, was constructed for previous mining operations and is the largest and most permanent surface water body in the Jervois region. Jervois Dam currently has a storage capacity of 279 ML below the existing spillway level (367.38 mAHD), and a catchment area of approximately 17.1 km<sup>2</sup>. The dam spillway is a narrow (less than three metres wide) rock chute that has been cut through the ridge at the northern end of the dam wall. The existing spillway chute is about four metres below the crest of the existing dam wall.

The structural stability of the existing dam wall is unknown, however it appears that there is significant leakage through the dam wall, as there is strong vegetation growth and signs of sodden ground along the southern side of the valley downstream of the dam wall (WRM 2018). Water quality analysis indicates that the water in the dam is fresh and close to rainwater in quality.

### Surface Water Flows

The Northern Territory Government operated a water level gauge (Gauge No. R0070009) in Jervois Dam between 1972 and 2010. Recorded sub-daily water level data at the Jervois Dam gauge were obtained from the Northern Territory (NT) Government water portal for the period of record. The recorded water level data was converted to stored volumes using a stage-storage relationship. Table 42 shows a statistical summary of daily maximum stored volumes in during the period of record.

**Table 42 – Statistical summary of daily maximum recorded volumes in Jervois Dam (WRM 2018)**

Percent of days	Volume exceeded (ML)	Comment
99%	3.7	1.4% full
90%	9.6	3.5% full
50%	59.0	21.5% full
10%	210.0	76.4% full
3%	274.8	Full storage level (FSL)
1%	315.	Dam spilling

The data indicates that:

- Jervois Dam generally fills up rapidly during the wet season (between December and February) and then gradually decreases in volume during the remainder of the year via evaporation and seepage, but it rarely empties completely;
- During the period of record, the dam is at least 3.5% full in 90% of all days, at least 21.5% full in 50% of all days and at least 76.4% full in 10% of all days; and
- The dam’s storage capacity below the spillway (274.8 ML) is exceeded in 3% of all days in the period of record.

### Surface Water Quality

The character of surface water quality is influenced by land use and the mineral composition of soils and near-surface geology. The absence of a sustained baseflow contribution to watercourses is likely to limit the influence of deeper bedrock geology on surface water quality.

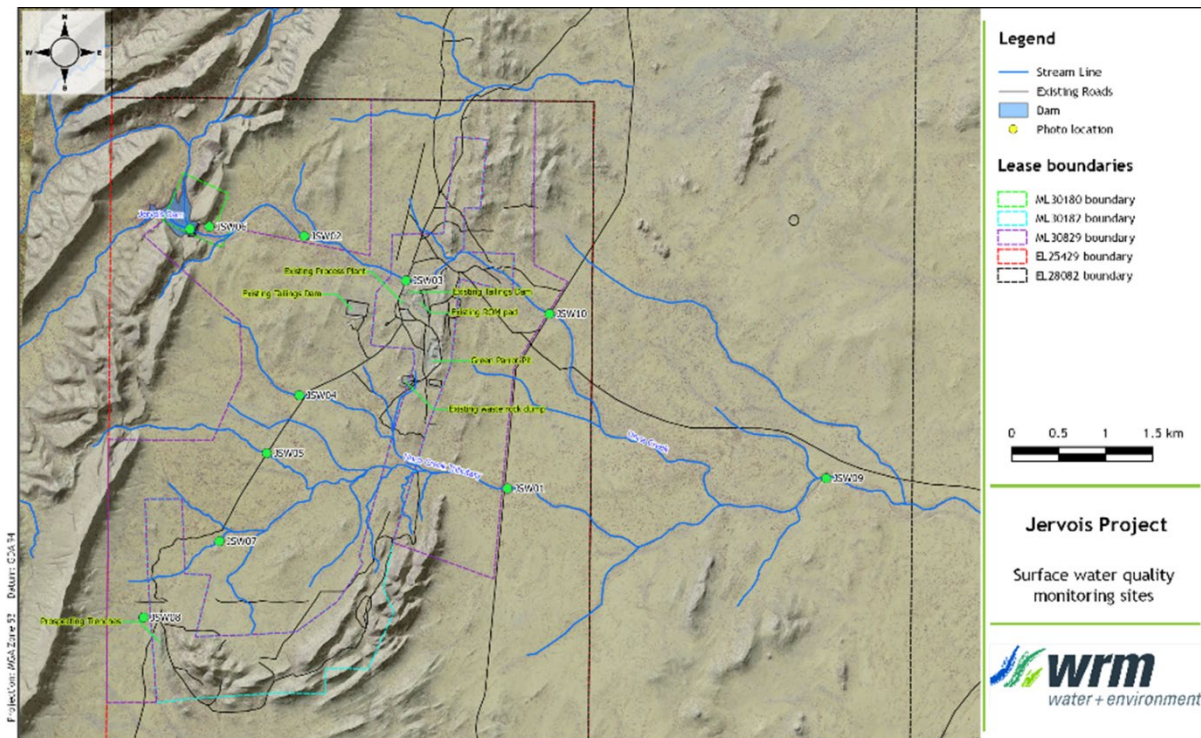
There are 11 surface water quality monitoring sites across the Project area - one monitoring site in Jervois Dam and 10 monitoring sites in the watercourses downstream of Jervois Dam (Figure 39). Few samples are available for each monitoring site (generally between one and four), while no data is available for the JSW03 monitoring site. The available samples were obtained following a total of four rainfall events which occurred between 2015 and 2018, except for one sample for Jervois dam which was obtained in January 1991.

Water quality data can be grouped into two groups:

- Group A – This group consists of eight samples obtained from monitoring sites located in the undisturbed areas within the Unca Creek Tributary catchment (sites JSW04, JSW05, JSW07 and JSW08); and
- Group B – This group consists of three samples obtained from monitoring sites located in the undisturbed areas in Unca Creek immediately downstream of Jervois Dam (sites JSW02 and JSW06).

The data shows that water quality of Group B is similar to that observed in Jervois Dam, with pH close to neutral, low EC, TSS and turbidity as well as low concentrations of metals. Contaminant concentrations in Group A are significantly higher than Group B, particularly TSS and metals. The Group A monitoring sites are located in the mineralised zone within the Project area, which likely contributes to the high concentrations of metals at these monitoring sites. The increased turbidity and TSS at the Group B locations is due to the flat, sandy nature of the channel and floodplain at those sites, compared to the rock catchment prevalent around the Group A sites.





**Figure 39 – Locations of baseline surface water quality monitoring sites**

In summary, water quality at the Project area is characterised as follows:

- Across the Project area, pH is slightly acidic, while salinities (ECs) are low;
- Water stored in Jervois Dam has low turbidity as well as low concentrations of TSS, TDS and metals. This was expected as the catchment upstream of the dam is located outside of the mineralised region of the Project area. Water quality immediately downstream of Jervois Dam (monitoring sites JSW02 and JSW06) is consistent with the observed water quality in the dam;
- In the undisturbed areas along the Unca Creek Tributary (monitoring sites JSW04, JSW05, JSW07 and JSW08), turbidity is relatively high, while concentrations of TSS and metals are also relatively high. The catchment upstream of these monitoring sites is located within in the mineralised region of the Project area which likely resulted in the elevated metal concentrations observed here despite the absence of mining disturbance in the contributing catchment; and
- Downstream of the Project area (monitoring sites JSW01, JSW09 and JSW10), contaminant concentrations are consistent with those observed in the undisturbed areas along the Unca Creek Tributary. Runoff from the mineralised zone within the Project area reports to these monitoring sites. It is possible that runoff from existing mining disturbance in the catchment of Unca Creek and its tributary may have also contributed to the elevated contaminant concentrations observed here.

### Surface Water and Groundwater Interactions

During and following rainfall, water that lands on the surface within the Jervois area will either infiltrate into the soil or rock as recharge or flow towards drainage lines as runoff. Two mechanisms provide recharge to the aquifers of the area:

- Direct (or diffuse) recharge; and
- Indirect (or local) recharge.



Recharge in this environment is generally via direct infiltration to outcropping or thinly covered aquifers such as the fractured rock aquifers outcropping in the Jervois Range and the Watt, Spring, and Tomohawk Ranges. Riverbed recharge during heavy rainfall events also occurs.

Groundwater from the Georgina Basin Carbonate Aquifer does not discharge to surface within the Project area. The water table ranges from 20 to 80 metres below ground surface and there are no springs, soaks, wetlands or salt lakes associated with the aquifer. Groundwater flows from the Southern Georgina Basin, eastward into the broader regional Georgina Basin for eventual discharge many hundreds of kilometres from the study site.

Groundwater discharge to surface features is low as the Bonya Metamorphics has a low hydraulic conductivity. Groundwater levels are approximately 20-15m below ground level.

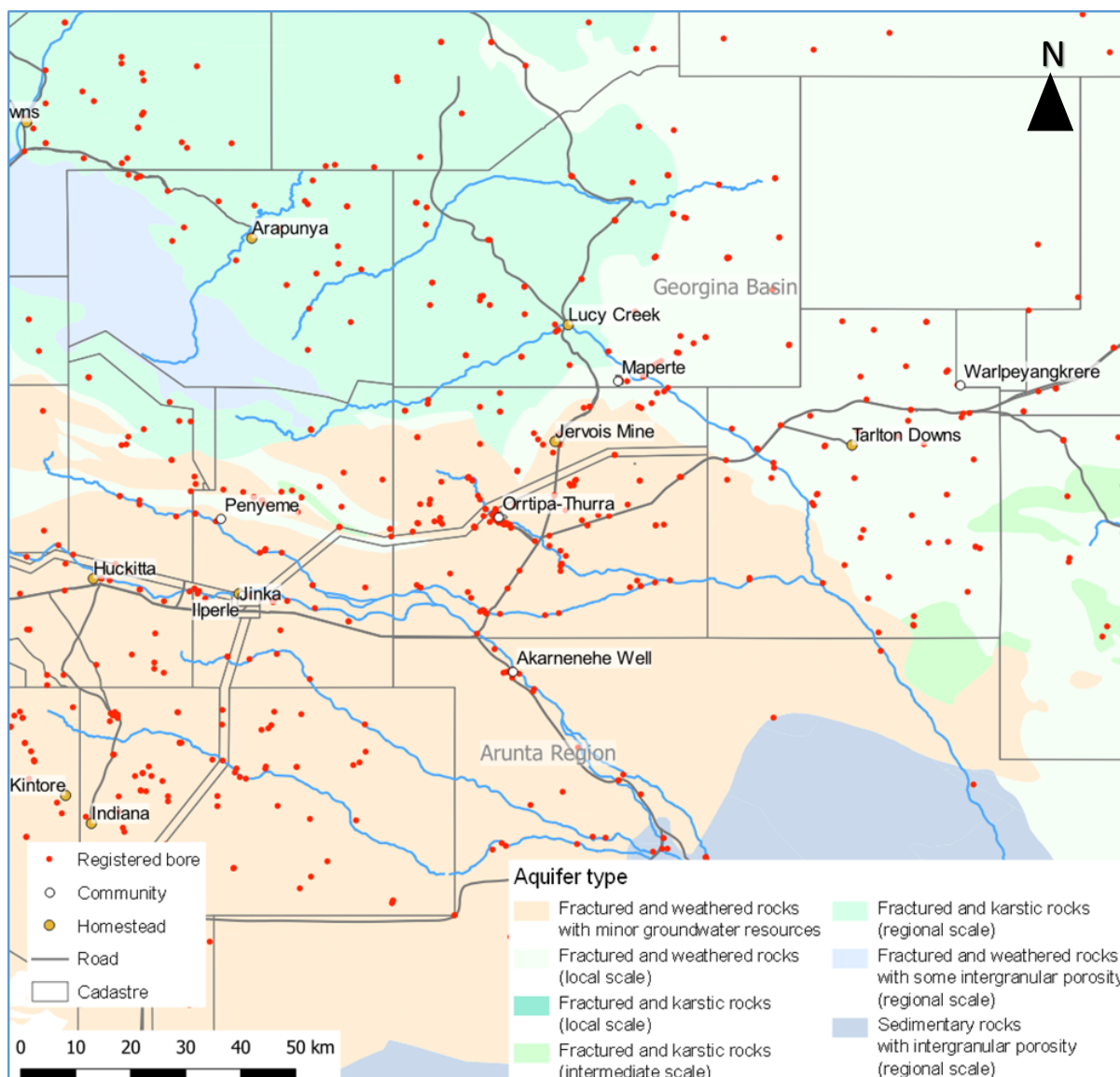
At Jervois, the average evaporation rate is much greater than the rate of rainfall. The evaporation rate is high throughout the year, with the highest evaporation rates occurring in the months between October and March. Evaporation is generally much higher than rainfall in all months of the year

#### **6.1.4 Groundwater**

The hydrogeology of the Project area can be separated into two distinct groundwater systems:

- the Georgina Basin, typified by karstic and fractured sedimentary rocks which host regionally extensive groundwater resources; and
- the Arunta Region (hosting the Jervois Mine ore bodies), typified by fractured and weathered metasediments with minor groundwater resources.

Cloud GMS developed and calibrated a transient groundwater flow model to predict groundwater drawdown and potential impacts on receptors in the aquifers surrounding the Project area over the life of the Project and post closure. The full model, including model calibration and predicted impacts on groundwater over the life of the Project are presented in the Groundwater Impact Assessment Supplement modelling report (Cloud GMS, 2019).



**Figure 40 – Hydrogeological Units Classified by Aquifer Type (Cloud GMS, 2018)**

**Hydrogeology of the Project EL**

A groundwater investigation program within the Project EL was completed in 2018 and 2019 (Figure 41). The aim of the program was to provide good spatial coverage around the Reward, Bellbird and Rockface deposits and to establish groundwater monitoring bores. The program included the construction of groundwater monitoring bores and test production bores. Deeper bores (150 metres) J11 and J7 were drilled in the centre of the proposed Bellbird and Reward open pit to investigate groundwater conditions throughout the pit sequence. All other bores targeted the water table aquifer and were drilled to an average depth of 55 metres.

All investigation bores were constructed in the Bonya Metamorphics which typically are comprised of light to dark grey uniform schist with zones of Hematite alteration and occasional calcite, quartz and pegmatite veins. The upper sequence of the schist is weathered and is typically softer with extensive iron staining, within an average thickness of around 20 metres. At most locations the weathered zone was unsaturated and consequently is not considered to form a significant aquifer across the EL area.

The findings suggest that the overall conceptual hydrogeological model for the mine site is that of a series of steeply dipping variably connected aquifers of limited lateral extent. The rock matrix has a

very low hydraulic conductivity ( $<0.001$  m/day), with fracture conductivity within the central and southern portion of the mine site in the order of 0.01-0.1 m/day from slug tests. The pumping tests indicate that the aquifer development is laterally constrained, with widths in the order of 1-100 m. There is limited connection between adjacent aquifers.



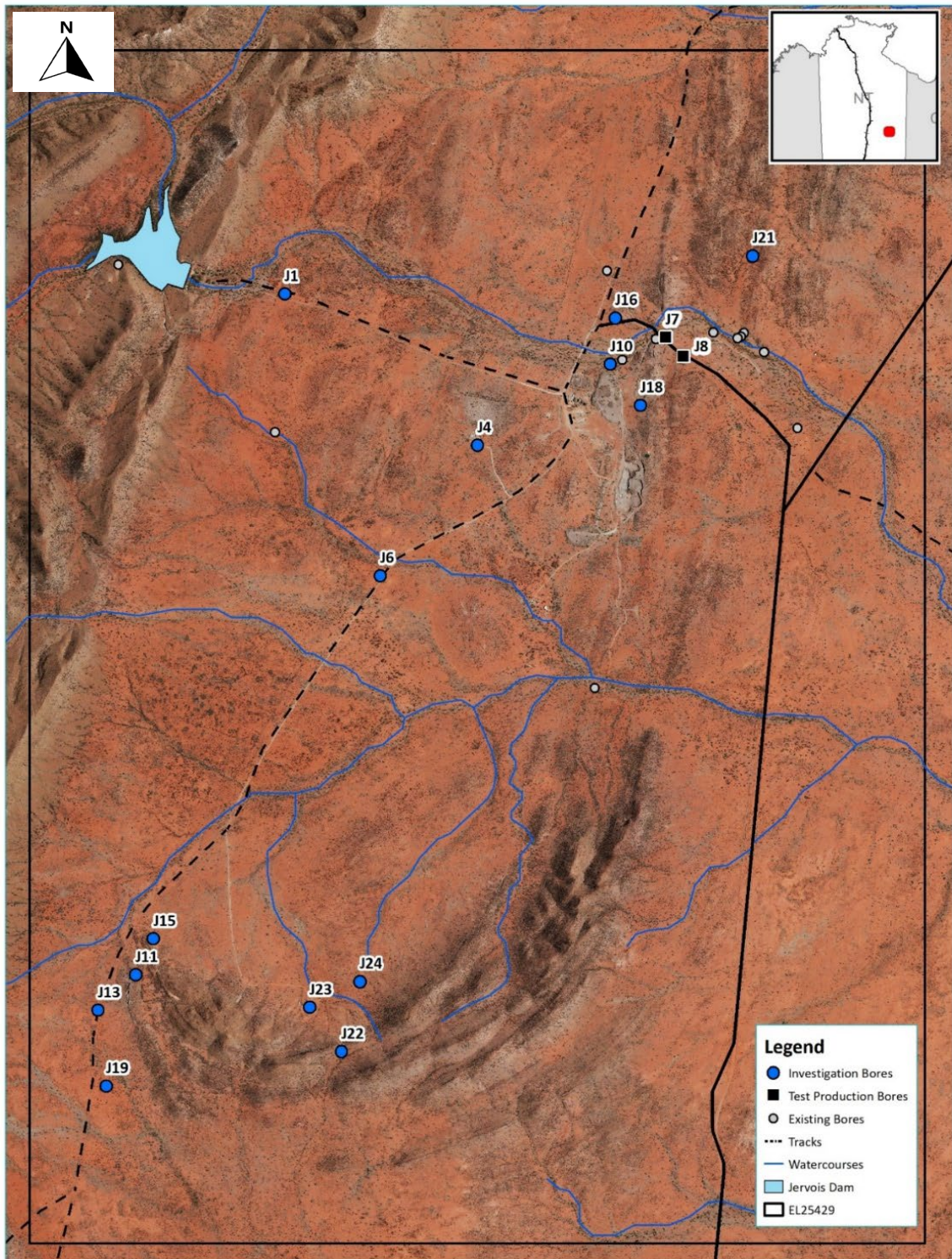


Figure 41 – Project EL Groundwater Investigation Drilling



Table 43 – Summary of Project EL Groundwater Drilling Results

Reg No	Bore_ID	Elevation	Stick-up	RL_TOC	Standing Water Level (mBGL)	RWL	Comment
RN019800	J1	362.2	0.5	362.65	18.82	343.83	Monitoring
RN019801	J4	348.5	0.5	348.88	12.58	336.30	Monitoring
RN019802	J6	347.8	0.5	348.21	15.03	333.18	Monitoring
RN019796	J7	345.8	0.5	346.33	16.38	329.95	Test production
RN019821	J8	347.3	0.6	347.81	17.22	330.59	Test production
RN019820	J10	347.0	0.7	347.57	Not Static	-	Monitoring
RN019813	J11	363.3	0.4	363.68	28.54	335.14	Monitoring
RN019815	J13	364.6	0.8	365.26	31.00	334.26	Monitoring
RN019818	J15	359.8	0.7	360.4	23.58	336.82	Monitoring
RN019797	J16	348.2	0.5	348.6	15.14	333.46	Monitoring
RN019799	J18	354.0	0.5	354.39	22.40	331.99	Monitoring
RN019814	J19	362.1	0.5	362.46	31.48	330.98	Monitoring
RN019798	J21	352.8	0.5	353.25	25.54	327.71	Monitoring
RN019817	J22	370.1	0.7	370.72	Dry	-	Monitoring
RN019819	J23	360.7	0.6	361.2	27.76	333.44	Monitoring
RN019816	J24	362.0	0.8	362.76	29.45	333.31	Monitoring
RN010121		347.0	0.3	347.3	14.18	333.12	
RN006910		343.1	0.7	343.84	20.45	323.39	Windmill
RN007598		342.0	1.0	343.03	Not accessible	-	Camp Bore
RN010323		345.2	0	345.21	14.52	330.69	Shaft Bore
RN012917		338.0	0	338.03	17.04	320.99	Solar Bore

Source – Cloud GMS, Groundwater Monitoring and Management Plan, 2020

### Hydrogeology of the Georgina Basin

The Georgina Sedimentary Basin commences immediately west of the mine site in the adjacent Jervois Range. Limited aquifers are known to occur in the Formations that form this range. The first Formation known to contain significant aquifers outcrops 20 kilometres to the north-west of the Jervois Range.

The Georgina Basin Carbonate Aquifer is part of the regionally extensive Georgina Basin and underlies approximately one quarter of the Northern Territory and extends beneath the northwest of Queensland. The Basin represents a large regional scale groundwater resource of ~ 1,320,000 GL, assuming a specific yield of 0.04, a saturated accessible thickness of 100 metres and an area of ~330,000 km<sup>2</sup>.

The carbonate aquifer system of the Georgina Basin comprises carbonates; limestone, dolomite, dolostone and sandstone. Regionally the aquifer is unconfined and the entire basin is understood to comprise a connected aquifer system. Previous studies of the system indicate that regionally it shows unconfined characteristics with a specific yield of about 0.01 to 0.04 (Jolly, 2002; Jolly et al., 2004; Knapton, 2006).

Carbonate formations in other regions of the Georgina Basin have recorded significant bore yields (50 L/s) in areas where weathering has led to dissolution features and karst development (i.e. cavernous limestone) within the limestone/dolostone sequence and significant secondary porosity. Where these features are absent, the Arrinthrunga Formation/Arthur Creek Beds display relatively poor yield potential (< 2 L/s). Groundwater resources are also present in intergranular sedimentary formations (Tomahawk Beds, Eurowie Sandstone), but supplies are typically less than 5 L/s.

Key local groundwater observations in the Arrinthrunga Formation are as follows:

- Lucy Creek Oil Well located 45 kilometres north-east of the Project intersected a full sequence of the Arrinthrunga Formation (700 metres) and airlifted approximately 60L/s of groundwater during drilling. Ride (1971) drilled several investigation holes along the oil bore access road, two bores were pumped at rates of 5 and 6 L/s, one of which recorded a “cavern” at a depth of 190 metres. Bores drilled closer to Lucy Creek Station along the access track had less success.
- BMR Huckitta 8 was a stratigraphic core hole drilled by the NTGS located 35 kilometres north-west of the Project. The hole was abandoned at a depth of 80 metres in the Arrinthrunga Formation due to a lack of water supply for drilling. Circulation loss was experienced from 17 metres and a total of 300,000 litres of drilling water was lost downhole, this suggested significant porosity in the top 80 metres of the sequence.

Groundwater resources capable of meeting the water demand for the process water supply of up to 45 L/s have been located within the southern Georgina Basin in the regionally extensive fractured and karstic rocks of the Arrinthrunga Formation and Arthur Creek Formation within the Lucy Creek Pastoral lease area.

Drilling for the process water supply investigation was completed over a three week period from end July to mid August 2018. Additional drilling to install process water supply production bores was completed in June 2019 and the results from this drilling were consistent with the 2018 investigation drilling results. Sufficient groundwater resources for the Project have been identified. The bores have typically yielded ~ 10 L/s.

### Groundwater Users

Third party uses include pastoral bores used for stock watering and station water supplies, and community water supplies. Pastoral bores, community water supply bores include:

- Arapunya Station stock and domestic bores;
- Jervois Station stock and domestic bores;
- Lucy Creek Station stock and domestic bores;
- Maperte community (abandoned) water supply (16 kilometres to the north east); and
- Orrtipa-Thurra (Bonya) community water supply (17 kilometres to the south west).

Arapunya Station (located 52 kilometres north west of the borefield) and the northern portion of Jervois Station use bores completed in the Georgina Basin Carbonate aquifer for stock and domestic purposes. Lucy Creek Station utilises groundwater from the Georgina Basin Carbonate aquifer and is located ten kilometres from the water supply borefield. The Bonya community water supply and the

Jervois Station utilise groundwater from the fractured rock aquifer and are located more than 30 kilometres and 50 kilometres respectively from the borefield.

The closest stock bores to the process water supply bores are RN011102 and RN013274, which are approximately 1.5 kilometres from the closest production bore.

Full details on these bores can be found in the Groundwater Monitoring and Management Plan.

## 6.2 Information/Knowledge Gaps

### 6.2.1 Identification of Information/knowledge gaps

Information gaps associated with the surface water investigations include:

- No filtered metal concentration available for background water quality monitoring sites, which means the data cannot be compared against 95%ile ecosystem protection WQOs;
- Quality of waste rock dump runoff is unknown;
- Quality of groundwater is unknown; and
- Insufficient data is available to calibrate Unca Creek flood models.

Information gaps associated with the groundwater investigations include:

- Lack of timeseries data to understand the dynamics of the groundwater system, which will give insights to recharge and storage parameters; and
- How the system will respond to the stresses that will be imposed on the groundwater system via the dewatering of the pits and the process water supply as these stresses are considerably greater than the stresses associated with pumping from stock and domestic bores and community/outstation water supply bores.

### 6.2.2 Filling Information/Knowledge Gaps

The Water Management Plan includes a surface water monitoring program which will collect data on:

- Background filtered metal concentrations from upland and lowland catchments;
- Quality of runoff and seepage from WRDs; and
- Quality of groundwater.

In addition, the Unca Creek diversion monitoring plan will collect data to allow calibration of the Unca Creek flood models.

Measures to protect the environment due to these data gaps are:

- All seepage from WRD pumped back to process water dam;
- No releases or spills from the process water dam;
- ANZECC & ARMCANZ 95%ile ecosystem protection WQOs adopted as site trigger limits for dissolved metals (background data not used to set trigger limits); and
- Sensitivity testing of the performance of the diversion has been undertaken to provide confidence in the adopted design.

Management strategies to address the groundwater information gaps include:

- The monitoring regime identified in the Groundwater Monitoring and Management Plan;
- The incorporation of additional data collected through the strategies provided in the Groundwater Monitoring and Management Plan to update the modelling and the associated impact predictions; and
- Updating the groundwater model based on the collected data.

### 6.2.3 Water Account

As construction works were delayed from 2021 and no works under the original MMP have commenced, there is no information to provide for the previous reporting period.

## 6.3 Risk Management

### 6.3.1 Identify Hazards and Rank Risks

The risk ratings as identified by the Project risk assessment (Appendix A1) are summarised in Table 44. Of the 29 identified risks, 13 have residual risk ratings of low, 13 are very low with the remaining 3 having Medium risk ratings.

**Table 44 – Risk Assessment Summary**

Potential Impact	Initial Risk Rating	Residual Risk Rating
Fears of impacts to water resources	High	Low
Aquifer depressurisation and reduced groundwater availability	Low	Very Low
Flooding resulting in Damage to mine workings and facilities	High	Medium
Water storage failure and loss of mine water resource	Medium	Low
Insufficient water supply in periods of drought	High	Low
Change to streamflow in Unca Creek due to Jervois Dam upgrade – damage to flora and fauna	Low	Low
Water bores creating new pathway to aquifers and enhancing contamination pathways which impact groundwater dependent ecosystems	Low	Very Low
Failure of fuels storage	Low	Very Low
Spillage of fuels during operation and transportation	Medium	Low
Spillage or release of hazardous substances during operation and transportation	Medium	Low
Inadequate design, failure of TSF	Medium	Low
Contaminated seepage from TSF	High	Very Low
Structural failure of the process water storage facility	Medium	Low
Contaminated seepage from process water storage facility	Medium	Very Low
Insufficient capacity of the process water storage facility	Medium	Low
Pumping/pipeline failure causing process water escapes to ecosystem	Medium	Very Low
ARD from waste dumps leading to contaminated seepage/runoff	Low	Very Low
ARD from ore ROM leading to contaminated seepage/runoff	Medium	Very Low
Insufficient clean-up of ore ROM at mine closure causing contaminated seepage/runoff	Medium	Low
Old ROM samples stored in barrels – ARD contamination of surface and groundwater	High	Very Low
ARD from old tailings dam/old waste piles/old ROM - ARD contamination of surface and groundwater	High	Low



Potential Impact	Initial Risk Rating	Residual Risk Rating
Failure of waste water treatment system	Medium	Low
Groundwater drawdown due to mining activities and project water supply – impacts on groundwater dependent flora and fauna	High	Medium
Increase in the area inundated by the upgraded Jervois Dam – habitat loss	Low	Low
Mine water not appropriately managed - contamination of surface and groundwater	Medium	Very Low
Migration of historical contamination to the environment during construction and operation - contamination of surface and groundwater	Low	Very Low
Long term contamination of land - contamination of surface and groundwater	Low	Very Low
Borefields not appropriately decommissioned, uncontrolled release of groundwater from borefields	Very Low	Very Low
Sudden inrush of waters at underground mine	High	Medium

### Surface Water

Surface water impacts may include changes to streamflow in Unca Creek, flooding, final voids water quality and the Jervois Dam lake extent.

#### **Unca Creek Streamflow**

The repair of the Jervois Mine Dam proposed after year four will include the construction of an improved dam wall and spillway to limit leakage and improve dam safety. The upgraded spillway will be raised to increase the storage volume from 279 ML to 945 ML.

The proposed upgrade to Jervois Dam will potentially result in changes to the existing conditions streamflow regime in Unca Creek but these will be insignificant. The upgraded dam will require a greater volume of catchment runoff to fill the dam before the spillway is activated and flow leaves the dam. Furthermore, the dam will be relied upon as a source of raw water following its completion so reducing dependence on the groundwater borefield. Therefore, the volume of water stored in the dam will be drawn down after a runoff event more rapidly than under existing conditions.

Overall, the proposed upgrade to the dam will potentially reduce the magnitude and number of overflows from the dam.

The water balance model was used to assess the change in flows in Unca Creek immediately downstream of the dam following the upgrade (which represents the longest period of the flow situation). The Water Management Plan provides detailed information including the existing conditions and predicted post-upgrade flow duration curves for Unca Creek immediately downstream of the dam for the first four years of Project life.

It should be noted that the existing dam has already altered the streamflow regime of Unca Creek significantly. In addition, the dam is situated in an arid catchment where it would not be unusual for the dam not to overflow for several years. Water balance modelling indicates that the existing dam

only overflows on average in every fourth year. The upgraded dam is predicted to overflow on average every 11 years under the year 1 scenario, and every 9 years under the post-mine closure scenario.

Therefore, the proposed dam upgrades will alter the streamflow regime in Unca Creek downstream of the dam, with reduced frequency of spill events but with increased maximum spill rates. The change in streamflow regime will have a significant affect along the reach of Unca Creek within the Project, up until the Unca Creek tributary confluence which doubles the Unca Creek catchment. The impacts downstream of this point will be insignificant.

### ***Flooding***

The relatively minor increases in peak flood levels and velocities in Unca Creek due to the upgrade to Jervois Dam are not considered significant. The increased flood levels and velocities are typically confined to the Unca Creek channel and do not affect any existing structures or property. The peak flood levels, discharges and velocities in Unca Creek with the upgraded dam in place will also be below the 'pre- dam' scenario. The predicted impacts on flooding are summarised below:

- There are no predicted increases in peak flood levels and velocities along the watercourses traversing the Project area, except in Unca Creek;
- The Jervois Dam spillway will be raised and widened under operational conditions which will increase the peak outflow discharge from the spillway by about 10 %. The increased discharges from the dam spillway will result in minor increases in peak flood levels and velocities along Unca Creek downstream of Jervois Dam;
- There are minor predicted increases in peak flood levels of up to 0.1 metres in Unca Creek downstream of Jervois Dam for the 10 % AEP and 1 % AEP events. The average increase in flood levels along Unca Creek is about 0.05 metres for the 10 % AEP event and about 0.08 metres for the 1 % AEP event. These minor increases in peak flood levels are not expected to have any material impact on existing land uses downstream of the Project area; and
- There are minor predicted increases in peak velocities of up to 0.2 m/s in Unca Creek downstream of Jervois Dam for the 10 % AEP and 1 % AEP events. The average increase in peak velocities along Unca Creek is about 0.07 m/s for the 10 % AEP event and about 0.11 m/s for the 1 % AEP event. Given that the average peak flood velocities along Unca Creek under existing conditions are about 0.9 m/s for the 10 % AEP event and 1.3 m/s for the 1 % AEP event, the minor predicted increases in peak velocities due to the Project are not considered significant.

Failure of the repaired Jervois Dam or the Unca Creek diversion would potentially result in a flood wave downstream of the project, or floodwater entering the Reward Pit. The only population at risk from such a failure would be mine personnel. To reduce the potential consequence of this occurrence, the Reward underground portal has been moved to higher ground, to the north of the diversion. There are no downstream dwellings or population centres at risk of flooding from a failure in either structure.

### ***Final voids***

CloudGMS (2019) has assessed the long-term behaviour of the final voids at the Project (post mine closure). The CloudGMS (2019) study indicates that approximately 190 years after mining has ceased, shallow pit lakes will have developed in the Bellbird and Reward final voids. The water surface level in the pit lakes is predicted to be some 20 metres to 50 metres below ground levels surrounding the voids.

The final landform hydraulic modelling in this report has demonstrated that the final voids will be protected from flooding from Unca Creek and its tributaries for all events up to and including the Probable Maximum Flood (PMF).

Therefore, the only water that collects in the final voids will be surface water runoff from the pit catchments and groundwater seepage. The final voids will therefore neither capture nor release surface water and will have no significant impact on surface water.

### ***Water quality***

The Project has the potential to impact on water quality in Unca Creek and its tributaries as a result of controlled and uncontrolled releases of water. The water balance model was used to investigate the predicted frequency and volume of uncontrolled releases (spills) of water from the process water dam and the waste rock dump sediment dams in the first four years of Project life. The results of the water balance model show that no uncontrolled releases are predicted from the process water dam in any of the water balance model simulations. Therefore, the Project will not release any mine affected water or dewatered groundwater to the environment.

The water balance model indicates that there is approximately a 10 % chance of uncontrolled releases of water from the waste rock sediment dams in the first four years of Project life. Due to the proposed capping of the waste rock dumps with NAF material, runoff from the dumps is likely to be of relatively similar quality to baseline surface water quality at the Project, however seepage from the dumps is likely to be of poorer quality (EGI, 2019). It is anticipated that runoff from the waste rock dumps may be suitable for release to the environment (following a period of monitoring).

Therefore, it is considered that the predicted uncontrolled releases from the waste rock sediment dam are unlikely to have any impact of significance on water quality in Unca Creek, as they will occur when there is likely to be some flow in the receiving watercourses, and the uncontrolled releases are likely to be of similar quality to background water quality. It is the intention to harvest water captured in waste dump sediment dams for use in the mines' processing facility.

### ***Jervois Dam Lake Extent***

The repairs and upgrade to Jervois Dam will result in an increase in the area inundated by the lake behind the dam wall. The water balance model was used to investigate the impact of the dam upgrade on lake water levels. The extent of inundation from the lake at full supply level will increase from about 16 hectares to about 36 hectares. The increased inundation extent does not affect any existing structures or sensitive environmental or cultural heritage areas.

The proposed dam upgrade will also result in an increase to the frequency of inundation. The water balance model predicts that water levels in the upgraded dam will exceed the existing full supply level approximately 27 % of the time (and conversely will be below the existing full supply level 63 % of time).

### **Groundwater**

The likely impacts of groundwater abstraction for the mine process water supply and dewatering of mine excavations on existing users may include drawdown and pit inflows during and post mining. A transient groundwater flow model was prepared and calibrated as part of the groundwater investigations (Groundwater Impact Assessment Supplement, Cloud GMS, 2019) to determine the groundwater drawdown on the surrounding aquifers over the life of the Project. While impacts on groundwater levels will vary spatially over time and mining progresses, the greatest impacts are predicted to occur post mining when the deepest areas of mining are accessed.

Potential impacts may include water table drawdown and groundwater contamination. Groundwater contamination may occur as a result of water rock and tailings leachate, hazardous materials spills and density driven flow beneath pit lakes. These impacts have the potential to affect other groundwater users and groundwater dependent flora and fauna species.

### ***Drawdown at Receptors***

Groundwater drawdown after ten years of pumping at the process water supply borefield are detailed in the Jervois Base Metals Mine Groundwater Impact Assessment Supplement (Cloud GMS, 2018). Groundwater modelling has indicated that during the mine life impacts may include:

- A maximum drawdown of 2 – 3 metres at the closest pastoral bores (RN011102 & RN013274) to the borefield; and
- Drawdown of less than one metre at the Lucy Creek homestead bore.

As drawdowns are not considered to be significant in terms of affecting yield or access to groundwater, the existing third-party use of groundwater should not be impacted. Drawdown at the end of mining is predicted to extend less than 40 km from the borefield to the 0.5m drawdown contour.

Groundwater modelling was also undertaken to predict the impacts on receptors due to mine dewatering via the fractured rock groundwater system. Over the ten year mine life, it is predicted that a maximum drawdown of 1.5 – 1.0 metres can be expected at a distance of less than three kilometres of the EL boundary.

### ***Leachates from Waste Rock Dumps and the TSF***

WRD leachate will be predominantly non-acid forming (NAF) and seepage will only occur under high intensity rainfall events when dilution effects are expected. TSF leachate quality will be similar to the process water supply during operations, although potentially acid forming (PAF) post mining. The underdrainage system will intercept seepage and dilution effects are expected as the seepage mixes with the ambient groundwater as it migrates down gradient.

The fate of leachate downgradient of the WRDs and TSF has been forecast using the flow field calculated by the numerical groundwater modelling and random walk particle tracking. The WRDs and TSF downgradient seepage is expected to be slow due to the low permeability of the fractured rock groundwater system and ultimately any seepage is expected to be captured by the local groundwater sinks formed at the Bellbird, Reward and Reward South pit-lakes. As there are no receptors within this distance, the beneficial use of the water will remain unchanged.

### ***Hazardous Materials Spills***

Groundwater contamination may occur through spills of hazardous material at the mine site or during transport. These risks will be managed through appropriate storage and transport of hazardous materials (Appendix A2).

Accidental spills will be managed in accordance with the EM Plan, Emergency Response Management Plan (ERMP) including the Environmental Incident Investigation Procedure.

### ***Groundwater Dependent Species***

Investigations have indicated that local riparian vegetation along Unca and Arthur Creeks are considered to be facultative groundwater dependent species and are reliant on surface water flow regimes. As such, there is not expected to be any impacts on this vegetation as a result of drawdown.

Impacts to stygofauna are unlikely as the local habitat suitability within the Project EL is poor as the lithology of metamorphosed rocks is fine grained and will not provide the pore spaces required to support stygofauna (CloudGMS, 2018). The 2019 Stygofauna Pilot Study investigated the presence of



stygo fauna in the borefield area of the Project and found that the geology and hydrology of the borefield area was considered suitable for providing habitat for stygo fauna whilst the water quality was assessed as potentially suitable. Of the ten bores sampled, only one contained stygo fauna: a single copepod, a stygoxene. Stygoxenes facultatively use groundwater ecosystems but are not dependent on groundwater to complete their lifecycle. Overall the stygo fauna community of the borefield area was assessed as having low environmental value based on the limited occurrence of a single taxon and the groundwater quality being only potentially suitable on the basis of total dissolved solids (frc environmental, 2019).

### **6.3.2 Actions and Strategies in Response to Identified Risks**

#### **Surface Water**

Mine water will be managed based on quality using the mine water classification system outlined in the Water Management Plan as summarised below:

- Clean water drains will be constructed to divert undisturbed runoff around disturbed areas to protect it from unnecessary potential contamination and released to the environment;
- Dirty water drains will be constructed to capture and convey sediment laden runoff from waste rock dumps to the waste rock dump sediment dams;
- Both clean and dirty water drains will be sized to convey all runoff from events up to and including 10 year ARI event;
- Runoff from ROM and product stockpiles (mine affected water) not suitable for release to the environment will be collected and reused on site;
- Runoff from the process plant area (mine affected water) not suitable for release to the environment will be collected and reused on site;
- The Process Water Dam will be designed and managed in accordance with the Water Management Plan;
- At source controls will be implemented within the process plant area to contain oil, grease and chemicals through:
  - Appropriate bunding of all chemical stores; and
  - Hydrocarbon capture and oil and grease separators.
- Runoff from pit areas (mine affected water) which contains sediment, elevated levels of metals and potentially oil and grease will be collected and reused on site;
- Groundwater seepage to underground mines (raw water plant standard) which may have been in contact with ore, and may contain elevated levels of metals will be collected and reused on site;
- Waste rock dumps (sediment laden water) – poorer quality seepage will be collected and reused on site while runoff which is likely to be of relatively similar quality to baseline surface water quality will be suitable for release;
- Water to be used for dust suppression will comply with the water quality limits outlined in Table 45 below;
- Sediment dams will be sized to capture all runoff from the waste rock dumps for a 10% AEP 24-hour rainfall event and designed in accordance with the ESCP;
- The tailings storage facility will be designed TSF in accordance with relevant requirements of ANCOLD 'Guidelines on tailings dams';
- The tailing storage facility will include a decant system to return water to the process plant;
- Heavy vehicle workshop area where spills are likely will drain to hydrocarbon separators and oil and grease traps;

- Chemical and fuel stores will be banded in accordance with AS1940 Storage and Handling of Flammable and Combustible Liquids to contain any spills;
- The explosives magazine will be covered and banded to prevent any spills or releases of chemicals;
- Implementation of the Acid Mine Drainage Plan;
- Following operations at the project commencing, the site water balance model will be calibrated against observed site data and used to developed updated forecast model results. The maximum period between review and recalibration of the site water balance model will be 12 months;
- The Unca Creek diversion will be constructed in accordance with the Unca Creek Diversion at Jervois Mine Design Report (WRM, 2020);
- Water quality in storages will be regularly sampled in accordance with the Water Management Plan schedule to identify trends in water quality over time and to inform water management decisions and comply with any Waste Discharge Licences;
- Water sampling will be conducted in accordance with recognised Australian Standards and guidelines (such as AS/NZS 5667, ANZECC & ARMCANZ);
- Water samples will be analysed at a laboratory with current NATA accreditation or equivalent, for the analytes tested;
- The water monitoring program will be reviewed by a suitably qualified person to ensure the program is meeting its objectives and updated at least annually; and
- Emergency responses will be in accordance with the procedures provided in the Environmental Emergency Management Plan.

**Table 45 – Adopted Water Quality Limits for Dust Suppression**

Parameter	Abbreviation	Units	External draining	Drains to mine water management system
<i>Non-metallic indicators</i>				
pH	pH	pH units	6.0 - 8.5	6.0 - 8.5
Electrical conductivity	EC	µS/cm	170	>170
Total dissolved solids	TDS	mg/L	125	>125
Sulphate	SO <sub>4</sub>	mg/L	1,000	>1,000
<i>Metals and metalloids (filtered, unless otherwise stated)</i>				
Aluminium	Al	µg/L	55	>55
Arsenic	As	µg/L	24	>25
Cadmium	Cd	µg/L	0.2	>0.2
Copper	Cu	µg/L	1.4	>1.4
Iron	Fe	µg/L	300	>300
Lead	Pb	µg/L	3.4	>3.4
Magnesium	Mg	mg/L	2,000	>2,000
Manganese	Mn	µg/L	1,900	>1,900
Mercury	Hg	µg/L	0.6	>0.6
Nickel	Ni	µg/L	11	>11
Zinc	Zn	µg/L	8	>8

## Groundwater

Groundwater management will be in accordance with the measures nominated in the Groundwater Monitoring and Management Plan as follows:

- Gather seepage from beneath the TSF via a system of underdrains and reuse in the process plant;
- Install water monitoring bores downstream of the TSF and undertake regular monitoring of groundwater quality;
- Implement groundwater impact investigation (section 7.7 of the Groundwater Monitoring and Management Plan);
- Re-calibration of the groundwater model and re- assessment of predicted drawdown at receptors;
- Make-good measures at receptors to ensure water availability (deepening bores/off-take from process water supply pipeline);
- Increased water efficiency to be studied and implemented if practicable;
- Modified pumping regimes;
- Implementation of the Biodiversity Management Plan and voluntary biodiversity offset strategy;
- Implementation of the Acid Mine Drainage Plan;
- Implementation of the Mine Rehabilitation and Closure Plan; and
- Annual groundwater management procedure reviews.

Groundwater quality impacts on areas beyond the immediate mining area post closure will be managed through measures such as:

- Ensure pit-lake forms with adequate gradient to maintain groundwater sink;
- Scenario assessments with groundwater model verified against 2-3 years of operational data to confirm optimum closure plan;
- Groundwater impact investigation of seepage on receptors;
- Life of mine seepage management if required, for instance pump and treat, or pump and reuse; and
- Ensure pit-lake forms with adequate gradient to maintain groundwater sink post-closure.

Groundwater contamination from spills will be managed in accordance with the Environmental Management Plan (EM Plan) and the Environmental Emergency Management Plan (ERMP) including the Environmental Incident Investigation Procedure.

## 6.4 Monitoring

### 6.4.1 Surface Water Monitoring Program

Surface water quality is collected by a network of remote sampling stations located in the waterways throughout the site. The sampling network was installed in 2015 and has collected samples from all significant rainfall events since then. A summary of these monitoring results is provided in Table 3.4 of the Jervois Base Metal Project EIS Surface Water Impact Assessment Supplement (WRM, 2019).

Surface Water quality will be monitored in accordance with the Water Management Plan schedule and include the monitoring of:

- Rainfall and meteorological data;
- Background surface water (undisturbed) quality data along natural streams upstream and downstream of the mine site, and through the mine site following runoff events;

- Receiving environment surface water quality data along streams downstream of disturbance areas at the mine site;
- Surface water storage quantity and quality data in the water storages on site; and
- The process water dam, Jervois Dam, underground dewatering dam and waste rock sediment dams will be monitored at least quarterly (and daily during or following significant runoff events).

The water monitoring program will be reviewed by a suitably qualified person to ensure the program is meeting its objectives and updated at least annually.

#### **6.4.2 Groundwater Monitoring Program**

Representative groundwater quality sampling for the fractured rock and Georgina Basin Carbonate Aquifer groundwater systems as determined from groundwater investigations (CloudGMS 2018a, CloudGMS 2018b, Groundwater Enterprises 2019) are presented in the Groundwater Monitoring and Management Plan. The groundwater levels in the vicinity of the Jervois Project mine site and the process water supply are also presented in the Groundwater Monitoring and Management Plan.

The groundwater monitoring outlined in the Groundwater Monitoring and Management Plan will include monitoring of groundwater levels and groundwater quality at a number of observation bores. The volume of water extracted from groundwater resources will be quantified, recorded and reported monthly.

Water table drawdown will be monitored will include monitoring of:

- Water levels and quality at a network of observation bores;
- Volumes and water quality pumped;
- Vegetation in accordance with the Vegetation Health Monitoring Plan provided in the Biodiversity Management Plan;

Water quality impact on areas beyond the immediate mining area post closure monitoring will include:

- Water levels and quality at a network of observation bores;
- Down gradient of waste rock dumps for groundwater levels and quality; and
- Down gradient of the tailings storage facility for groundwater levels and quality.

#### **6.4.3 Data Review and Interpretation**

As construction works were delayed from 2021 and no works under the original MMP have commenced, there is no information to provide for the previous reporting period. When requested, data and an analysis of data trends will be provided to the relevant regulator. All data will be analysed and interpreted by appropriately qualified personnel. Data analysis will include an assessment of trigger levels or benchmarks to determine the effectiveness of control strategies.

### **6.5 Management**

#### **6.5.1 Remedial or Corrective Management Actions**

Should monitoring data or other observations detect the potential for or actual adverse trends in performance or water quality impacts, corrective actions will include:

- Review of the surface water management system and structures;
- Repair and maintenance of water collection and storage facilities;
- Review of site water restrictions;
- Review of the water use hierarchy;
- Maintenance of the Unca Creek diversion;
- Modification and repair of hazardous materials storage facilities;



- Make-good measures at groundwater receptors to ensure water availability (deepening bores/off-take from process water supply pipeline);
- Increased water efficiency to be studied and implemented if practicable;
- Modified groundwater pumping regimes;
- Additional water recycling;
- Investigation of alternative water sources;
- Implementation of the Biodiversity Management Plan and voluntary biodiversity offset strategy;
- Investigation of spills, seepage or water quality non-compliances that result in unnecessary contamination; and
- Review of the Acid Mine Drainage Plan, Water Management Plan, Erosion and Sediment Control Plan and the Groundwater Monitoring and Management Plan to ensure further incidents are avoided.

## 6.6 Actions Proposed Over the Reporting Period and Potential to Impact on Water Quality

Actions proposed over the forward reporting period include:

- Clearing, grubbing and stockpiling of topsoil for required areas for roads, infrastructure and village construction;
- Preparation of compacted areas for village, plant construction & other infrastructure;
- Construction of initial 100 man village facility including medical facilities;
- Mobilise borefield construction contractors, and construct borefield and pipeline to mine raw water storage facility;
- Mining Contractor site facilities workshops, storage, magazine and fuel facilities, plant construction;
- Completion of Unca Creek diversion,
- Produce quarry products from materials won at site for use in project construction,
- Complete construction full 300 man village facility;
- Clearing, grubbing and stockpiling of topsoil for required areas for Reward Waste Dump and Tailings Facility;
- Preparation of compacted areas for Reward Open Pit development and TSF construction infrastructure;
- Mine Bellbird Satellite Open Pit and establish access portal for the Rockface underground mine;
- Commence development of the Rockface underground mine access decline; and
- Mobilise Processing Plant construction contractor, establish construction facilities on site and construct the crushing, milling, flotation, water recovery, product dewatering and product loadout facilities.

This section of the Mining Management Plan and the Water and Groundwater Management Plans will be updated should the existing strategies not be suitable to maintain the local water values.

## 7 Incident Reporting

As Project construction works have been delayed from 2021 and no works were undertaken under the original MMP, reported incidents during the previous reporting period are not applicable.

The incident reporting and management process for the oncoming period is outlined in the EM Plan.

## 8 Closure Planning

The EIS Terms of Reference (ToR) required a conceptual Mine Rehabilitation and Closure Plan MRCP to outline concepts for mine closure that consider results of materials characterisation, data on the local environmental and climatic conditions, and consideration of potential impacts through contaminant pathways and environmental receptors.

The Guidelines for Preparing Mine Closure Plans 2015 (Western Australia Department of Mines and Petroleum) have been referenced in the preparation of the Projects MRCP as well as several other industry leading publications, further information is available in the MRCP.

The MRCP submitted with the draft EIS has been updated to reflect feedback from stakeholders and in response to the NT EPA recommendations provided in the Assessment Report. Specific mine closure and rehabilitation requirements are provided in this MRCP.

The MRCP includes a post-mining monitoring and reporting program to evaluate rehabilitation success and progress toward achieving closure objectives, and contingency measures to be implemented in the event that monitoring demonstrates that rehabilitation closure objectives are not being met.

The MRCP will be reviewed regularly to ensure that the plan will be relevant to the activities being undertaken and planned to be undertaken as part of the Mining Management Plan.

This MRCP is closely aligned with numerous documents and management plans including the:

- Biodiversity Management Plan;
- Social Impact Management Plan;
- Water Management Plan;
- Acid and Metalliferous Drainage Management Plan;
- Erosion and Sediment Control Plan;
- Unca Creek Diversion Design;
- Mining Management Plan;

This MRCP has been adapted from the MRCP submitted with the draft EIS and standardised to match the format of the individual management plans which make up the Environmental Management Plan (EM Plan).

This MRCP was submitted for approval by the relevant regulator on the advice of the NT EPA. Further updates will be submitted in accordance with Condition 26 of the Authorisation<sup>4</sup> and on an agreed reporting period thereafter.

### 8.1 Closure Objectives

Closure objectives were developed as part of the Project planning. These objectives provide basis for the completion criteria discussed in MRCP, summarised below.

#### Compliance

- Closure requirements of the Northern Territory government will be met.
- All legally binding conditions and commitments relevant to rehabilitation and closure will be met.

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<sup>4</sup> Condition 26 – A refined MRCP must be submitted to the Director for approval within 12 months of the Project commencement, unless otherwise approved by the Director.

**Safe to Human Health and Wildlife**

- Post mining landscape will be left in a condition safe and secure for human health and animals.

**Landforms**

- Constructed waste landforms will be stable and consistent with local topography.
- Landform functionality will be maintained.
- Sediment release does not adversely impact on water quality.
- Erosion does not affect functionality of the landform.

**Flora and Fauna**

- Vegetation is resilient, self-sustaining and comparable to the surrounding areas and pre-existing ecosystem.
- Rehabilitated areas will provide appropriate habitat for fauna – abundance and diversity will be appropriate.

**Water**

- Surface and groundwater hydrological patterns/flows not adversely affected.
- Surface and groundwater levels and quality reflect original levels and water chemistry.
- Project does not compromise the quality and quantity of surface water or groundwater to existing users and water dependent ecosystems.
- Seepage water quality to be monitored at the base of landforms.

**Infrastructure and Waste**

- During decommissioning and through closure, wastes will be managed according to the Waste Management Plan.
- No infrastructure to be left on site unless agreed to by regulators and post-mining landowners.
- Disturbed surfaces rehabilitated to facilitate post-mining land use.

**8.2 Post Mining Land Use Closure Objectives**

In general, the purpose of mine closure and rehabilitation is to return the land to as close as is reasonably possible to its pre-disturbance condition: i.e., resilient, self-sustaining native vegetation of local provenance suitable for use by Traditional Owners and as habitat for flora and fauna.

Disturbed land around the borefield will remain for pastoral use and open voids will remain within the Mineral Lease area. Some infrastructure may be left to be used by the pastoralist or the Bonya Community subject to future consultation with the various stakeholders. At this stage, the base case is that Jervois Operations will remove all infrastructure, apart from the water bores and a downgraded airstrip, from the Jervois mine site.

The proposed plans are described in more detail in the MRCP. These plans are conceptual and are subject to ongoing review during operation. The MRCP is progressively refined through consultation with relevant internal and external stakeholders, taking into account additional information obtained regarding environmental and other constraints as operations progress.

**8.3 Identification and Management of Closure Issues**

A risk assessment is included in the MRCP that identifies activities which may impact the environment and included mine rehabilitation and closure aspects. The post closure risk assessment has identified key environmental, social and economic, health and safety risks regarding mine rehabilitation and closure.

The risk assessment was used to guide the development of the Project's MRCP and can be referenced in the MRCP.

## **8.4 Materials Management**

### **8.4.1 Topsoil**

Soil material will be stockpiled where direct spreading is not practicable. Soil stockpiles will be managed to improve long term viability of the soil resource through implementation management practices including

- separation of material types and exclusion of machinery from topsoil conservation areas;
- protection against weather degradation by establishing vegetation across stockpiled materials; and
- preparation prior to re-use after topsoil being in storage.

### **8.4.2 Waste Rock and Ore**

Mined materials dominate material management tasks by volume and by management complexity.

Geochemical testing for waste rock characterisation has been carried out as part of the PFS and the EIS. Results show that the Project open cut and underground mine waste rock materials will comprise mainly NAF material, accounting for 70% of the waste rock samples tested. This proportion does not reflect true proportions of materials to be mined (largely due to an inherent bias of drilling to find (sulphidic) copper mineralisation), and the overall proportion of NAF waste rock material is to be confirmed throughout mining phase and is expected to be higher than 70%. It is noted that there exists very little evidence of AMD at the site from areas previously mined.

Waste rock landforms will be developed to existing disturbance area where economically possible and adjacent to each open pit. Where suitable, NAF waste rock will be used for construction purposes such as haul roads, hard stands, and construction of embankments for the TSF. Waste rock with favourable characteristics may also be separately stockpiled or used directly in Project closure related activities.

Most waste rock from pit and underground development is expected to be NAF and environmentally benign and will not require specific management for control of AMD. The smaller portion of PAF material will be selective handled, including:

- Placed in-pit or ex-pit, isolated ex pit by an infiltration control cover (encapsulation) system;
- In pit or underground disposal below recovery water table levels; or
- Selective underground disposal of PAF as part of paste backfill.

The waste material mined from underground will be disposed of preferentially in underground voids and used as backfill when possible rather than disposed of on the surface which has the effect of reducing the footprint of the site. Waste mined during early stages of underground development at Reward and Bellbird will be stored in the pit or trucked to the surface.

Contingency for treatment during operations include segregation and confinement and/or blending to help delay onset of acid drainage, and/or collection of seepage/runoff and treatment.

### **8.4.3 Historic Mined Materials**

Historic mine materials showed varying acid and salinity potential but were generally metalliferous and all generated leachates with some degree of elevated metals/metalloids in water extracts, particularly Cd, Co, Cu, Mn, Ni, Pb and Zn, particularly in partially-mined pits (EGI, 2018).



Historic mine materials are metalliferous and show varying potential for generating acid, saline, and metalliferous drainage on a localised scale. Reactivation of the old facilities for storage of waste rock and tailings as part of the proposed Project will allow for re-handling or incorporation of historic mine materials into management approaches to be isolated from the receiving environment.

#### **8.4.4 Tailings**

Tailings from sulphide ore samples will have moderate S values around 1% S, and likely to be PAF. Tailings showed enrichment in a similar suite of metals/metalloids as the waste rock and ore.

Tailings will be mostly contained within a dedicated facility which will incorporate suitably designed and constructed seepage control aspects as detailed in Section 4.3.9 and the MRCP. Tailings will be progressively dewatered with recovered supernatant returned to the Process Plant (potentially via the Process Water Dam).

The coarse fraction of tailings has some potential to be used in paste backfilled into underground workings. The feasibility of this is under investigation and would be a preferred option, as it would reduce the inventory of tailings requiring surface management. However, this will only be confirmed during the detailed design phase, laboratory testing and following site trials during underground mining operations. The possible sterilisation of future resources and occupational health and safety will be taken into consideration during these investigations.

### **8.5 Closure Implementation**

Closure activities will generally be undertaken based on an -as-soon-as-practical strategy in order that Project closure becomes synergistic with operations and the final effort (and cost) for Project closure following cessation of mine operations is reduced. Progressive rehabilitation will be in accordance with the MRCP (Figure 2 – Provisional Progressive Rehabilitation Timeline).

Using this strategy should also reduce the liability risk in the case of premature mine closure. The MRCP addresses these risks (MRCP Table 6) and makes comment on strategy in the short and medium term.

Rehabilitated areas will be monitored in accordance with the MRCP and the success criteria listed therein. Areas progressively rehabilitated will be carefully monitored for evidence of the introduction and establishment of weeds, with the objective of identifying and treating them before they become persistent. Weed control measures will include hand pulling and spraying of weeds with an appropriate herbicide.

Closure monitoring and maintenance will be in accordance with Section 12 of the MRCP.

### **8.6 Life of Plan – Unplanned Closure**

Premature closure could happen in a few situations, such as:

- Short term care and maintenance (C&M) up to two years due to commodity price or weather issues;
- Long term care and maintenance due to large scale technical failures, bankruptcy, etc, however future operations are possible with foreseeable solutions; and
- Unplanned early closure with future operations not foreseeable.

These situations could occur at various times through the Project. The Mining Management Plan submitted annually to the Department contains a summary of the disturbed areas and the progressive rehabilitation status. This information can be used for planning associated with premature closure.

The MRCP summarises various phases of Project preparation, development, operations and

closure. The period applicable to this version of the Jervois Project MMP in relation to physical site activities are identified in Table 46. Site remediation (where required) should premature closure occur is detailed in the MRCP Table 6 – Premature Closure Plans for Short, Long Term C&M).

**Table 46 – Closure Remediation Activities**

Project Stage	Description	Estimated Key Dates	Premature Closure Activities
Stage 1	<ul style="list-style-type: none"> <li>Mine design based upon increased level of confidence from Resource Drilling activities.</li> <li>Completion of detailed mine designs for:               <ul style="list-style-type: none"> <li>Rockface underground mine</li> <li>Reward open pit mine</li> <li>Reward underground mine</li> <li>Bellbird open pit mine; and</li> <li>Bellbird underground mine.</li> </ul> </li> <li>Completion of haul road and flood mitigation structure detailed design.</li> <li>Completion of Processing Plant detailed design.</li> <li>Completion of workforce village detailed design.</li> <li>Completion of detailed design of tailings storage facility.</li> </ul>	Complete in H2 2023	No physical site activities requiring site remediation
Stage 2	<ul style="list-style-type: none"> <li>Complete expression of interest process to select preferred Mining Contractor(s).</li> <li>Complete discussions and contract negotiations with preferred Mining Contractor(s).</li> <li>Complete expression of interest process to select preferred Plant Construction and Operations Contractors.</li> <li>Complete discussions and contact negotiations with preferred Plant Construction and Operations Contractors.</li> <li>Complete expression of interest process to selected preferred power supply build, own and operate contractors.</li> <li>Complete discussions and contract negotiations with preferred power supply build, own and operate contracts.</li> <li>Complete expression of interest process to select preferred village build, own and operate contractors.</li> <li>Complete discussions and contract negotiations with preferred village build, own and operate contractors.</li> <li>Complete expression of interest process to select preferred tailings storage construction contractors.</li> <li>Complete discussions and contract negotiations with preferred tailing storage construction contractors</li> </ul>	H2 2023 – H1 2024	No physical site activities requiring site remediation
Stage 3	<ul style="list-style-type: none"> <li>Review critical path equipment delivery items.</li> <li>Provide early orders for all critical long lead items.</li> <li>Complete Project Financing</li> </ul>	H2 2023	No physical site activities requiring site remediation
Stage 4 Early Works	<ul style="list-style-type: none"> <li>Mobilisation of equipment for groundwater supply infrastructure installation (Stage 1 pipe burial)</li> <li>Mobilisation of limited equipment to site for preparation of accommodation facility building pad and a project laydown area.</li> <li>Supply and installation of a starter camp for construction (80 pax).</li> </ul>	H1 2024	

Project Stage	Description	Estimated Key Dates	Premature Closure Activities
Stage 4	<ul style="list-style-type: none"> <li>Mobilisation Stage 1 bulk mining/earthmoving fleet:</li> <li>Clearing, grubbing and stockpiling of topsoil for required areas for initial Topsoil and ROM stockpiles, haul roads, and village construction</li> <li>Preparation of compacted areas for plant construction and other process related infrastructure</li> <li>Mobilise Processing Plant construction contractor, establish construction facilities on site and construct civil aspects for the processing plant.</li> <li>Complete Stage 2 of the groundwater supply system</li> <li>Complete construction full 230 person village facility</li> <li>Establish Phase 2 of off-site to site communications.</li> </ul>	H2 2024	
Stage 5	<ul style="list-style-type: none"> <li>Construct the crushing, milling, flotation, water recovery, product dewatering and product loadout facilities</li> <li>Mobilisation Stage 2 bulk mining/earthmoving fleet,</li> <li>Mining Contractor site facilities workshops, storage, magazine and fuel facilities, plant construction</li> <li>Clearing, grubbing and stockpiling of topsoil for required areas for Reward Waste Dump, Tailings Facility</li> <li>Preparation of compacted areas for Reward Open Pit development and TSF construction infrastructure</li> </ul>	H1 2025	
Stage 6	<ul style="list-style-type: none"> <li>Commence pre-stripping of waste from the Reward open pit mine.</li> <li>Continue tailings storage facility construction,</li> <li>Establish remaining site facilities</li> <li>Supply and construction of the power station including PV array</li> </ul>	H2 2025	
Stage 7	<ul style="list-style-type: none"> <li>Commence mining ore from the Reward open pit to provide ore supply for the Processing Plant commissioning.</li> <li>Commence mining ore from Reward</li> <li>Commission the tailings storage facility,</li> <li>Commission the Processing Plant, water recovery and product dewatering facilities.</li> <li>Commence pre-stripping at Bellbird and preparing rock dump area,</li> <li>Supply and installation of the wind turbine power generators,</li> </ul>	H2 2025	

### 8.7 Background for Costing of Closure Activities

The current development plan detailed in Table 46 – Closure Remediation Activities, shows that groundwork activities commence at the start of Stage 4, and mining and processing operations are established by the completion of Stage 7, which is at the completion of 24 months.

During this two-year period, mining will have been completed at the Bellbird Satellite open pit providing portal access to the Rockface Underground Mine, and mining of the Reward Open Pit would be underway. The first Stage of the tailings dam would be operational, and the Unca Creek diversion

and all site access and haul roads would have been established. These activities will result in the estimated disturbances summarised below in Table 47.

**Table 47 – Mining Disturbance**

Proposed Action	Historic Disturbance Area (Ha)	Additional Clearing Area Required (Ha)	Total Footprint (Ha)
Accommodation Village	10	5	15
Mine Infrastructure Area	68	-29	39
Proposed Solar Array & Wind Farm	0	27	27
Open Pits	27	19	46
Jervois Dam	7	0	7
Surface Water Infrastructure (excluding the MIA area and the Jervois Dam)	0	47	47
Tailings Storage Facility	14	41	55
Borrow Pits (excluding the overlapping areas)	5	26	31
Topsoil Stockpiles and Waste Rock Dumps	8	160	168
Borefield and Pipeline	14	46	60
Roads and Tracks	20	19	39
<b>Total</b>	<b>173</b>	<b>361</b>	<b>534</b>

## 8.8 Security Estimate



## Appendices

## A1 Risk Assessment Process & Matrix

The risk assessment process was based on *AS/NZS ISO 31000:2009, Risk management - Principles and guidelines*. Initially the potential events of the Project development, operation and closure were identified. The risks and impacts of these potential events were then analysed and evaluated using the qualitative risk assessment matrix (Table A1-1, Table A1-2). The likelihood of occurrence (Table A1-3) and the consequence (Table A1-4) of the risks were assessed to determine the initial risk rating. Mitigation measures were developed to remove or reduce the risks to be as low as practicably possible and to an acceptable level. The residual risks were determined based on the same matrix. The residual risks were determined based on the same matrix.

**Table A1-1 – Qualitative Risk Matrix**

Likelihood of the Consequence Occurring	Maximum Reasonable Consequence				
	1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic
A. Almost Certain	<b>11 Low</b>	<b>16 Medium</b>	<b>20 High</b>	<b>23 Extreme</b>	<b>25 Extreme</b>
B. Likely	<b>7 Low</b>	<b>12 Medium</b>	<b>17 High</b>	<b>21 High</b>	<b>24 Extreme</b>
C. Occasionally	<b>4 Very Low</b>	<b>8 Low</b>	<b>13 Medium</b>	<b>18 High</b>	<b>22 High</b>
D. Unlikely	<b>2 Very Low</b>	<b>5 Very Low</b>	<b>9 Low</b>	<b>14 Medium</b>	<b>19 High</b>
E. Rarely	<b>1 Very Low</b>	<b>3 Very Low</b>	<b>6 Very Low</b>	<b>10 Low</b>	<b>15 Medium</b>

**Table A1-2 – Risk Level**

Risk Level	
<b>Very Low</b>	Such risks are below the risk acceptance threshold, no significant action or further assessments required, can be managed under existing operational controls
<b>Low</b>	Such risks are below the risk acceptance threshold, some mitigation may be required - no detailed assessment of factors and aspects required but addressed in the Environmental Management Plan as routine controls
<b>Medium</b>	Such risks are above the risk acceptance threshold, active monitoring and substantial mitigation required - assessment required of factors and aspects
<b>High</b>	Such risks are above the risk acceptance threshold, monitoring program and major mitigation action required - assessment required of factors and aspects
<b>Extreme</b>	Such risks are significantly above the risk acceptance threshold, potentially unacceptable, urgent management and comprehensive mitigation action required

**Table A1-3– Qualitative Measure of Likelihood**

Level	Descriptor	Description	Guideline Frequency
<b>A</b>	Almost Certain	Consequences are expected to occur in most circumstances	Occurs more than once a month
<b>B</b>	Likely	Consequences will probably occur in most circumstances	Occurs once every month to once every year
<b>C</b>	Occasionally	Consequence SHOULD occur at some time	Occurs once every 1 year to once every 10 years
<b>D</b>	Unlikely	Consequence COULD occur at some time	Occurs once every 10 to 100 years
<b>E</b>	Rarely	Consequence may only occur in exceptional circumstances	Occurs less than once every 100 years

**Table A1-4– Qualitative Measure of Consequence**

Risk Rating	Consequence type			
	Financial	Environmental	Personal, Commercial, Community, Reputation/Media	Legal
<b>Catastrophic</b>	> \$10M	An event or incident that causes substantial permanent damage requiring significant resources to control. Permanent damage expected.	Definite serious negative personal and or commercial effect; attention from regulators, workforce, contractors, public or national media outcry.	Highest level damage prosecution and fines. Major litigation including class action up to and including potential revocation of operating licenses and permits and fines.

<b>Major</b>	\$1M - \$10M	An event or incident that causes substantial long-term adverse effects requiring significant resources to control. Long-term damage expected.	Serious negative personal and or commercial effect; attention from regulators, workforce, contractors, public or national media outcry.	Major damage, breach of regulation, litigation, up to and including potential revocation of operating licenses and permits and fines.
<b>Moderate</b>	\$100K - \$1M	An event or incident that causes widespread temporary damage requiring extended resources to remedy. Full recovery expected.	Significant negative personal and or commercial effect; attention from regulators, workforce, contractors, public or national media outcry.	Serious damage, breach of regulation with investigation or report to authority including potential suspension of operating licenses and permits and fines.
<b>Minor</b>	\$10K - \$100K	An event or incident that causes localised low-level damage requiring minimal resources to remedy. Full recovery expected.	Medium negative personal and or commercial effect; attention from regulators, and potential media and/or heightened concern by workforce, contractors and local community. Criticism by non-government organisations.	Serious damage; minor legal issues, non-compliances and breaches of regulations, potentially resulting in fines.
<b>Insignificant</b>	<\$10K	An event or incident that is contained within controls and/or does not cause long term measurable impact.	Medium negative personal and or commercial effect; attention from regulators, and potential minor adverse workforce, contractor, local public or media attention or complaints.	Damage, non-compliances and breaches of regulations, resulting in investigation and reparation.

**Social and Economic Risk Assessment**



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
1	Project traffic	Road	Increased road trauma on local roads	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Minimise required number of trips to and from site</li> <li>Codes of behaviour when driving on public road</li> <li>Consultation with locals whether restricting Project traffic to certain times of day</li> <li>Implement Traffic Management Plan</li> <li>Community liaison to ensure good communication</li> <li>Communication with other road users</li> <li>Road maintenance in consultation with key stakeholders</li> <li>Working with NT government to seek approval for early sealing of the Plenty Highway between Jervois and the Stuart Highway</li> </ul>	Occasionally	Moderate	Medium
2	Project traffic	Third Party	Reduction in tourist activity in the region	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Communication with NT Government for early sealing of Plenty Highway from Jervois to Gemtree Caravan Park</li> <li>Traffic Management Plan – Journey Management Plan to include speed limits, possible road watering in specific areas</li> <li>Good communication and engagement with key tourism stakeholders</li> <li>PR strategy around traffic/road safety around mining trucks</li> </ul>	Occasionally	Minor	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
3	Dust and noise from Project traffic	Third Party	Increased dust and noise level for nearby communities and residents	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Traffic Management Plan to include speed limits, possible road watering in specific areas</li> <li>Community liaison to ensure good communication</li> <li>Stakeholder engagement</li> </ul>	Rarely	Minor	Very Low
4	Driving on single sealed road and gravel shoulders	Mine Worker Third Party	Increased road trauma	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Community engagement to educate the public on how to interact with road trains</li> <li>Traffic Management Plan to ensure light vehicle leaves the seal and stops to allow oncoming loaded heavy vehicle to pass without leaving seal</li> <li>Kentor Minerals to engage with NTG to review priorities and possible acceleration of widening program and review introduction of passing lanes at several locations</li> </ul>	Occasionally	Moderate	Medium
5	Site distance deficiencies	Mine Worker Third Party	Increased road trauma	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Provide additional signage</li> <li>Lower crest curves</li> <li>Journey Management Plan for all transportation contractors to restrict speed at these locations to 80km/h for 500m in each direction</li> <li>Modify intersection if possible</li> </ul>	Occasionally	Moderate	Medium
6	Increase to traffic volumes	Mine Worker Third Party	Increased road trauma	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Kentor Minerals to engage with NTG to review priorities and possible acceleration of widening program and review introduction of passing lanes at several locations</li> </ul>	Occasionally	Moderate	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Staging vehicle operations to minimise number of vehicles on the road at any one time</li> <li>Increased maintenance grades from 4 to 5 per year</li> <li>Wet weather restrictions for transportation of product and consumables</li> </ul>			
7	Night time operations	Mine Worker Third Party	Incidents relating to poor visibility	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Installation of traffic control devices to aid visibility after dark</li> <li>Infra-red line of site system to be installed in vehicles required to operate at night to alert drivers to people or animals adjacent on the road</li> </ul>	Occasionally	Moderate	Medium
8	Poor road conditions	Mine Worker Third Party	Increased road trauma	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Reconstruct offlets where drains encroach into the road</li> <li>Re-profile sub-standard sections</li> <li>Lift the road where the wearing surface is lower than natural surface</li> <li>Re-sheet where gravel loss is excessive</li> <li>Remove objects where clear zone defects are present</li> </ul>	Occasionally	Moderate	Medium
9	Risk to cyclist	Third Party	Increased road trauma	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Education Program</li> <li>Infrared on-board system in vehicles to highlight cyclist in line of sight at night</li> <li>Slow down when passing or approaching oncoming cyclists</li> </ul>	Occasionally	Moderate	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Notify other drivers in the fleet of presence of cyclist</li> </ul>			
10	Dust and noise from borefield construction and operation	Third party	Increased dust and noise level for nearby communities and residents	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Community liaison to ensure good communication</li> <li>Ensure noise emissions in accordance with manufacturer’s specifications and Australian Standards</li> </ul>	Unlikely	Insignificant	Very Low
11	Influx of Indigenous people back to communities	Third Party	High expectation of benefits such as job opportunities from the community	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Community engagement and good communication to manage expectations about job availability and timelines</li> </ul>	Occasionally	Insignificant	Very Low
12	Fears of impacts to water resources	Mine Worker	Opposition to mine development by property owners and the community	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Open and transparent communication plan about hydrological studies and monitoring program, water source for the Project and impacts of drawdown on pastoral bores, soaks and other beneficial users</li> <li>Implement Environmental Management Plan</li> <li>Continuous communication on monitoring results</li> </ul>	Occasionally	Minor	Low
13	Aquifer depressurisation due to mining activities	Third Parties	Reduced groundwater availability for related parties	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Groundwater modelling demonstrates that the reduction in groundwater availability for other parties is negligible</li> <li>Groundwater monitoring</li> <li>Implement Groundwater Management Plan</li> </ul>	Rarely	Moderate	Very Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
14	Mobilisation of workforce and paid work	Third Party	Reduced community or social cohesion, displacement of other economic sectors through crowding out	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Community liaison to ensure good communication</li> <li>Communication with local police</li> <li>Recruitment strategy that seeks locals, then encourages FIFO workers to relocate to Alice Springs so they are living in the local economy, not short-term accommodation.</li> <li>Manage transport to reduce impacts,</li> </ul>	Occasionally	Minor	Low
15	Distribution of sponsorship funds and royalties to local community	Third Party	Local community benefit	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Sponsorship Plan</li> <li>Royalties distributed through community development projects could be invested in community facilities</li> </ul>	Occasionally	Major	High
16	Rumours and misinformation received by native title holders	Third Party	Anxiety of native title holder about potential impacts	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Work closely with the Central Land Council to ensure continuous and good communication to native title holders</li> <li>Good communication</li> </ul>	Unlikely	Minor	Very Low
17	Early sealing of Plenty Highway from Jervois to Stuart Highway and upgrade to the Lucy Creek airstrip	Third Party	Benefit to communities, tourism and property owner	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Communication with NT government and Outback Way and provide case for early sealing of Plenty Highway (road safety audit completed, supplied and discussed with NT government)</li> <li>Good communication to manage expectations</li> </ul>	Occasionally	Minor	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
18	Increased pressure on local services (health, police)	Third Parties	Drawing on local services and infrastructure, inadequate emergency response	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Implementation of an Emergency Response Plan in consultation with local Police and health service providers</li> <li>Provision of health monitoring of workers first response medical facility on site</li> <li>Installing appropriate firebreaks and safety precautions</li> </ul>	Unlikely	Minor	Very Low
19	Direct and indirect jobs and training for local Indigenous people and residents in Alice Springs	Third Parties	Increased job and training opportunities	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Indigenous employment and training plan</li> <li>Work with local employment and training providers and advance planning</li> <li>Communication with other major resource projects in the region to employ Indigenous workers when their project is complete</li> </ul>	Likely	Moderate	High
20	Direct and indirect jobs and training for local Indigenous people and residents in Alice Springs	Third Parties	Expectation of local jobs not met, low take up of jobs by local Indigenous people due to lack of work readiness, structural or cultural issues	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Indigenous employment and training plan</li> <li>Work with local employment and training providers</li> <li>Good communication on reasons if expectations are not met</li> <li>Good communication that allows for advance planning</li> <li>Workforce planning to address barriers to employment</li> <li>Support structures for local staff</li> <li>Good communication on jobs available, including site visits</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Collaboration with the community, NT and Australian Governments, employment and training providers</li> </ul>			
21	Project activities	Pastoralists	Reduced productivity of pastoralists	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Ensure continuous and good communication with pastoralists</li> <li>Compensation agreement for areas excluded from properties for mining and associated activities</li> </ul>	Rarely	Minor	Very Low
22	Local business awarded contracts from the Project	Third Parties	Boost to local businesses	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Local Industry Participation Plan which includes consideration of how contracts might be packaged to suit existing capacity</li> <li>Good communication about opportunities with the Project</li> <li>Working closely with industry groups (ICNNT and Chamber of Commerce) and NT Government to prepare businesses</li> </ul>	Likely	Moderate	High
23	Local targets not met due to lack of capacity or skills	Third Parties	Loss of opportunity to local businesses	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Local Industry Participation Plan which includes consideration of how contracts might be packaged to suit existing capacity</li> <li>Good communication and understanding of the capacities of local businesses</li> <li>Working closely with industry groups (ICN NT and Chamber of Commerce) and NT Government to prepare businesses</li> </ul>	Unlikely	Moderate	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
24	Expectations of boost to local and/or regional economy not met	Third Parties	Expectations of boost to local and/or regional economy not met	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Industry Participation Plan</li> <li>Work with ICN NT, NT Government, Chamber of Commerce, REDCs to package and promote tenders to suit local capacity, boost skills, prepare businesses for competitiveness and standards required by Kentor Minerals</li> <li>Good communication to manage expectations</li> </ul>	Occasionally	Minor	Low
25	Project activities affect other sectors	Third Parties	Reduced productivity of other sectors	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Industry Participation Plan</li> <li>Forward planning and communication</li> <li>Schedule flights so that workers are met and taken straight to site</li> <li>A recruitment strategy focussing on locals and the encouragement of FIFO workers to relocate</li> <li>Traffic management plan to reduce impacts</li> </ul>	Rarely	Minor	Very Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
26	Skill shortage	Mine Owner	Difficulty employing skilled workers for the mine, loss of staff and difficulties backfilling, potential financial impact to mine owner	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>A recruitment strategy focussing on locals and the encouragement of FIFO workers to relocate</li> <li>Continued work with ICN NT, NT Government departments, the Chamber of Commerce and the REDC to promote tenders which suit local capacity, boost skills, prepare businesses for an increase in competition and standards required by Kentor Minerals</li> <li>Engage local training providers and develop local training programs</li> <li>Workforce planning to address employment barriers</li> <li>Local Industry Participation Plan</li> <li>Collaborate with other major resource projects on training and education programs</li> </ul>	Unlikely	Minor	Very Low
27	Drugs or alcohol brought to site by mine worker	Third Parties	Reduced sense of safety and wellbeing in nearby communities	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Drug and alcohol policy</li> <li>HR management</li> <li>Good communication with local police</li> </ul>	Unlikely	Minor	Very Low
28	Disturbance to Indigenous heritage items	Cultural Heritage	Damage to sacred sites, upsetting of local Indigenous community and the CLC, possible fines to mine owner and damage to reputation;	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Establish and maintain a heritage register</li> <li>Cultural heritage survey</li> <li>Implement permit system to require consideration of cultural heritage sites</li> <li>Community liaison and communication</li> <li>MOU with Bonya community</li> </ul>	Rarely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
			Reduced cultural and spiritual connections to country or cultural offence							
29	Cumulative impact of five major resource projects in Central Australia potentially at the same time (TNG, Verdant, Arafura Resources, Tellus and Kentor Minerals).	Third Parties	Cumulative impacts create pressure on workforce availability, services, inflationary pressures, but they can also increase the opportunities – local jobs, economic benefits, Indigenous employment and education outcomes	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Working with other proponents to sequence work, if possible, and take account of cumulative impacts</li> <li>Stakeholder engagement</li> <li>Good communication</li> </ul>	Occasionally	Minor	Low
30	Flood from waterways located within mine area	Mine Owner	Damage to mine workings and facilities, financial loss to mine owner	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Surface water modelling concluded that the Project will not have any significant impact on flooding</li> <li>Water diversions appropriately design according to Water Management Plan</li> </ul>	Rarely	Catastrophic	Medium
31	Little warning of impending floods to mine	Mine Owner	Damage to mine workings and facilities, financial loss to mine owner	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Surface water modelling concluded that the Project will not have any significant impact on flooding</li> <li>The proposed Reward pit is the only infrastructure proposed which would be affected by flooding, located on the floodplain of Unca Creek. A permanent diversion of Unca Creek around the</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							Reward pit is proposed to manage the risk for events up to 1,000 years			
32	Disturbance to non-Indigenous heritage items during mining operations	Heritage Items	Damage to heritage Items	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Establish and maintain a heritage register</li> <li>Implement permit system to require consideration of heritage sites</li> <li>Fence off identified Heritage Sites</li> </ul>	Rarely	Insignificant	Very Low
33	Uncontrolled fire caused by third party or natural disaster	Mine Owner Property Owner	Damage to mine facilities, workings and property, financial loss to mine owner and property owner	Likely	Major	High	<ul style="list-style-type: none"> <li>Establish and maintain fire breaks</li> <li>Conduct of hazard reduction burns</li> <li>Monitoring of fire tracking and alert systems</li> </ul>	Unlikely	Moderate	Low
34	Uncontrolled fire caused by third party or natural disaster	Cultural Heritage	Damage to sacred sites	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Establish and maintain a heritage register</li> <li>Implement permit system to require consideration of cultural heritage sites</li> <li>Bushfire Management Plan</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
35	Uncontrolled fire caused by mining operations	Mine Owner	Damage to mine facilities and workings, financial loss to mine owner	Likely	Major	High	<ul style="list-style-type: none"> <li>Establishment and maintenance of fire breaks</li> <li>Conduct of hazard reduction burns</li> <li>Store hydrocarbon and flammable material according to the requirements of AS1940-2004 - The storage and handling of flammable and combustible liquids</li> <li>Bushfire Management Plan</li> <li>Implement Hot Work Permits System</li> <li>Provision of firefighting training for personnel conducting hot works</li> </ul>	Unlikely	Moderate	Low
36	Uncontrolled fire caused by mining operations	Property Owner	Damage to property, financial loss to property owner	Occasionally	Major	High	<ul style="list-style-type: none"> <li>Implement Hot Work Permit System</li> <li>Provision of firefighting training for personnel conducting hot works</li> <li>Communication with neighbours upon detection of wildfire</li> <li>Bushfire Management Plan</li> </ul>	Unlikely	Moderate	Low
37	Uncontrolled fire caused by mining operations	Cultural Heritage	Damage to sacred sites	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Establish and maintain a heritage register</li> <li>Implement permit system to require consideration of cultural heritage sites</li> </ul>	Rarely	Catastrophic	Medium



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
38	Water storage failure	Mine Owner	Loss of water resource, financial loss to mine owner, potential damage to ecosystem	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Develop and implement Standard Operating Procedures</li> <li>Develop and implement a Water Management Plan</li> <li>Appropriate planning and design standards for water storages</li> </ul>	Rarely	Major	Low
39	Insufficient water supply in periods of drought	Mine Owner	Shut down or reduce production, financial loss to mine owner	Occasionally	Major	High	<ul style="list-style-type: none"> <li>Detail mine planning and scheduling</li> <li>Upgrade of existing Jervois Dam facility to increase water supply</li> <li>Groundwater study and construction of borefields to ensure sufficient water for operation</li> <li>Water recycling</li> </ul>	Rarely	Major	Low
40	Base metals price change	Mine Owner	Impact on financial factors to mine operation, project stalled, potential financial impact to mine owner	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Financial modelling and business planning</li> <li>Market Awareness – Offtake Agreements</li> </ul>	Unlikely	Moderate	Low
41	Activists disrupting mining operations	Mine Owner	Production disrupted, raised underserved public awareness, financial loss to mine owner, share price fall	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Preparing a Local Industry Participation Plan</li> <li>Regular community engagement, communicating openly with land owners, local community and government, such as water monitoring results, soil test results, etc to reduce fears and to manage perception</li> </ul>	Rarely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
42	Influx of predominantly male workforce	Third Parties	Health and social impacts arising from interaction between locals and a predominantly male workforce	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Reduce recreational interaction of FIFO workers with local towns on days off (straight to plane or bus)</li> <li>Worker code of behaviour</li> <li>Communication with local police</li> </ul>	Unlikely	Minor	Very Low
43	Site not rehabilitated, infrastructure not removed	Community, future generations	Residual liability for site rehabilitation or maintenance	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Lodgement of security bond to the Northern Territory government on an annual basis as per operation condition to cover rehabilitation cost</li> <li>Removal of site infrastructure as per MRCP</li> </ul>	Rarely	Minor	Very Low
44	Final waste rock dump at closure not appropriately designed	Visual amenity	Decrease in visual amenity compared to baseline	Rarely	Insignificant	Very Low	<ul style="list-style-type: none"> <li>Waste rock dump will be similar to the topography in the area</li> </ul>	Rarely	Insignificant	Very Low
45	Unaware of mine closure concept and timing	Local community	Unexpected loss of financial support or unexpected population decline for the community	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Continuous community engagement and public awareness campaign</li> </ul>	Rarely	Major	Low

**Environmental Risk Assessment**

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
1	Land Clearing during construction, mining operations and exploration	Ecosystem	Loss of Flora and Fauna including Stygofauna	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Obtain relevant regulatory approvals for land clearing related to mine development</li> <li>Implement Clearing Procedures to ensure clearing is minimised and within defined boundaries</li> <li>Ensure there is an appropriately qualified Environmental Officer on-site</li> <li>Vegetation clearing / excavation to be subject to internal permitting system</li> <li>Staging works to manage habitat loss</li> <li>Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing</li> <li>Measures to retain mature trees or habitat trees where possible</li> <li>Salvage hollow logs, rocks and large debris removed by construction for habitat enhancement in areas for rehabilitation</li> <li>Collection of native seed from the Project area for use in rehabilitation program</li> <li>Progressive rehabilitation of Project area</li> <li>Offset for clearing of regionally exceptional vegetation communities</li> <li>Ongoing implementation and monitoring of offsets</li> </ul>	Occasionally	Moderate	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
2	Land Clearing during construction, mining operations and exploration	Ecosystem	Loss of threatened flora	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>• New mine infrastructure design to avoid clearing of threatened species</li> <li>• Future repair works on Jervois Dam to avoid impacts to the threatened species</li> <li>• Speed restrictions on haul roads to lessen the impact of dust on threatened species near roads</li> <li>• Ensure there is an appropriately qualified Environmental Officer on-site</li> <li>• Pre-clearing surveys to be undertaken within three months of clearing activities</li> <li>• Flag any areas containing threatened flora species in or directly adjacent to the Project area as an exclusion area prior to works commencing</li> <li>• Collection of seed from mature individuals prior to clearing</li> <li>• Use of collected seed in revegetation</li> <li>• Progressive rehabilitation of site</li> <li>• Monitoring program to monitor health of retained vegetation and rehabilitated areas</li> <li>• Ongoing implementation and monitoring of offsets</li> <li>• Employees and contractors to participate in an environmental induction program</li> </ul>	Unlikely	Moderate	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
3	Introduction and spread of weeds during operations	Ecosystem	Habitat quality reduction, reduction in biodiversity value, reduction in food availability for native fauna	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Clearing of vegetation to be restricted to the minimum required to enable safe construction, operation and maintenance</li> <li>Weed surveys and implementation of control programs for weeds of significance</li> <li>Prioritisation of treatment of weed infestations or weed species and ongoing treatment regimes (as necessary)</li> <li>Appropriate disposal of weed material to prevent further spread</li> <li>Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the project area</li> <li>Rehabilitation will be undertaken progressively</li> <li>Employees and contractors to participate in an environmental induction program</li> </ul>	Unlikely	Moderate	Low
4	Introduction of exotic fauna	Ecosystem	Habitat quality reduction, reduction in biodiversity value, reduction in food availability for native fauna	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Inspection of all machinery (including motor vehicles) and equipment prior to entering mine areas</li> <li>Ensure site waste management measures reduce the potential to attract vermin and other fauna</li> <li>Any waste storage facilities to be designed and located to restrict fauna access</li> <li>Fauna, including pest species, will not be fed</li> <li>Implement weed management protocol to prevent degradation of remaining habitat areas and spread of feral animals into degraded areas</li> </ul>	Unlikely	Minor	Very Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
5	Dust from construction, mining operations and exploration	Ecosystem	Loss of Flora and Fauna	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Regular watering of haul roads</li> <li>Adopt speed limits on site for all vehicles</li> <li>Regular grading of onsite haul roads</li> <li>Apply gravel to surfaces of haul roads</li> <li>Stage clearing and construction activities to minimise area of exposed ground</li> <li>Visual inspection requirements</li> <li>Limit burning of cleared vegetation</li> <li>Wet dust suppression measures in the form of high pressure, low volume water sprays</li> <li>Milling and ore processing are to be completed using wet processes</li> <li>Rehabilitation and vegetation of excavated areas as soon as practicable</li> <li>Minimise drop heights into hoppers, onto stockpiles and into haul trucks</li> <li>Minimise double handling of materials</li> <li>Positioning of crushing and screening plant and stockpiles in areas shielded by terrain</li> <li>Covering of all haul vehicles entering and exiting the site</li> <li>Chassis and wheels of haul trucks to be cleaned prior to exiting the site</li> </ul>	Unlikely	Minor	Very Low
6	Project lighting	Fauna	Disruption Fauna	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Limit Project lighting</li> <li>Where lighting is required, use directional lighting to reduce the spill over into surrounding areas</li> <li>Use lighting in buildings only as required, i.e. sensor lighting or switch off during non-operational hours</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
7	Erosion and sedimentation due to land clearing and surface disturbance	Ecosystem	Ongoing damage to ecosystems, contamination of surface water and groundwater	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Use sediment catchment dams to prevent any sedimentation from the Project site travelling to downstream areas</li> <li>Rehabilitation and vegetation of excavated areas as soon as practicable – establish erosion management controls</li> </ul>	Unlikely	Minor	Very Low
8	Change to streamflow in Unca Creek due to Jervois Dam upgrade	Ecosystem	Damage to flora and fauna	Likely	Insignificant	Low	<ul style="list-style-type: none"> <li>Implement a water management plan to ensure retention of base environmental flows through Unca Creek to maintain the health of the riparian ecosystem</li> </ul>	Likely	Insignificant	Low
9	Water bores creating new pathway to aquifers	Ecosystem	Enhanced contamination pathways, damage to groundwater quality and dependent ecosystem	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Implement Water Abstraction Management Plan and Groundwater Management Plan</li> <li>Only licensed drillers to carry out borefield drilling and construction of borefield</li> <li>All bores to be registered – regular assessment of groundwater monitoring program</li> </ul>	Rarely	Moderate	Very Low
10	Failure of fuels storage	Surface and Groundwater	Fuels leak into surface drainage systems and groundwater, poisoning and death of fauna and flora	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Store hydrocarbon fuels according to the requirements of AS1940-2004 - The storage and handling of flammable and combustible liquids</li> <li>MSDS and Hazardous Substance Register</li> <li>Ensure SOP for use of hydrocarbons</li> </ul>	Rarely	Moderate	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
11	Spillage of fuels during operation and transportation	Ecosystem	Spillage of fuels causing contamination of ecosystem, surface waters and/or ground waters, knock on effects to flora and fauna	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Store hydrocarbon fuels according to the requirements of AS1940-2004 - The storage and handling of flammable and combustible liquids</li> <li>Appropriate spill kits to be kept adjacent to storage area</li> <li>Implement procedure for transport and storage of hazardous substances /dangerous goods</li> <li>MSDS and Hazardous Substance Register</li> <li>PPE and clean-up procedure</li> <li>Ensure SOP for use of hydrocarbons</li> </ul>	Occasionally	Minor	Low
12	Spillage or release of hazardous substances during operation and transportation	Ecosystem	Contamination of surface and ground water, damage to dependent ecosystems	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Hazardous substances register and MSDS, all material to be stored according to the relevant MSDS</li> <li>Regular inspection and maintenance of all hazardous substance storages</li> <li>Signage and labelling</li> <li>Provide training to personnel for appropriate handling of hazardous materials</li> <li>Implement procedure for transport and storage of hazardous substances, all vehicles to be registered and fitted with spill kits and PPE for emergency response</li> <li>Notify the Environmental Manager in case of a spill and commence investigation into soil, surface and groundwater impacted</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>First Aid, spill kits and Environmental Emergency Response Plan</li> </ul>			
13	Inadequate design, failure of TSF	Ecosystem	Long term damage to ecosystem, leaching into ground and surface waters	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Design TSF in accordance with the ANCOLD 'Guidelines on tailings dams' requirements, in particular regarding Extreme Storm Storage, Contingency Freeboard, Spillway Capacity, Design Earthquake Loading, Stability Minimum Factor of Safety, Dam Safety/Inspection Frequency</li> <li>Low permeability compacted composite liner comprising HDPE and soil liner incorporating a basin underdrainage system in the basin area for seepage control</li> </ul>	Rarely	Major	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Maintenance of TSF in accordance with specifications</li> </ul>			
14	Contaminated seepage from TSF	Ecosystem	Acidic pH, salinity and/or heavy metals causing ongoing damage to ecosystems, contamination of surface and ground water	Occasionally	Major	High	<ul style="list-style-type: none"> <li>TSF to be covered to prevent ARD runoff</li> <li>Low permeability compacted composite liner comprising HDPE and soil liner incorporating a basin underdrainage system in the basin area for seepage control</li> <li>Ongoing monitoring program, including monitoring at the release points, upstream and downstream of release points</li> <li>Groundwater monitoring</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> <li>Ongoing testing for contamination of soils surrounding TSF to detect seepage</li> <li>Develop Emergency Overflow Procedures for contamination events</li> <li>Basic store and release cover system on closure to isolate the tailings from the environment</li> </ul>	Unlikely	Minor	Very Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Paste backfilling of tailings into underground workings, tailings backfilling into the final void will be the preferred option for TSF Rehabilitation. Detail studies will be carried out to investigate the feasibility in the detailed mine planning stage</li> </ul>			
15	Fauna drowning	Fauna	Death of Fauna	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Implementing appropriate bird-deterrent methods to keep waterbirds and birds of prey away (Fauna will preferentially use the neighbouring Jervois Fresh Water Dam)</li> </ul>	Unlikely	Minor	Very Low
16	Structural failure of the process water storage facility	Ecosystem	Process water report to the environment and ecosystems, long term damage to ecosystem, leaching into ground and surface water	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Design processing plant following the appropriate engineering standards</li> <li>Develop Emergency Overflow Procedures for contamination events</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> </ul>	Rarely	Major	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
17	Contaminated seepage from process water storage facility	Ecosystem	Pollution of surface and groundwater systems, ongoing damage to ecosystems, contamination of surface and ground water	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Design processing plant to suitable design standards</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> <li>Develop Emergency Overflow Procedures for contamination events</li> </ul>	Unlikely	Minor	Very Low
18	Insufficient capacity of the process water storage facility	Ecosystem	Overtopping of dam walls, ongoing damage to ecosystems, contamination of surface and ground water, financial costs to mine owner to enlarge the storage facility	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Appropriate design of process water storage facility</li> <li>Develop Emergency Overflow Procedures for contamination events</li> <li>Design processing plant to suitable design standards</li> </ul>	Rarely	Major	Low
19	Pumping/pipeline failure causing process water escapes to ecosystem	Ecosystem	Damage to ecosystems, contamination of surface and ground water	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Backup pump, maintenance schedule</li> <li>Routine pipeline inspections to identify potential failure points</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> </ul>	Rarely	Moderate	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
20	ARD from waste dumps leading to contaminated seepage/runoff	Ecosystem	Contamination of surface and ground water, damage to dependent ecosystems	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Waste rock to be retained within underground voids and pits where possible to minimise the operational footprint requiring rehabilitation</li> <li>Ongoing review and update of S-block Model to identify future changes to predicted waste characterisation</li> <li>Selective handling of PAF material to prevent ARD, placement of PAF underground if practical with cement backfill</li> <li>Scheduling of underground waste rock to utilise PAF material in back fill</li> <li>WRDs to be covered to prevent ARD runoff</li> <li>Construction of surface water management infrastructure according to the surface water model and water management plan, including the process water dam, underground dewatering dam and sediment dams to capture and manage runoff from waste rock dumps</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> </ul>	Rarely	Moderate	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							<ul style="list-style-type: none"> <li>Ongoing testing for contamination of soils surrounding waste dump to detect seepage</li> <li>Develop Emergency Overflow Procedures for contamination events</li> </ul>			
<b>21</b>	Insufficient cover material for waste dumps	Ecosystem	Inability to meet rehabilitation requirements	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Design waste rock dump according to geochemical properties of waste rock</li> <li>Independent site survey completed to identify suitable materials</li> <li>Implement soil stockpiling for all clearance areas in suitable areas for rehabilitation uses</li> <li>Implement Environmental Management Plan, including Erosion and Sediment Control Plan, Water Management Plan and MRCP</li> </ul>	Rarely	Moderate	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
22	ARD from ore ROM leading to contaminated seepage/runoff	Ecosystem	Contamination of surface and ground water, damage to dependent ecosystems	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Design ROM according to geochemical properties of the ROM Ore, incorporate management strategies to ensure leachate during storage is managed</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> <li>Ongoing testing for contamination of soils surrounding to detect seepage</li> <li>Develop Emergency Overflow Procedures for contamination events</li> <li>Assess likelihood of eventual processing and include contingency for appropriate management if processing does not take place</li> </ul>	Rarely	Moderate	Very Low
23	Insufficient clean-up of ore ROM at mine closure causing contaminated seepage/runoff	Ecosystem	Contamination of surface waters and groundwater, damage to dependent ecosystems	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Implement a Mine Rehabilitation and Closure Plan, including measures if the mine is put into care and maintenance</li> <li>Ensure all ore mined is treated prior to closure</li> </ul>	Rarely	Major	Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
24	Blasting	Fauna	Injury or death of Fauna	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Limit the requirement for blasting where possible, particularly around sensitive areas such as the Unca Creek Corridor</li> <li>Blasting to be undertaken during the middle of the day when fauna movement is generally at its slowest</li> <li>Fence operating areas</li> </ul>	Unlikely	Minor	Very Low
25	Uncontrolled fire caused by mining operations	Ecosystem	Loss of flora and fauna	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Conduct hazard reduction burns</li> <li>Provision of firefighting training for personnel conducting hot works</li> <li>Implement Hot Work Permits System</li> <li>Restrict vehicle access to burnt areas to minimise erosion</li> <li>Coordinate weed spraying activities for the period following burns to assist native plant regeneration</li> </ul>	Unlikely	Moderate	Low
26	Old ROM samples stored in barrels	Ecosystem	ARD from barrels, contamination of surface and groundwater, damage to dependent ecosystems	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Incorporate old ROM into new development</li> </ul>	Rarely	Insignificant	Very Low
27	ARD from old tailings dam/old waste piles/old ROM	Ecosystem	Contamination of surface and ground water, damage to dependent ecosystems	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Incorporate old materials into new development to manage historical risks</li> </ul>	Unlikely	Moderate	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
28	Elevated noise levels	Fauna	Disturbance to Fauna	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Minimise noise from mining and construction equipment and machinery, ensure noise emissions in accordance with manufacturer’s specifications and Australian Standards, and noise suppression equipment fitted consistent with the requirements of the activity</li> <li>Domestic fauna excluded from operational areas with site fencing</li> </ul>	Rarely	Minor	Very Low
29	General waste escapes to environment	Ecosystem	Contamination of ecosystem, potential injury or death to fauna	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Operate under the procedures included in the Waste Management Plan</li> </ul>	Unlikely	Minor	Very Low
30	Waste exposed at storage facilities	Ecosystem	Potential injury or death to fauna	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>Operate under the procedures included in the Waste Management Plan</li> <li>Any waste storage facilities to be designed and located to restrict fauna access</li> </ul>	Unlikely	Minor	Very Low
31	Failure of waste water treatment system	Ecosystem	Waste water released to the environment, potential contamination to surface water and ground water	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>STP will be developed in accordance with the Northern Territory Code of practice for on-site wastewater management and the Guidelines for wastewater works design approval for recycled water systems</li> <li>Regular maintenance, monitoring and testing of the system to the manufacturer's specifications</li> </ul>	Unlikely	Moderate	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
32	Accidents when driving on public road/mine road	Fauna	Injury or death of fauna	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Develop and implement a Traffic Management Plan to reduce driving on public roads and impose speed limits on mine roads</li> <li>Minimise mine worker driving during dawn and dusk</li> </ul>	Occasionally	Minor	Low
33	Greenhouse gas emission from project activities	Air Quality	Contribution to Northern Territory and Australian emission levels	Likely	Insignificant	Low	<ul style="list-style-type: none"> <li>Incorporate a hybrid diesel and solar power station</li> <li>Minimising the use of fuel by selecting fuel efficient plant and equipment</li> <li>Operation of vehicles in a fuel efficient manner</li> <li>Turning off idling equipment</li> <li>Selecting construction techniques that utilise lower amounts of fuel</li> <li>Reduction of fuel usage through adopting efficient haul routes over the shortest distances</li> <li>Maintenance plan for all fuel-powered equipment</li> </ul>	Occasionally	Insignificant	Very Low
34	Groundwater drawdown due to mining activities and project water supply	Ecosystem	Impact on Flora, Fauna, Stygofauna, GDE, potential loss of habitat causing death of GDE	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Implement Biodiversity Management Plan and voluntary biodiversity offset strategy</li> <li>Implement Groundwater Management Plan</li> <li>Implement Mine Rehabilitation and Closure Plan</li> </ul>	Occasionally	Moderate	Medium
35	Increase in the area inundated by the upgraded Jervois Dam	Ecosystem	Loss of habitat	Likely	Insignificant	Low	<ul style="list-style-type: none"> <li>Discussion with relevant stakeholders before closure to consider options of upgraded dam remaining, reduction in spillway level to pre-mining level or complete removal of the dam</li> </ul>	Likely	Insignificant	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
36	Mine water not appropriately managed	Ecosystem	Contamination to surface water and groundwater, adverse impact on ecosystem	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Construction of surface water management infrastructure according to the surface water impact assessment and water management plan, including the process water dam, underground dewatering dam and sediment dams to capture and manage runoff from waste rock dumps, dewatering of pits and underground workings</li> <li>Ongoing water quality monitoring program, monitoring at the release points, upstream and downstream of release points</li> <li>Monitoring of water quality in sediment dams</li> <li>Spills or exceedance of water quality parameters reported to the Environmental Officer</li> <li>Ongoing testing for contamination of soils surrounding waste dump to detect seepage</li> <li>Develop Emergency Overflow Procedures for contamination events</li> </ul>	Unlikely	Minor	Very Low
37	Site not appropriately rehabilitated after closure	Ecosystem	Landscape function and vegetation no resilient, self-sustaining and comparable to surrounds	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>The project area is located on pre-disturb mine site</li> <li>Progressive rehabilitation and active revegetation of site at closure as per MRCP</li> <li>Post rehabilitation monitoring to ensure objectives are achieved as per MRCP</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
38	Migration of historical contamination to the environment during construction and operation	Ecosystem	Contamination to surface water and/or groundwater, adverse impact on dependent flora and fauna	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Implement an Environmental Management Plan</li> <li>Implement a Water Management Plan, Groundwater Management Plan and Erosion and Sediment Control Plan</li> <li>Dust suppression and implement other dust mitigation measures to ensure compliance</li> <li>Implement procedure for transport and storage of hazardous substances</li> </ul>	Rarely	Moderate	Very Low
39	Long term contamination of land	Ecosystem	Contamination to surface water and/or groundwater, adverse impact on dependent flora and fauna	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Appropriate design of facility to minimise land contamination</li> <li>Standard operating procedure and Environmental Management Plan to minimise land contamination, spill response and remediation if contamination occurred</li> <li>Monitoring program during operation and post rehabilitation</li> <li>Decommissioning and rehabilitation activities as per MRCP to minimise contamination and to ensure contaminated areas are remediated</li> </ul>	Unlikely	Minor	Very Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
40	Borefields not appropriately decommissioned, uncontrolled release of groundwater from borefields	Groundwater	Adverse change in ecological conditions	Rarely	Minor	Very Low	<ul style="list-style-type: none"> <li>Decommissioning and capping of borefields to be undertaken in accordance with relevant Australian and Northern Territory guidelines/standards</li> <li>Consultation with post closure land users to determine post closure infrastructure uses</li> <li>Monitoring after closure to ensure standards are met</li> </ul>	Rarely	Insignificant	Very Low
41	Surface water structures not physically stable	Fauna	Injury or death of Fauna	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Surface water structures remain as per MRCP will be shaped to allow safe ingress and egress of fauna</li> <li>Ensure stability according to relevant standards and guidelines</li> <li>Monitoring after closure to ensure objectives are met</li> </ul>	Rarely	Insignificant	Very Low
42	Waste rock dump not physically or chemically stable	Ecosystem	Adverse effect on ecosystem	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Ensure waste rock dump geotechnically and chemically stable as per MRCP</li> <li>Monitoring after closure to ensure objectives and standards are met</li> </ul>	Rarely	Major	Low
43	Inadequate rehabilitation of exploration sites, including drill holes, pads, sumps, costeans, tracks, etc	Ecosystem	Potential injury of fauna, adverse effect on ecosystem	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>All drill holes, pads, costeans and sumps will be backfilled according to the relevant Northern Territory guidelines</li> <li>Tracks and gridlines rehabilitated as per MRCP and relevant Northern Territory guidelines</li> <li>Monitoring after rehabilitation to ensure objectives are met</li> </ul>	Rarely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
44	Premature Closure	Ecosystem	Site rehabilitation or maintenance not completed	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Premature Closure Plans to be carried out as per MRCP</li> <li>Lodgement of security bond with the Northern Territory government as per operation condition to cover rehabilitation cost</li> </ul>	Rarely	Minor	Very Low
45	Natural disaster: earthquakes, rainfall events, fire and flood after closure	Ecosystem	Adverse effect on ecosystem	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Implement Environmental Management Plan, including Water Management Plan, Bushfire Management Plan and Erosion and Sediment Control Plan</li> <li>Rehabilitation to be carried out as per MCRP</li> <li>Monitoring after closure to ensure objectives and standards are met</li> <li>Lodgement of security bond with the Northern Territory government as per operation condition to cover rehabilitation cost</li> <li>The proposed Reward pit is the only infrastructure on site that would be affected by flooding, located on the floodplain of Unca Creek. A permanent diversion of Unca Creek is proposed to manage the risk for events up to 1,000 years. The final landform between the Reward pit and the creek diversion will ensure that the final void is protected from inundation for all flood events up to and including the Probable Maximum Flood event. The Unca</li> </ul>	Rarely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
							Creek diversion will remain in place as part of the final landform <ul style="list-style-type: none"> <li>• Ensure stored water in the final voids cannot overflow to impact on surface water, as predicted from groundwater modelling</li> <li>• Seismic hazard assessment has been carried out as part of the Project PFS, seismic ground motion parameters for the project area were determined and will be used in the detail mine planning</li> <li>• TSF will be constructed according to ANCOLD guidelines requirement, in particular: Extreme Storm Storage, Contingency Freeboard, Spillway Capacity, Design Earthquake Loading, Stability Minimum Factor of Safety, Dam Safety/Inspection Frequency</li> </ul>			

Human Health and Safety Risk Assessment

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
1	Dust from construction, mining operations and exploration	Worker	Impact to human health	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Regular watering of haul roads</li> <li>Adopt speed limits on site for all vehicles</li> <li>Regular grading of onsite haul roads</li> <li>Apply gravel to surfaces of haul roads</li> <li>Stage clearing and construction activities to minimise area of exposed ground</li> <li>Visual inspection requirements</li> <li>Limit burning of cleared vegetation</li> <li>Wet dust suppression measures in the form of high pressure, low volume water sprays</li> <li>Rehabilitation and vegetation of excavated areas as soon as practicable</li> <li>Minimise drop heights into hoppers, onto stockpiles and into haul trucks</li> <li>Minimise doubling handling of materials</li> <li>Positioning of crushing and screening plant and stockpiles in areas shielded by terrain</li> <li>Covering of all haul vehicles entering and exiting the site</li> <li>Chassis and wheels of haul trucks to be cleaned prior to exiting the site</li> <li>Dust management and monitoring of TSF as recommended by TSF Design Recommendations</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
2	Serious animal bites	Worker	Impact to human health or death of workers	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Potential wildlife hazards to be included in staff inductions</li> <li>First aid facilities, snake bite kits to be available on site</li> <li>PPE including steel cap boots, long-sleeve shirts and trousers</li> <li>Implement Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Moderate	Very Low
3	Personnel drowning	Worker Public	Deaths of people	Rarely	Catastrophic	Medium	<ul style="list-style-type: none"> <li>Secure water storage area appropriately to ensure the public and unauthorised workers do not have access</li> <li>Signage</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Major	Low
4	Failure of upgraded Jervois Dam	Worker Public	Flood to Unca Creek downstream, deaths of people	Rarely	Catastrophic	Medium	<ul style="list-style-type: none"> <li>Jervois Dam upgrade to be carried out according to relevant standards</li> <li>Regular Jervois Dam monitoring and inspections</li> </ul>	Rarely	Major	Low
5	Failure of Unca Creek Diversion	Worker Public	Flood to Reward pit, deaths of people	Rarely	Catastrophic	Medium	<ul style="list-style-type: none"> <li>Regular diversion monitoring and inspections</li> <li>Construction of the Eastern and Western flood protection bunds along the right bank of Unca Creek Diversion to protect the final void and TSF from flooding</li> </ul>	Rarely	Major	Low



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
6	Collapse of pit walls	Worker	Serious injury or death of workforce	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Detail mine design and planning based on mine geotechnical data</li> <li>Geotechnical and geological monitoring</li> <li>Hazard reporting</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium
7	Workers or people from the public fall from mine pits, mine shafts	Worker Public	Serious injury or death of people	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Secure the Project site appropriately to ensure the public or unauthorised workers do not have access to pits and shafts</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium
8	Heavy machinery, plant and equipment accidents during operation	Worker	Serious injury or death of workers	Occasionally	Catastrophic	High	<ul style="list-style-type: none"> <li>Guarding</li> <li>PPE</li> <li>Competency and standard operating procedures</li> <li>Isolation Procedure</li> <li>Provide safe work platforms</li> <li>Regular service of machinery and plants according to the manufacturer's recommendation</li> <li>Implementation of an Emergency Management Plan and Emergency Plan</li> <li>Implementation of a traffic management plan</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
9	Accidents when driving on mine road	Worker	Serious injury or death of mine work	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Implement Site Emergency Management Plan and Emergency Plan</li> <li>Competency and standard operating procedures</li> <li>Implement a Traffic Management Plan to impose speed limit on mine roads</li> </ul>	Rarely	Catastrophic	Medium
10	Accidents when driving on public road involving mine worker	Worker Public	Serious injury or death of mine worker and personnel from the public	Occasionally	Catastrophic	High	<ul style="list-style-type: none"> <li>Implement a Traffic Management Plan to reduce driving on public roads, all workers to stay onsite or to travel by bus/flights provided by Kentor Minerals</li> <li>Public awareness campaign</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Unlikely	Catastrophic	High
11	Inadequate ventilation at underground mine	Worker	Impact to human health or death of workers	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Adequate ventilation system design according to detail mine plan and to ensure provision of adequate flow rate and maintain healthy and safe atmosphere at all times</li> <li>Implement a Ventilation Control Plan</li> <li>Temperature, humidity and air quality monitoring</li> <li>Ventilation system auditing and maintenance</li> <li>Reduction/suppression of dust deposition in intake roadways</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
12	Blasting	Worker	Serious injury or death of workers	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Accurate survey and measurement</li> <li>Blasting and blasting design to be carried out by competently trained personnel only and follow the Blasting Standard Operating Procedure</li> <li>Restriction of access such as excursion distances</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium
13	Collapse of underground roof or walls	Worker	Serious injury or death of workers	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Detailed mine design and ground control mechanisms based on mine geotechnical data</li> <li>Geotechnical and geological monitoring &amp; mapping</li> <li>Inspection after blasting and restoration of support</li> <li>Installation of roof and upper wall support mesh</li> <li>Access restriction</li> <li>Inspection of roof and walls before starting and during work commencement</li> <li>Hazard reporting</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
14	Falling material from underground roof (rock spall)	Worker	Serious injury or death of workers	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Detailed mine design and planning based on mine geotechnical data</li> <li>Geotechnical and geological monitoring &amp; mapping</li> <li>Inspection after blasting and restoration of support</li> <li>Access restriction</li> <li>Installation of roof and upper wall support mesh</li> <li>Inspection of roof and walls before and during work commencement</li> <li>Scaling of all observed loose material</li> <li>Hazard reporting</li> <li>Install barriers</li> <li>PPE</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium
15	Ground subsidence	Worker	Serious injury or death of worker	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Detailed mine design and planning based on mine geotechnical data</li> <li>Geotechnical and geological monitoring &amp; mapping</li> <li>Regular inspection of ground surface above underground workings,</li> <li>Maintain a free draining surface above underground workings</li> </ul>	Rare	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
16	Sudden inrush of waters at underground mine	Worker	Serious injury or death of workers	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Accurate surveying of new workings and maintain register of plans of old workings</li> <li>Drainage of old workings</li> <li>Adherence to underground working design</li> <li>Groundwater modelling and monitoring, detail mine plan following Water Management Plan and Groundwater Management Plan</li> <li>Fault grouting</li> <li>Probe drilling where necessary</li> <li>Adequate pump capacity</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium
17	Uncontrolled fire caused by third party or natural disaster	Worker	Serious injury or death of people	Occasionally	Catastrophic	High	<ul style="list-style-type: none"> <li>Provision of fire information at formal and informal site meetings, wildfires monitoring</li> <li>Maintenance of fire breaks and access tracks</li> <li>Establishment of Emergency Muster Points within safe areas</li> <li>Identification of safe egress routes in event of fire emergency</li> <li>Establishment of Refuge Chambers in Underground operations</li> <li>Develop and implement a Bushfire Management Plan</li> </ul>	Rarely	Catastrophic	Medium



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
18	Uncontrolled fire caused by mining operations	Worker	Serious injury or death of people	Occasionally	Catastrophic	High	<ul style="list-style-type: none"> <li>Provision of firefighting training for personnel conducting hot works</li> <li>Implement Hot Work Permits System</li> <li>Identification of safe egress routes in the event of fire emergency</li> <li>Establishment of Refuge Chambers in Underground operations</li> <li>Equipping all mobile and stationary equipment within the project area with appropriate fire extinguishers</li> <li>Store hydrocarbon fuels according to the requirements of AS1940-2004 - The storage and handling of flammable and combustible liquids</li> <li>All staff, contractors and visitors to comply with fire ban days and advice provided by Bushfires NT</li> <li>Develop and implement a Bushfire Management Plan, establishing Emergency Muster Points within safe areas, identifying safe egress routes in the event of fire emergency</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
19	Transport and handling of hazardous substances and dangerous goods	Worker	Potential serious injury or death from exposure	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Hazardous substances register and MSDS, all material to be stored according to the relevant MSDS</li> <li>Regular inspection and maintenance of all hazardous substance storages</li> <li>Signage and labelling</li> <li>PPE</li> <li>Provide training to personnel for appropriate handling of hazardous materials</li> <li>Implement procedure for transport and storage of hazardous substances, all vehicles to be registered and fitted with spill kits and PPE for emergency response</li> <li>Notify the Environmental Officer in case of a spill and commence investigation into soil, surface and groundwater impacted</li> <li>First Aid and spill kits</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
20	Noise	Worker	Damage to hearing	Occasionally	Moderate	Medium	<ul style="list-style-type: none"> <li>Minimise noise from construction equipment and machineries, ensure noise emissions in accordance with manufacturer’s specifications and Australian Standards, and noise suppression equipment fitted consistent with the requirements of the activity</li> <li>Regular Noise Audit Surveys</li> <li>Provide training to mine worker regarding appropriate PPE</li> </ul>	Unlikely	Moderate	Low
21	Failure of communication systems	Worker	Incidents or accidents due to loss of communication, financial loss to mine owner	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Implement a Communication Management Plan, including use of communication equipment suitable for the area</li> <li>Back-up and redundancy within included in design of site and off-site communications systems</li> <li>Establish a site communication system</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> <li>Vehicles to be fitted with recovery equipment, first aid kits and water supply</li> </ul>	Unlikely	Moderate	Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
22	Working in remote location	Worker	Limited site medical facilities, emergency response time increase, long travel distances and potential communication failures	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Implementation of a Site Emergency Management Plan in consultation with local Police and health service providers</li> <li>Implement a Communication Management Plan, including use of communication equipment suitable for the area</li> <li>Implement an Adverse Weather Procedure</li> <li>Strick worker code of conduct, site safety inductions and pre-employment medical checklists</li> <li>Fitness for work procedure, fatigue management and drug &amp; alcohol policy</li> <li>Vehicles to be fitted with recovery equipment, first aid kits and water supply</li> <li>Personnel only to work alone using Remote Work Procedures when working in remote or isolated locations</li> <li>Establish First Response Medical Facilities and personnel on site</li> </ul>	Unlikely	Minor	Very Low
23	Working in remote location	Worker	Mental health issues	Occasionally	Minor	Low	<ul style="list-style-type: none"> <li>HR management to support workers living away from families</li> <li>Access during recreational time to communications off-site with family/friends</li> <li>Good mentoring of staff, particularly Indigenous workers</li> <li>Manageable FIFO rosters</li> </ul>	Unlikely	Minor	Very Low

Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
24	Working in the field	Worker	Sunburn, dehydration and heat exhaustion	Likely	Major	High	<ul style="list-style-type: none"> <li>Where reasonably practical, reschedule tasks to the cooler part of the day</li> <li>Install shade cloth to reduce radiant heat from the sun</li> <li>Provide cool drinking water near work site and encourage mine workers to drink a cup of water (about 200 ml) every 15 to 20 minutes during hot weather conditions</li> <li>PPE including long-sleeve UV protection/High-Vis shirts, trousers, hats, sunglasses and sunscreen</li> <li>Provide mine worker with information and supervision on heat related illness, symptoms, sunburn, dehydration, and first aid</li> <li>Fitness for work policy, drug &amp; alcohol policy and fatigue management</li> </ul>	Unlikely	Major	Medium
25	Contact with an electrical source	Worker	Electric shock, potential serious injury or death	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Only licensed electricians to carry out electrical work</li> <li>Procedure to ensure electricity switched off before working on equipment</li> <li>Testing and tagging of electrical equipment</li> <li>Remove unsafe electrical equipment or cords from site</li> <li>Tag out and isolation procedures</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Rarely	Catastrophic	Medium



Reference	Potential Event	Aspect	Potential Impact	Initial Risk rating			Method of Control	Residual Risk rating		
				Likelihood	Consequences	Risk Rating		Likelihood	Consequences	Risk Rating
26	Manual handling	Worker	Potential injuries relate to lower back injuries, knee and ankle injuries and soft tissue strains.	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Implement a Manual Handling Standard Operating Procedure</li> <li>Implement Site Emergency Management Plan and Emergency Plan</li> </ul>	Unlikely	Minor	Very Low
27	Site not appropriately rehabilitated post closure, sites not geotechnically stable, or ease of public access	Public	Injury or potential death on human health	Rarely	Catastrophic	Medium	<ul style="list-style-type: none"> <li>All infrastructure to be removed from site as per MRCP</li> <li>Ensure stability of potentially dangerous structures such as waste rock dump</li> <li>A pit bund to be constructed around each pit according to relevant standards at closure to prevent public access</li> <li>Secure site to restrict public access to site by obstructing or concealing the access road and constructing bunds around the pits</li> </ul>	Rarely	Catastrophic	Medium
28	Inadequate rehabilitation of exploration sites, including drill holes, pads, sumps, costeans, tracks, etc	Public	Potential injury	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>All drill holes, pads, costeans and sumps will be backfilled according to the relevant Northern Territory guidelines</li> <li>Tracks and gridlines rehabilitated as per MRCP and relevant Northern Territory guidelines</li> <li>Monitoring after rehabilitation to ensure objectives are met</li> </ul>	Rarely	Minor	Very Low

## A2 Storage, Transport and Handling of Dangerous Goods

### 1. Overview on Hazardous Substances

Jervois Operations shares the concern of the community regarding the use of substances and materials which can be hazardous to persons, wildlife and the environment. The Company therefore recognises that it has both a legislated and ethical responsibility to ensure the use by the Company of hazardous substances and materials complies with all statutes, procedures and guidelines issued by all relevant governing authorities.

Chemical products and substances are an indispensable component of the mining industry with some of these products also being used in exploration areas. Occupational Health and Safety legislation has been introduced in all States and Territories of Australia placing a “Duty of Care” responsibility upon employers, manufacturers, suppliers, importers and others to provide information on hazardous substances and materials and also on employees to handle and use the products according to the information provided and other guidelines.

Access to Material Safety Data Sheets (MSDS) is to be available to all employees and these MSDS will provide information on, but not be limited to:

- Components or ingredients of all chemicals and hazardous substances.
- Personal Protective Equipment (“PPE”) requirements.
- Handling, storage and transport details.
- First Aid.

Environmental risks and the management of risks associated with dangerous goods are addressed in the Project Environmental Management Plan, and specifically the Waste Management Plan and the Environmental Emergency Management Plan.

This document will provide a basis for information on hazardous substances and materials to:

- All persons handling or using hazardous materials, substances and chemical products, to managers and supervisors and to purchase and store personnel.
- Safety committees and health and safety representatives.
- First Aid and emergency personnel.

Bulk hazardous material storage facilities are listed in the following Tables and their locations are shown on the below Figures. The specific locations of these facilities may alter depending on the outcomes of additional detailed mine design.

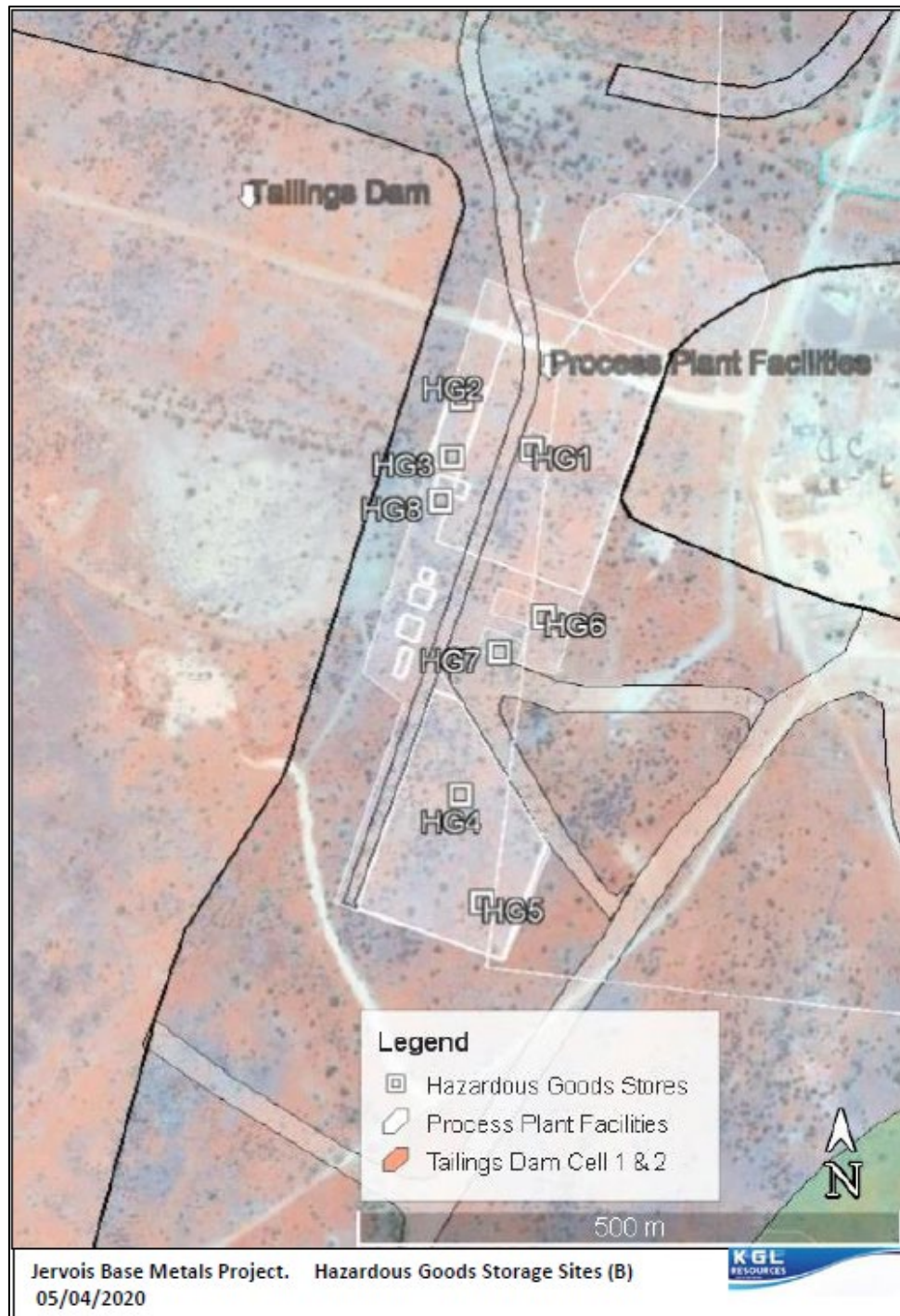
Jervois Base Metals Project Hazardous Goods Storage (1)								
Location Number	Location	Explosives	Flammable Gases	Non Flammable Non Toxic Gases	Poisonous Gases	Flammable Liquids	Flammable Solids	Spontaneous Combustible Substances
	CLASS	Class 1	Class 2.1	Class 2.2	Class 2.3	Class 3	Class 4.1	Class 4.2
1	Process Plant Site		X	X		X	X	X
2	Process Plant Workshop		X	X		X		
3	Process Plant Warehouse		X	X	X	X	X	
4	Mining Contractor Area Workshop		X	X		X		
5	Mining Contractor Area Store		X	X	X	X	X	
6	Power Station		X	X		X		
7	Diesel Fuel Storage					X		
8	Laboratory		X	X	X	X	X	
9	Explosives Magazine	X				X	X	
10	Accommodation Village			X		X	X	
11	Bellbird Mining Store		X	X	X	X	X	
12	Lucy Creek Borefield					X		
13	Lucy Creek Airstrip		X	X	X	X	X	

Jervois Base Metals Project Hazardous Goods Storage (2)								
Location Number	Location	Flammable If Wet Substances	Oxidizing Substances	Organic Peroxides	Poisonous Substances	Radioactive Substances	Coorsive Substances	Miscellaneous
	CLASS	Class 4.3	Class 5.1	Class 5.2	Class 6	Class 7	Class 8	Class 9
1	Process Plant Site	X	X		X	X	X	
2	Process Plant Workshop		X		X		X	
3	Process Plant Warehouse		X	X	X		X	X
4	Mining Contractor Area Workshop		X		X		X	
5	Mining Contractor Area Store		X	X	X		X	X
6	Power Station							
7	Diesel Fuel Storage							
8	Laboratory		X	X	X		X	X
9	Explosives Magazine		X		X			X
10	Accommodation Village		X				X	X
11	Bellbird Mining Store		X	X	X		X	X
12	Lucy Creek Borefield							X
13	Lucy Creek Airstrip							X



Locations of Bulk Hazardous Material Storage Facilities (A)





**Locations of Bulk Hazardous Material Storage Facilities (B)**

## 2. Control of Hazardous Substances

### 2.1 Overview

Chemical products and substances should only be used after taking into account the degree of risk involved and consequential procedures for the prevention of injury, ill health and/or damage as opposed to the operational and economic effect of substitution with less hazardous products.

In order to determine current storage and practices, an initial hazard inspection of the following aspects shall be conducted and thereafter at regular intervals:



- Chemical products and substances.
- Storage areas.
- Areas of use.

Subsequent hazard inspections shall be conducted in accordance with the Company's Occupational Health and Safety Procedures and Guidelines manual and Safety Plan.

Where the risks of injury or disease are identified, the Company shall control those risks by:

- Elimination – removal of the hazardous substances or process.
- Substitution – replacing the substance or process with a less hazardous substance or process.
- Engineering – redesigning the work processes or methods to reduce or eliminate risks.
- Isolation – removing employees from hazards by enclosing or guarding.
- Administration – adjusting the duration or conditions of risk exposure.
- PPE – supplying the appropriate PPE. This measure will only be a last resort where other control measures cannot be successfully implemented.

## 2.2 Purchasing

Necessary quantities to maintain supply of chemical products and substances shall be regularly assessed and reviewed and Store “minimum” and “maximum” quantities adjusted to reflect the current and immediate future's requirements. This will avoid over-running the shelf life of chemical products and substances and also avoid excessive storage of dangerous goods.

From time to time the Company may issue guidelines concerning the preferred use of particular products or substances and, if a new product, all information in the form of a MSDS must be obtained prior to purchase by either:

- Requesting and MSDS; or
- Requesting the information from the supplier (it is the supplier's responsibility to supply such information).

When the information has been made available and any Company obligations or requirements in respect to the storage and handling of the product have been addressed, the Purchase Order may be actioned.

**Note: The MSDS may verify that the chemical product or substance is not hazardous thus not requiring any action on the part of the Company.**

### Purchasing Specifications

An employer, supplier, visitor or other person shall not bring onto, sell, convey or keep on any site any hazardous substance which is not in good condition or is otherwise not safe to keep on that site.

The following specifications are required for each chemical product or substance which is purchased:

- Compliance with Company standards and procedures.
- Packaging, labelling and transportation in accordance with the following:
  - - Dangerous Goods Regulations 1992.
  - - Explosives Regulations 1963.
  - - Where neither of these Regulations apply, the current Australian Code for the Transport of Dangerous Goods by Road and Rail.
- A fully detailed and completed MSDS.
- Labelling details as follows:
  - - Supplier's identification.

- - Supplier's batch number.
- - Product name.
- - Recommended use/s.
- - Application method/s.
- - User safety precautions.
- - Names of toxic or hazardous components.
- - First Aid information.
- - Dangerous Goods symbol (where applicable).

### **Transport**

Transport of all chemical products and substances shall be strictly in accordance with the Dangerous Goods Regulations 1992 or the Explosives Regulations 1963 or, where neither regulations applicable, the current Australian Code for the Transport of Dangerous Goods by Road and Rail.

Where transport is provided by a contracted party, compliance with the above mentioned regulations must be a contractual obligation by the transporters to the Company at all times. If at any time these regulations are not complied with while transporting dangerous or hazardous substances on the Company's behalf, the contracted transporter will be asked to show cause why the contract should not be terminated.

### **Labelling, Storage and Placarding**

Where a chemical product or substance is stored, handled, transported or used on a site, the Company shall ensure that the label remains readily identifiable and legible for the period that any of the product or substance remains in the container and the container is appropriately disposed of.

No label or colour code shall, without reasonable cause, be:

- Removed.
- Defaced.
- Modified.
- Altered.

***To do so is an offence under the Mines Safety and Inspection Regulations.***

All storage of chemical products and substances and all placarding of chemical products and substances shall be strictly in accordance with the relevant State authority's regulations.

### **Registers**

A register shall be established and maintained for hazardous products or substances which are stored, handled or used on a site. The register should include, where applicable:

- Manifest.
- MSDS.
- Assessment report.
- Details of any training programme relating to the product or substance.
- Employee records of any training programme relating to the product or substance.
- Any result of atmospheric monitoring.
- Any health surveillance report.
- Any result of a placarding calculation.
- An emergency plan.
- Any other record required by legislation.

**Manifests**

Hazardous products and substances manifests shall comply with the requirement of the National Occupational Health and Safety Council (NOHSC) "Guidance Note for Emergency Services Manifests" and should be current, simple and accurate. They should be updated whenever a new chemical is introduced or the quantity stored is increased by more than 20% and should include the following information:

- A list of each category of hazardous product or substance using the ADG Code and Class where the quantity stored exceeds the placarding exemption limits.
- The maximum anticipated quantity stored.
- A site plan showing the location of each category of hazardous products and substances.
- •

**Emergency Procedures**

Emergency plans shall be documented and implemented in accordance with the Company's "Occupational Health and Safety Procedures and Guidelines" manual. Details concerning First Aid control in emergencies are provided in MSDS.

Emergency plans require revision when:

- A new hazardous substance is introduced to the site in a quantity which alters the placarding requirements.
- A change is made to a process or procedure which alters the risk.
- Updated information becomes available for a hazardous substance with such new information denoting a significant hazard.

The Company's Emergency Plan specifies evacuation procedures where there is a possibility that chemicals and/or explosives may be involved in a fire. This does not preclude the necessity to have fire protective equipment in the vicinity of chemical stores or usage areas.

**Emergency Equipment**

Protective equipment, as detailed individually on MSDS, shall be supplied to employees as required and employees shall be trained in the care, maintenance and use of applicable protective equipment.

All protective equipment shall be checked at appropriate intervals and repaired or replaced as necessary to ensure the health and safety of all personnel. Respirators shall be required for all spray painting applications and also as directed by MSDS (refer to the Occupational Health and Safety Procedures and Guidelines for use, maintenance and storage).

**Training**

The Company shall ensure that all persons engaged in the handling of hazardous substances are instructed in the hazards involved and the procedures and precautions to be observed at all times.

Initial and ongoing training is essential to maintain a high standard of personal safety and hygiene. As new chemical products and substances are introduced, the necessary relevant safety information shall be provided immediately to the supervisors and employees who will be using or handling the products and substances.

Training should include:

- General duties of care.
- Information on the products and substances.
- Work procedures and safe practices.
- The role of employees in assessment of situations and monitoring of use.
- Control measures.

- PPE and its care and maintenance.
- Emergency procedures.

#### Use

Only authorised and trained personnel shall use chemical products and substances in the workplace and all usage shall be consistent with safe work practices and handling procedures. The required protective equipment and information as detailed in MSDS and the Company's Occupational Health and Safety manual shall be observed at all times.

#### Spillage

Exposure to employees and release to the environment of chemical products and substances, and associated noxious effluent, shall be kept to lowest practicable level by safe work practices, handling procedures and engineering controls.

Where spillages do occur, the clean-up and waste disposal shall be immediate and in accordance with the emergency procedure for spillages, the MSDS, and local, State and other statutory regulations.

All regulations should be regarded as the minimum requirement in this respect and every effort shall be made to prevent contamination of:

- Water courses.
- Water reservoirs.
- Drains and Sewers.
- The environment in total.

### 3. Control procedures – storage, placarding, handling

#### 3.1 Overview

Regulations for the storage of chemical products and substances vary from State to State within Australia. However, the regulations take into account the ADG Code Packaging Group and the Dangerous Goods Class (in addition to AS1940-2017 and AS1956-1976).

Precautions shall be taken to prevent water from coming into contact with hazardous products and substances except:

- Water sprinkler systems or other water supply used for the purpose of extinguishing a fire.
- Water used to cover a hazardous product or substance to prevent the material from reacting with air or oxygen.

No person shall smoke within 3 metres of a hazardous substance store or storage area nor take any article likely to cause a fire or explosion within 3 metres of such a store, except where that article is to be kept in that store.

The area within 5 metres of a hazardous substance store shall be kept clear of vegetation and combustible materials except:

- An explosives store which shall have a 10 metre clearance.
- An internal store (where the store in total is kept clear of vegetation and combustible materials).

***The following guidelines do not replace relevant State and/or Statutory regulations but shall be conformed with and in conjunction with those relevant State and/or Statutory regulations.***

## 3.2 Flammable Liquids Storage

### Minor Usage

For minor usage of flammable liquids Class 3.1, 3.2, 3.3 and 3.4 (AS1940-2017), storage shall be:

- Distant from a hot location and not in the proximity to any ignition source.
- Separated from combustible waste materials or residues.
- Situated to allow ease of access to a well ventilated area, for the purpose of opening or decanting from containers.
- Sufficiently distant from any ignition source to ensure safety.
- Supervised to ensure containers are kept closed.
- Naturally or mechanically ventilated in accordance with AS1940-2017.
- Situated so that the store does not hinder access or egress from any other building and an easy escape from the store is not jeopardised in the event of an emergency.
- Provided with adequate fire protection equipment.
- Designated and signposted as a “No Smoking” or “No Naked Lights” area. No hot work shall be performed in a minor usage flammable storage area.

### Packaging, Storage and Handling Areas

Package storage applies to containers not exceeding 250 litres capacity.

For storage and handling of flammable or combustible liquids in excess of minor usage, storage installations shall comply with AS1940-2017 and shall be restricted to the storage and handling of flammable and combustible liquids.

Such storage installations shall be kept separate from boundaries, other buildings and protected works.

In accordance with AS1940-2017 and where more than one Class of liquid is stored, the distance of separation shall be for the Class with the lowest flashpoint but need not exceed:

- 15 metres for Classes 3.1 and 3.2.
- 7.5 metres for Class 3.3.
- 3 metres for Class 3.4.

An office which may be used for the control of these products and is located adjacent to the storage area is exempt from this provision.

Provision shall be made to contain any leakage, spillage or contamination of surrounding soil or drainage systems in accordance with AS1940-2017 and the bund shall be of sufficient capacity to hold 100% of the contents of the store.

Vapour barriers shall be:

- Not lower than the top of the storage, or
- Not more than 4 metres in height.
- Of an approved fire wall construction with suitable fire resistance rating.

External storage building shall be constructed of non-combustible material with an earthen or concrete floor and ventilated in accordance with AS1940-2017 (including the protection afforded the vents).

Indoor storage rooms and storage cabinets shall comply with AS 1940-1993.

All package storage and handling areas shall be designated and signposted “No Smoking” and/or “No Naked Lights” areas and provided with dangerous goods “diamond signs” and any other signs as



required by relevant Regulations and Standards. Fire protection shall be provided in accordance with AS1940-2017.

### Storage in Tanks

Storage tanks shall be located so that:

- They are protected from mechanical damage, interference and excessive heat.
- Adequate access is maintained for operation, maintenance and emergencies.
- The distance from the boundaries, other buildings and protected works complies with AS1940-2017.
- Control of access (security) shall comply with AS1940-2017.
- The filling point is easily accessible and does not require a tanker to enter the compound (with the filling hose limited to a maximum length of 6 metres).

Storage tanks for combustible and flammable liquids shall be constructed in accordance with AS1692-2006 and installation shall comply with AS1940-2017. Earthing and bunding shall comply with AS1020-1995 and AS1768-2007 such that the bund is of sufficient capacity to contain 100% of the total contents stored in the tank or tanks. All tanks shall be vented in accordance with AS1940-2017.

Except for single tank installations and temporary storage, each tank shall be individually numbered and have the filling point marked to identify it unless it is immediately obvious.

All tanks shall be labelled to identify the contents.

The bunding shall be:

- Impervious.
- Designed to withstand the hydrostatic head when full.
- In accordance with the requirements of AS1940-2017, but in any case, not less than 1 metre from the tank and no more than 1.5 metres high unless permanent means for safe, rapid access and egress are provided.
- Constructed to allow for settling and erosion and still maintain the volume criteria.
- Constructed to have the angle of repose consistent with the material used and if more than 1 metre high, a flat top not less than 600mm wide.
- Constructed to comply with the drainage requirements of AS1940-2017 and where a pipe passes through the bunding to facilitate drainage, or any other purpose, be designed to prevent excessive stresses due to settlement or expansion.

All tank storage installations shall be designated and signposted “No Smoking – No Naked Lights” areas and shall be furnished with other signs as required by relevant Regulations and Standards.

### Fire Protection

Fire protection facilities shall comply with AS1940-2017 for all storage areas for flammable and combustible liquids in regards to:

- Type and rating.
- Location.
- Maintenance.
- Alarm systems.

No hot work shall be carried out in flammable and combustible liquid storage areas unless a Hot Work Permit has been completed and necessary precautions have been considered and taken.

All storage areas shall be kept clean and tidy.

### 3.3 Storage of Compressed and Flammable Gases

#### Cylinders

Storage and handling of gases in cylinders shall comply with AS4332-2004 (R2016).

Storage areas for compressed and flammable cylinders shall be:

- Located such to ensure cylinders are not liable to physical damage, tampering or excessive temperatures and preferably shaded. These requirements do not preclude storage in the open and exposed to the sun.
- Well ventilated at low and high levels.
- Away from flammable or combustible liquid storage areas.
- More than 1 metre from a door or opening.
- Situated to allow easy, rapid access and egress in the event of an emergency.
- More than 150mm below a window.
- More than 3 metres from an above ground LPG storage tank.
- Ventilated top and bottom when stored in a shelter which must be constructed on non-combustible materials.
- Designated and signposted “No Smoking – No Naked Lights” areas with other signs as required by Regulations and Standards.

All cylinders shall be stored upright and securely chained in position.

Acetylene and LPG cylinders shall be stored 3 metres from:

- Oxygen.
- Nitrogen
- Other non-flammable compressed gas cylinders.

The distance may be measured around a fire wall or vapour barrier (not less than 1.5 metres high) constructed in compliance with Regulations.

Empty cylinders shall be stored 3 metres from any other cylinders and clearly signposted as “MT”. Cylinders shall NOT be stored where, or in such a manner that they could become part of an electrical circuit nor in the proximity of compressed air or air compressors.

#### Tank Storage

Where LPG (Handygas) is stored in tanks, such storage shall comply with AS1596-2014.

#### Fire Protection

Fire protection facilities shall comply with AS1596-2014 for all storage areas of compressed and flammable gases in regards to:

- Type and rating.
- Location.
- Maintenance.
- Alarm systems.

No hot work shall be done in the vicinity of compressed and flammable gases storage areas.

Grease and oils shall not be stored in the vicinity of compressed and flammable gases, as well as other Classes of substances as indicated by Guidance for Storage Chart.

All storage areas shall be kept clean and tidy.

### 3.4 Storage of Explosives

Explosives up to 250kg shall be stored in a magazine constructed in accordance with AS2188-1988 and approved by the District Inspector of Mines.

Storage of explosives in excess of 250kg shall be in a magazine constructed in accordance with AS2188-1988 and the Explosives and Dangerous Goods Act and be licensed by the Chief Inspector of Mines.

Seatainers converted for the use of storage of explosives shall be constructed in accordance with AS2188-1988 and approved and licensed as necessary.

Explosives magazines shall be:

- Located in accordance with the Explosives and Dangerous Goods Act and as approved by the Department of Industry and Resources.
- Secured in a fenced compound, if required by the relevant State authority, cleared of vegetation and combustible materials for a radius of 10 metres around the magazine and kept locked unless exemption is obtained from the relevant authority.
- Lightning protected in compliance with AS1768-2007.
- Internally posted with the licensed capacity.
- Shall ONLY contain high explosives and blasting agents.
- Designated and signposted “No Smoking – No Naked Lights” and any other signs as required by Regulations and Standards.
- Mounded when required with the mounding to be at least 1.5 metres thick and 1 metre higher than the stored explosives within the magazine.

#### Special Precautions

- Explosives shall only be stacked in approved containers to a height of 2 metres without blocking vents.
- Detonators, detonating relay connectors and delay connectors shall be stored in a separate magazine.
- Quantities up to and exceeding 5,000 detonators require a magazine of construction and security at least equal to an explosives magazine.

The detonator magazine shall be 15 metres from the main magazine for up to 5,000 detonators and 30 metres from the main magazine for in excess of 5,000 detonators. Regulations for the storage of less than 1,000 apply in some States.

#### Fire Protection

There shall be no naked light nor any implement capable of creating a spark or a naked light within 20 metres of a magazine.

No hot work shall be carried out within 20 metres of a magazine.

All storage areas shall be kept clean and tidy.

### 3.5 Storage of Other Hazardous Chemical Products and Substances

#### Chemical Stores

Other chemical products and substances shall be stored in accordance with:

- Their ADG Code Class.
- Their ADG Code Packaging Group.
- Their compatibility or otherwise with the other chemical products and substances in the store as indicated by the Guidance for Storage Chart.

Oxidising agents shall be stored and handled in compliance with AS4326-2008. These stores shall be:

- Located to protect the chemical products and substances containers from physical damage, interference, excessive heat and any source of ignition.
- Well ventilated with vents protected from blockage by debris or other containers.
- Situated to allow for easy, rapid access and egress in the event of emergency.
- Designated and signposted “No Smoking – No Naked Lights” and furnished with placarding and signs as required by Regulations.
- Constructed from non-combustible materials.
- Located away from flammable or combustible liquids storage areas and compressed and flammable gases storage areas, and storage of other incompatible materials.
- Provided with flame proof lighting as required.
- Bunded where applicable.

#### **Fire Protection**

Fire protective equipment of the appropriate type shall be installed in chemical stores in proportion to:

- The floor area.
- The nature and the aggregate quantity of all chemical products and substances in the store.

As required by the relevant statutory regulations, no hot work shall be carried out in a chemical store unless a Hot Work Permit has been completed and all necessary precautions have been considered and the appropriate action taken.

#### **Placarding**

Placards are required in stores for hazardous substances and products to:

- Alert people to the presence of such substances and products.
- Identify the categories of hazardous substances stored and, in certain circumstances, the individual hazardous substances.
- Indicate required emergency actions and contacts.

All stores for chemical products and substances shall be placarded if the aggregate of each category of hazardous substance exceeds specified exemption limits. Exemption limits are given for each Dangerous Goods Class and Packaging Group as determined by their ADG Code. High hazardous substances of Packaging Group 1 (PGI) have lower exemption limits than Packaging Group 2 (PGII) or Packaging Group 3 (PGIII).

***There is no exemption for Class 6.2 – Infections Substances or for Class 1 – Explosives. All storage and placarding requirements for explosives are covered by Explosives Regulations 1963.***

#### **Placarding Requirements and Description**

If, at premises containing one or more stores, the aggregate quantity of a hazardous substance on the premises is greater than its exemption limit, then placarding is required. Where placarding is necessary, the entrance to the premises shall have an “outer warning placard”.

#### **Single Storage**

Single storage placarding shall include:

- The Hazchem Code.
- The Dangerous Goods Class label.

### Mixed Storage

Mixed storage placarding shall include:

- The derived Hazchem Code (see ADG Code).
- The Dangerous Goods Class label in accordance with AS1216-1995, for each class of Hazardous substance stored, provided the aggregate quantity of each is more than 10% of its exemption limit.

### Tank or Bulk Storage

Tank or Bulk Storage placarding shall be placed on or near the Tank or Bulk Store so it is clearly visible from all directions of approach and shall include:

- The correct technical name of the products or substance.
- The UN Number.
- The Hazchem Code.
- The Dangerous Goods Class label and, where necessary, the “Subsidiary Risk” Dangerous Goods Class label in accordance with AS1216-1995.

**Note:** *Dangerous Goods Class 9 have no pictorial class label in some States and the words “Class 9” shall be written in red. Definitions of Class 9 differ in some States and the appropriate State authority should be consulted. Class 9 goods are regarded as Packaging Group III.*

## 4. Hazchem emergency action code

The Hazchem emergency action code consists of a numeral followed by one or more letters, some of which may be characterised by being displayed on a dark rectangle to indicate a special application for protective equipment.

Refer to “Labelling Examples and Explanations”.

### 4.1 Interpretation

The numeral indicates fire equipment suitable for fire fighting and, where appropriate, for dispersing spillage:

- Water jets.
- Water fog (if available fine water spray may be used).
- Foam.
- Dry agent (for substances where contact with water is hazardous).

The first alpha character indicates the following:

- Danger of violent reaction or explosion.
- The PPE requirements.
- What measures are to be employed in the event of spillage.

A second alpha character, the letter “E” is added when “Evacuation” of people from the neighbourhood of an incident should be considered in the emergency. Actual evacuation is a matter of decision after taking into account all relevant factors.

#### HAZCHEM CODE “FIRST ALPHA CHARACTER” REFERENCE

Letter	Danger of Violent Reaction/Explosion	PPE and Breathing Apparatus	Appropriate Measure
<b>P</b>	Yes	Full protective clothing	<b>Dilute</b>
<b>R</b>	No	Full protective clothing	<b>Dilute</b>
<b>S</b>	Yes	Breathing Apparatus	<b>Dilute</b>



<b>T</b>	No	Breathing App-fire only	<b>Dilute</b>
<b>W</b>	Yes	Full protective clothing	<b>Contain</b>
<b>X</b>	No	Full protective clothing	<b>Contain</b>
<b>Y</b>	Yes	Breathing Apparatus	<b>Contain</b>
<b>Z</b>	No	Breathing App-fire only	<b>Contain</b>

**Note:**

***Full protective clothing includes breathing apparatus.***

***Where breathing apparatus is indicated, protective gloves shall be worn.***

***“Dilute” indicates that the substance may be washed away with large quantities of water.***

***“Contain” indicates the need to prevent any spillage from entering drains, water courses, water reservoirs.***

## **5. Emergency Notes**

### **5.1 General**

This section is not intended as a First Aid manual nor as an Emergency procedures document.

The best remedy for hazardous substance accidents is to prevent their occurrence by using safer alternatives whenever possible. However, when hazardous substances must be introduced to a site, personnel responsible for First Aid should be made fully aware of the nature of the material, the area and manner of use, the hazards involved and the appropriate First Aid required for each type of possible injury.

### **5.2 Medical Assistance**

With any case of poisoning, regardless of the route of entry, medical assistance should be requested immediately.

### **5.3 Inappropriate First Aid**

Untrained personnel must not be allowed to provide First Aid other than making the casualty safe and as comfortable as possible until appropriately trained assistance is available. Certain actions in certain circumstances can cause further injury or even death.

### **5.4 Protecting the Rescuer**

Rescuers should always ensure that the accident area is safe before entering. They must also ensure that the appropriate protective equipment is worn. There have been many tragedies multiplied by well-meaning workers rushing unprotected into dangerous atmospheres in futile rescue attempts.

### **5.5 Emergency Equipment**

At any site where hazardous substances are used, appropriate emergency equipment should be close at hand, clear of potential hazard areas, easily identified and well maintained.

Safety showers and emergency eye wash fountains are essential wherever caustic, corrosive or severely irritating chemicals are used regularly. When chemicals with potential for eye injury must be used on a site remote from facilities, portable eye wash packs should be carried as part of the First Aid Kit.

Where employees work in dangerous atmospheres which require the wearing of breathing apparatus, they must NOT work unobserved and rescue breathing apparatus should be stationed outside the area and the appropriate employees trained regularly in its use, care and storage.

In the event of caustic or corrosive chemical splashes, the prime requirement is to wash the chemical off with water. In some cases, it is often more effective to remove contaminated clothing while the victim is under the emergency shower.

## 5.6 Poisoning

There are three main routes of absorbing a chemical substance into the body:

- Ingestion.
- Skin absorption.
- Inhalation.

Each route of absorption carries with it a specific First Aid treatment which varies from one chemical to the next. All cases of poisoning require qualified medical attention – effective medical attention requires detailed information on the substance/s involved. Consult the relevant MSDS for specific information.

### Ingestion

Poisoning via ingestion in industry is now relatively rare. Poor hygiene however, can lead to inadvertent ingestion. Some cases of lead and mercury poisoning have been traced to this method of entry into the body.

### Skin Absorption

This route of entry is more insidious than ingestion because it is not easily noticed and products that can be absorbed through the skin are widespread in industry. The outer skin, or epidermis, provides a good barrier against intrusion into the body of most substances. However, some chemicals e.g. amides, amines, phenols and some chlorinated hydrocarbons, are capable of penetrating the skin. Any damage to the skin, whether by physical abrasion, corrosive chemical attack or removal of lipids (fats) by solvents, will facilitate absorption of toxins.

### Inhalation

Inhalation is an even more general hazard than ingestion or skin absorption because no physical contact is required. Chemical products can be inhaled in the form of gases, vapours, mists, fumes and dusts. Once inhaled into the lungs, they pass quickly into the blood stream and reach vital organs. Some products e.g. resins and polymers, which are relatively inert and non-toxic under normal conditions, may decompose on heating or machining to form highly toxic by-products that can be inhaled.

## 6. Additional Statutory and Company Requirements

### 6.1 Employer's Duties

- An employer shall ensure that an MSDS is obtained or produced for all hazardous substances stored or handled at the workplace and are readily available to all employees.
- When a hazardous substance is first supplied to a workplace, the employer shall advise all relevant employees of the requirements for storing, handling and using the substance.
- An employer shall ensure that all hazardous substances are identified with a product name so that the corresponding MSDS can be identified.
- An employer shall ensure that all containers of hazardous substances stored or handled at the workplace, including those substances which are produced within the workplace,

are labelled in accordance with the requirements of the NOHSC's Guidance Note for the Labelling of Hazardous Substances Used at Work.

- The employer shall ensure that all containers of decanted hazardous substances (other than those containers of which the contents and the containers will be consumed and disposed of within a single shift), are labelled in accordance with the national guidelines.
- Where a hazardous substance at a workplace is contained in or transferred in a pipe, or piping system, a process or reaction vessel or a tank car, tank truck, car, conveyor belt or similar conveyance, the employer shall ensure that the container or conveyance is identified by a colour code in accordance with AS1345-1995, "Identification of the Contents of Piping, Conduits and Ducts".

## 6.2 Employee's Duties

All employees working with or near hazardous substances need to maintain safe work practices so that their health and safety, that of other persons working with them and also members of the public likely to be exposed are not affected.

Employees should be aware of and understand all aspects of Hazardous Substances procedures to control the use, storage and handling of workplace chemical products and substances.

Employees should therefore:

- Participate in required training programmes.
- Participate with the employer in the development of any methods of work and control by contribution of any relevant information.
- Co-operate with the employer in the assessment process.
- Use the engineering control measures such as air extraction systems within the plant or as provided for any particular process.
- Follow directions set out in administrative control measures.
- Correctly use and/or wear PPE that is provided.
- Store PPE, when not in use, in the correct manner and location.
- Remove from their person any PPE which may be covered with or contain hazardous substances, prior to eating, drinking, smoking or using ablutions to reduce the risk of poisoning by inhalation, ingestion or absorption.
- Exercise a high standard of personal hygiene for reasons aforementioned.
- Co-operate with their employers in conducting appropriate air monitoring and health surveillance.
- Promptly report to their supervisor any defects in a control measure, device or facility, any label or any item of PPE which may affect the successful implementation of this Code of Practice.

## 6.3 Consignment Records

The employer shall ensure that records of consignment of hazardous substances are kept and retained in the workplace. Information should include:

- The name of every person to whom goods were consigned.
- The address to which goods were consigned.
- The date on which the goods were consigned.
- Details of the substance and quantity of goods consigned from the workplace.

## 7. Appendices

### 7.1 Definitions

ACGIH	American Conference of government Industrial Hygienists.
Acute Toxicity	Toxic by single exposure with an effect which occurs immediately or shortly after
ADG CODE	Australian Code for the Transport of Dangerous Goods by Road or Rail
ADG CLASS	The number assigned to dangerous goods which exhibits a common or single most significant risk determined from the criteria in Section 2 of the ADG Code
Assessment Report	Means a written record and includes any assessment on the risk to health and safety of any person from using or storing a hazardous substance and any assessment of the placarding requirements. The term includes results from any atmospheric monitoring or health surveillance identified from the assessment
Bulk Storage	Means the storage of: (a) Any Class 2 dangerous goods in a container having a capacity in excess of 500 litres; or (b) Any liquid hazardous substance, other than Class 2 dangerous goods, in a container having a capacity in excess of 250 litres; or (c) Any solid hazardous substance stored in a container, in a quantity in excess of 400 kilograms
Carcinogenic	A substance or agent which produces or incites cancerous growth
Class Label	A specific label which diagrammatically describes the hazard associated with a particular class of hazardous substance
Exposure Standards	Exposure standards (or base criteria) refer to airborne concentrations of individual chemical substances which, according to current knowledge, should neither impair the health of nor cause undue discomfort to nearly all workers, based on exposure over an eight hour day, five days per week throughout a normal working life. In Australia, exposure standards are published as a Guidance Note by NOHSC and therefore must only be used as a guideline by Company personnel. The approach taken is based on those standards used by ACGIH
Flash Point	Flash point is the lowest temperature at which, under special test conditions, a liquid gives off enough vapour to form an ignitable mixture with air and produce flame when a source of ignition is present
Hazardous Substance	Any substance which has the potential though being used at work to harm the health or safety of persons in the workplace and includes substances which can be generated in the workplace (e.g. fumes from welding rods)
IARC	International Agency for Research of Cancer

Incompatible Substances	Means those dangerous goods which must be segregated during transport and storage and combinations of such dangerous goods as described in Section 7 of the ADG Code
LC50	The concentration of a substance in the air breathed which results in the death of 50% of the test population i.e. mg/L
LD50	The dose of a substance which results in the death for 50% of the test population by either ingestion or skin absorption. The mode of entry is specified and the dose is quoted as milligrams or grams of substance per kilogram of body weight i.e. mg/Kg or g/Kg
LDLO	Lowest published lethal concentration
Mixed Store	Stores where material or either more than one packaging group or hazardous substance or more than one hazardous substance class are permitted to be stored together
MSDS	Material Safety Data Sheet
Mutagenic	Inducing genetic mutation
National Commission also HOHSD	National Occupational Health and Safety Commission
National Exposure Standard	Means an exposure standard stated in the NOHSC's "Exposure Standards for Atmospheric Contaminants in the Occupational Environment – Guidance Note and National Exposure Standards"
NH & MRC	National Health and Medical Research Council
NTP	US National Toxicology Programme
Packaging Group	Division of dangerous goods into three groups in decreasing order of hazard i.e. PG I (great danger), PG II (medium danger), PG III (minor danger)
Summary Report	Means a report defined in the Industrial Chemicals (Notification and Assessment) Act 1989 – Commonwealth
Tank	Means a container having a liquid capacity equal to or greater than 250 litres
TC50	A concentration of a substance that produces a toxic response in 50% of the test population on inhalation for a short period of time
TD50	A dose of a substance that produces a toxic effect in 50% of the test population, expressed in milligrams per kilogram of body weight (mg/Kg)
Teratogenic	Tending to produce anomalies of formation in foetus
Toxic Effect	This refers to the harmful effect of a substance on some biological organisms. There are two types: <b>Local Effect</b> – The action takes place at the point or area of contact – it may be the skin, mucous membranes of the eyes, nose, mouth, throat or anywhere along the respiratory tract or gastrointestinal system depending on the body area exposed. Absorption does not necessarily occur. <b>Systemic Effect</b> – This term refers to a site of action other than the point of contact and pre-supposes that absorption has occurred. It is possible, however, for toxic agents to be absorbed through a channel (skin, lungs or intestinal canal) and produce later



	manifestations on one of those channels which are not a result of the original direct contact. Therefore, it is possible for some agents to produce harmful effects on a single organ or tissue as a result of both “local” and “systematic” actions.
Toxicity Scale	<p><b>Low</b> – causes readily reversible tissue changes which disappear after exposure stops. It may cause some discomfort.</p> <p><b>Moderate</b> – may cause reversible or irreversible changes to exposed tissue, not permanent injury or death. It may cause considerable discomfort.</p> <p><b>High</b> – capable of causing death or permanent injury due to exposures of normal use. It can be incapacitating and poisonous and requires special handling.</p>
UN Number	A system of four digit numbers assigned by the UN Committee of Experts on the transport of Dangerous Goods and may be applied to a single substance or a group of substances with similar characteristics
WHO	World Health Organisation

## 7.2 Determination and Classification of Hazardous Substances

The criteria for the determination of a hazardous substance is categorised into the following parts:

### **PART A** Hazardous Substances Criteria

#### **PART B1** Health Effects Criteria

And

#### **PART B2** Physiochemical Properties Criteria

### **PART C** Concentration Cut-off Levels

All materials, products and substances shall be considered hazardous until proven otherwise by the application of the following criteria. When proven hazardous, a MSDS is required.

### **PART A**

A substance is considered hazardous if it:

- Is included in the Consolidate List of Hazardous Substances.
- Has a biological exposure index determined by the NOHSC.
- Has been specified by the NOHSC to be a hazardous substance.

The Consolidated List of Hazardous Substances is compiled from substances specified in:

- Australian Code for the Transport of Dangerous Goods by Road and Rail.
- Standard for the Uniform Scheduling of Drugs and Poisons – No. 5.
- Poisons Regulations in any Australian State or Territory.
- IARC list of carcinogenic substances.
- NTP list of carcinogenic substances.
- Exposure Standards for Atmospheric Contaminants in the Occupational Environment.

**PART B1**

Health effects criteria should be applied to:

- Mixtures tested as a whole substance.
- Ingredients of mixtures not tested as a whole substance.
- Pure substances which are not listed in the Consolidated List of Hazardous Substances or which do not meet the criteria as defined for Part A.

Table H1 is a summary of the Health Effects Criteria from “Worksafe Australia”.

**TABLE H1 – HEALTH EFFECTS CRITERIA**

	Very Toxic	Toxic	Harmful
<b>Acute Lethal Effects</b>			
Oral LD50 (mg/Kg)	<25	25-200	00-2,000
Dermal LD50 (mg/Kg)	<50	50-400	400-2,000
Inhalation LC50 (mg/L/4 hour)	<0.25	0.25-1	1-5
<b>Non-Lethal Irreversible Effects after a Single Exposure</b>			
Oral TD50 (mg/Kg)	<25	25-200	200-2,000
Dermal TD50 (mg/Kg)	<50	50-400	400-2,000
Inhalation TC50 (mg/L/4 hour)	<0.25	0.25-1	1-5
<b>Severe Effects after Repeated or Prolonged Exposure</b>			
Oral (mg/Kg)		*	<50
Dermal (mg/Kg)		*	<100
Inhalation (mg/L/6 hour/day)		*	<0.5

*Toxic classification levels to be obtained from Worksafe Australia.*

**Irritancy (Skin Contact)**

Substances classified in scientific literature as slight (mild), moderate or severe, or for pure substances/mixtures tested as a whole.

**Irritancy (Eyes)**

Substances cited in scientific literature as an eye irritant or for pure substances/mixtures tested as a whole.

**Irritancy (Inhalation)**

Substances cited in scientific literature as known to cause irritation to the respiratory system or for pure substances/mixtures tested as a whole.

**Sensitisation (Skin or Inhalation)**

Substances cited in scientific and known sensitisers or for pure substances/mixtures tested as a whole.

**Carcinogenic Effects**

Carcinogenic substances are classified as follows:

- |            |                                               |
|------------|-----------------------------------------------|
| Category 1 | Known to be carcinogenic to humans.           |
| Category 2 | Should be regarded as carcinogenic to humans. |
| Category 3 | Possibly carcinogenic to humans.              |

### Mutagenic Effects

Mutagenic substances are classified as follows:

- Category 1                      Known to be mutagenic to humans.
- Category 2                      Should be regarded as mutagenic to humans.
- Category 3                      Possibly mutagenic to humans.

### Teratogenic Effects

Teratogenic substances are classified as follows:

- Category 1                      Known to be teratogenic to humans.
- Category 2                      Should be regarded as teratogenic to humans.

## PART B2

The physiochemical properties criteria relates to the classification in the ADO Code based on relevant classes and sub-classes. The ADG Code classifies “dangerous goods” as follows:

- Class 1                      Explosives
- Class 2                      Gases (compressed, liquefied or dissolved under pressure)
  - 2.1                      Flammable gases.
  - 2.2                      Compressed gases, neither flammable or poisonous.
  - 2.3                      Poisonous gases.
- Class 3                      Flammable Liquids
  - 3.1                      Flammable liquids, flashpoint below 23oC.
  - 3.2                      Flammable liquids, flashpoint from 23oC to 61oC inclusive.
  - 3.3                      Combustible liquids, flashpoint from 61oC to 150oC inclusive.
  - 3.4                      Combustible liquids, flashpoint >150oC.
- Class 4                      Flammable Solids or Substances
  - 4.1                      Flammable solids.
  - 4.2                      Substances liable to spontaneous combustion.
  - 4.3                      Substances emitting flammable gases when wet.
- Class 5                      Oxidising Agents
  - 5.1                      Oxidising agents.
  - 5.2                      Oxidising peroxides.
- Class 6                      Poisonous (toxic) Substances
  - 6.1                      Poisonous (toxic) substances.
  - 6.2                      Infectious substances.
- Class 7                      Radioactive Substances
- Class 8                      Corrosives
- Class 9                      Miscellaneous Dangerous Substances

## PART C

Concentration cut-off level applies to mixtures or substances which contain at least one hazardous substance as an ingredient and for which sufficient health effects data is available on all ingredients.

A mixture satisfying any of the health effects criteria of Part B1 shall have Part C applied to the ingredients.

If, after applying Part C criteria to all the hazardous ingredients, their individual concentrations in the mixture are all below the levels prescribed for each health effect, the substance cannot be considered a hazardous substance by virtue of its overall health effects.

However, it may still be a hazardous substance due to the physiochemical properties of the mixture in accordance with the ADG Code.

Any substance which meets the criteria of Part B1 and Part B2, after applying the concentration levels of Part C, where applicable, is considered to be a hazardous substance.

**Note:** *Where an ingredient may be hazardous and there is insufficient health effects data available on the ingredient to classify it according to the health effects criteria of Part B1, then the mixture should be considered to be a hazardous substance if the ingredient is present in the mixture at a concentration of 1% w/w or greater. Further information is available from Worksafe Australia.*

Table H2 is a summary of the Concentration Cut-off levels applicable under Part C.

#### TABLE H2 – CONCENTRATION CUT-OFF LEVELS

% w/w of the hazardous ingredient in the mixture

	Very Toxic	Toxic	Harmful
<b>Acute Lethal Effects</b>			
Concentration	0.1	3	25
<b>Non-Lethal Irreversible Effects after a Single Exposure</b>			
Concentration	0.1	1	10
<b>Severe Effects after Repeated or Prolonged Exposure</b>			
Concentration	0.0	1	10

#### Concentration Cut-Off Level

Irritancy (Skin Contact)	20
Irritancy (Eye Contact)	20
Irritancy (Serious Eye Damage)	5
Irritancy (Inhalation)	20
Sensitisation (Skin or Inhalation)	1

	Category 1	Category 2	Category 3
<b>Carcinogenic Effects</b>	0.1	0.1	1
<b>Mutagenic Effects</b>	0.1	0.1	1
<b>Teratogenic Effects</b>	0.5	5	N/A
<b>Corrosivity</b>	<b>Group 1</b>	<b>Group 11</b>	<b>Group 111</b>
Concentration	1	5	5

FROM WORKSAFE AUSTRALIA GUIDANCE NOTES FOR DETERMINING AND CLASSIFYING A HAZARDOUS SUBSTANCE.

## Hazardous Substance Class Definitions

As discussed in Part B2, Appendix 2, “Determination and Classification of Hazardous Substances”, the ADG Code classifies “dangerous goods” into classes from Class 1 through to Class 9. Definitions and further qualification of these classes are as follows:

### Class 1 – EXPLOSIVES

Class 1 covers all explosive products except those which cannot be transported due to the extreme hazards of transportation and those where the greatest hazard is more appropriate to another Class. There are another five (5) classes within Class 1:

#### Class 1.1

Class 1.1 comprises products, materials and substances, such as powergel, detonating cord, detonators and ANFO, which have a mass explosion risk.

#### Class 1.2

Class 1.2 comprises items and substances which have a projection hazard but not a mass explosion hazard e.g. “practice grenades”.

#### Class 1.3

Class 1.3 comprises items and substances which have a fire hazard and a minor blast and/or a minor projection hazard but not a mass explosion hazard e.g. ammunition. Class 1.3 is comprised of items and substances which give rise to considerable radiant heat or which burn one after another and therefore produce minor blasts and/or projectiles.

#### Class 1.4

Class 1.4 comprises items and substances which present no significant hazards and only present a small risk of ignition or initiation during transport e.g. safety fuse.

#### Class 1.5

This class is comprised of items and substances which, while they have a mass explosion hazard, are so insensitive that little probability exists, under normal conditions of transport, for initiation or transition from burning to detonation e.g. bulk primer sensitive explosives.

### Class 2 – GASES

Gases are substances which are gaseous under atmospheric pressure at ordinary temperature and are:

- Contained under pressure as a gas or liquid.
- Dissolved under pressure.
- In deeply refrigerated pressurised liquid form.

For labelling purposes, gases are divided, depending on their properties, into either of 3 groups i.e. Flammable Gas, Non-Flammable Compressed Gas and Poison Gas.

#### Flammable Gas

Flammable gas is a gas which is readily ignited such as acetylene or LPG fuel gases.

#### Non-Flammable Compressed Gas

Non-flammable compressed gases will not burn but present a hazard as they are in a compressed state e.g. carbon dioxide, argon and nitrogen. Rupture or damage to the container could result in the sudden escape of the compressed gas.

#### Poison Gas

Poison gas is just that and presents a serious hazard to people and the environment should it escape e.g. chlorine.



**Class 3 – FLAMMABLE LIQUIDS**

Class 3 is comprised of any liquid or liquid containing solids in solution or suspension and which have a flashpoint up to and including 61°C, such as kerosene. It is further defined into highly flammable liquids (Class 3(a)) and flammable liquids (Class 3(b)).

**Class 3(a) – Highly Flammable Liquids**

Have a flashpoint less than 23°C e.g. paint.

**Class 3(b) – Flammable Liquids**

Have a flashpoint not less than 23°C and up to and including 61°C e.g. paint thinners, kerosene.

**Class 4 – FLAMMABLE SOLIDS**

Class 4 comprises flammable solid substances which will burn in certain conditions e.g. lead phosphate, with Class 4 further defined into the following 3 categories:

**Class 4.1 – Flammable Solids**

Solids, other than explosives, which are easily ignited by external sources.

**Class 4.2 – Spontaneously Combustible**

Either solids or liquids with the ability to heat and ignite without the application of fire.

**Class 4.3 – Dangerous When Wet**

Either solids or liquids which, when in contact with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

**Class 5 – OXIDISERS AND ORGANIC PEROXIDES**

This Class is comprised of materials which, although not necessarily combustible themselves, may cause combustion in other materials and may also intensify a fire by supplying oxygen. Class 5 materials are further defined into 2 categories.

**Class 5.1 – Oxidising Agents**

All oxidizing substances, other than organic peroxide e.g. nitrates, hydrogen peroxide, metallic peroxides.

**Class 5.2 – Organic Peroxides**

All organic peroxides.

**Class 6 – TOXIC SUBSTANCES**

Class 6 covers all poisonous, toxic and infectious substances and is sub-divided into another 3 categories.

**Class 6.1 – Harmful**

Represents substances presenting a relatively low poisoning hazard and must be stored away from foodstuffs.

**Class 6.2 – Poison**

Represents substances presenting a serious to very serious poisoning risk and therefore a high degree of hazard.

**Class 6.3 – Infectious Substances**

Represents substances containing viable micro-organisms or their toxins and are known or suspected to cause disease in humans and animals.

**Class 7 – RADIOACTIVE SUBSTANCES**

Class 7 covers radioactive substances which have a specific radioactivity greater than 100 becquerels/gram with that criteria established by the International Atomic Energy Agency.

A radiation density gauge measures the pulp density of slurry passing through a cyclone feed pipeline in a treatment plant and this gauge contains a small amount of radioactive caesium-137 enclosed in a lead shielded steel “body”.

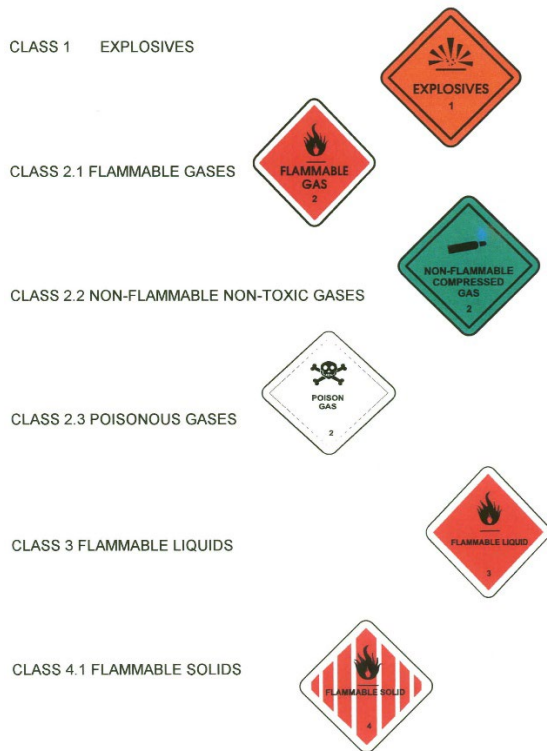
**Class 8 – CORROSIVES**

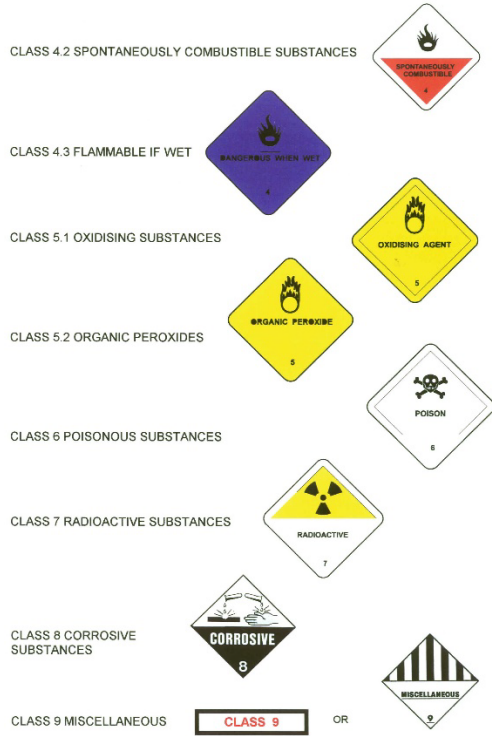
Substances such as sulphuric acid or sodium hydroxide (caustic soda) which cause severe damage to living tissues and other materials are classified as corrosive. They may also cause other hazards indirectly.

**Class 9 – MISCELLANEOUS HAZARDS**

Class 9 represents materials, items or substances which represent a transport hazard and are not otherwise covered by another Class.

**7.3 Labelling Examples and Explanations**





EXAMPLE OF HAZCHEM NUMERIC AND ALPHA CHARACTERS

AND

HAZCHEM SCALE FOR FIRE AND/OR SPILLAGE

SUBSTANCE PLACARD (PETROL)



- "1" - Water Jets
- "2" - Water Fog (for fine spray)
- "3" - Foam
- "4" - Dry Agent (where contact with water is dangerous)

The letter "E" is added to the Hazchem Code when evacuation of persons from the area should be considered as a necessary precaution.

P	V	FULL	D
R		FULL	I
S	V	BA	L
S	V	BA for FIRE only	U
T		BA	T
T		BA for FIRE only	E

W	V	FULL	C
X		FULL	O
Y	V	BA	T
Y	V	BA for FIRE only	A
Z		BA	I
Z		BA for FIRE only	N

V	Can be violently or explosively reactive
FULL	Full body protective clothing plus BA
BA	Breathing apparatus plus protective gloves
DILUTE	May be washed away to drain with large quantities of water
CONTAIN	Prevent, by any means available, spillage from entering drains or water courses

### A3 Environmental Commitments

#### Environmental Impact Assessment Commitments

This section provides information on the performance of the Project against the voluntary commitments nominated in the draft EIS and the Supplement Report. As construction works were delayed from 2021 and no construction or operational works under the original MMP have commenced many performance results are not yet available.

#### Draft EIS

Commitment	MMP Section	Performance against Commitment
<b>Terrestrial Flora</b>		
The Biodiversity Management Plan will be updated following formal assessment of the EIS by the NT EPA, and by Department of Mines and Energy through the mine authorisation process.	EM Plan	The Biodiversity Management Plan has been updated in accordance with recommendations on the draft EIS and in accordance with the NT EPA Assessment Report
Design of the new mine infrastructure avoids clearing of threatened flora species located in the Project area ( <i>S. rigens</i> and <i>E. cordatisepala</i> ) according to the Biodiversity Management Plan (Section 11.6) and Mine Closure Plan Voluntary Offset Strategy (Section 11) will be implemented.	Biodiversity Management Plan	Where possible, mine design has taken into consideration the locations of these species. A Voluntary Offset Strategy has been included
Ensure there is an appropriately qualified Environmental Officer on-site.	Sections 1 and 2.3	Environmental personnel will be employed prior to the commencement of construction activities.
The majority of the new infrastructure will be located within the existing infrastructure footprint.		Approximately 173 hectares of the 534 hectares of proposed disturbance will be within the historic disturbance footprint.
Future works on Jervois Dam will consider nearby <i>S. rigens</i> and avoid impacts to the species.	Biodiversity Management Plan	Management strategies are provided for this species.
Land clearing will be undertaken in accordance with site Clearing Procedures to ensure clearing is minimised and is conducted within defined boundaries.	Biodiversity Management Plan	The Biodiversity Management Plan contains a vegetation clearing protocol and permit process which will be implemented when construction commences.
Demarcation of exclusion zones to protect areas of vegetation to be retained prior to clearing.	Biodiversity Management Plan	To be completed prior to any clearing works when construction commences.

Commitment	MMP Section	Performance against Commitment
Implementation of measures to retain mature trees or habitat trees where possible.	Biodiversity Management Plan	To be completed prior to any clearing works when construction commences.
Salvage hollow logs, rocks and large debris removed by construction will be used for habitat enhancement in areas for rehabilitation.	Biodiversity Management Plan	To be completed prior to any clearing works when construction commences.
Collection of native seed from the Project area for use in the rehabilitation program as well as for revegetation.	Biodiversity Management Plan	To be completed prior to any clearing works when construction commences.
Progressive rehabilitation of the Project area.	Biodiversity Management Plan/MRCP	To be completed prior to any clearing works when construction commences and as areas become available.
Offset for clearing of regionally exceptional vegetation communities, such as the Mature bloodwood and ironwood community.	Biodiversity Management Plan	A Voluntary Offset Strategy has been included.
Speed restrictions on haul roads will be used to lessen the impact of dust on specimens of <i>E. cordatisepala</i> located near roads.	Biodiversity Management Plan	To be enforced when construction commences and haul roads are in use.
Flagging of any areas of vegetation containing threatened flora species in or directly adjacent to the Project area as an exclusion area prior to works commencing.	Biodiversity Management Plan	To date no threatened flora species have been found on site. The near threatened <i>E. cordatisepala</i> at location J06 was flagged off in July 2021 to avoid potential disturbance from exploration surveying activities. The remainder of the areas containing <i>E. cordatisepala</i> will be flagged off prior to any works being conducted at these locations (J02, J04, J14, P03, P05). The patch of <i>S. rigens</i> at survey site J03 will also be flagged off prior to any works occurring in the area.
Collection of seed from mature individuals prior to clearing.	Biodiversity Management Plan	To be completed prior to any clearing works when construction commences.
Employees and contractors will be required to participate in an environmental induction program. The program will provide	Section 5/EM Plan	Full environmental induction to be provided to construction and site personnel when construction commences.



Commitment	MMP Section	Performance against Commitment
information on employee environmental responsibilities as well as threatened flora.		
Clearing of vegetation to be restricted to the minimum required to enable the safe construction, operation and maintenance of the Project, including infrastructure corridors.	Biodiversity Management Plan	No vegetation has been cleared due to the delay to the construction timetable.
Weed surveys and implementation of control programs for weeds of significance.	Biodiversity Management Plan	Jervois Operations site personnel inspect for the weeds listed in the Biodiversity Management Plan and control as necessary. Extensive weed surveys and control programs to commence when Jervois Operations has the personnel and equipment on site.
Prioritisation of treatment of weed infestations or weed species and ongoing treatment regimens (as necessary).	Biodiversity Management Plan	Jervois Operations site personnel inspect for the weeds listed in the Biodiversity Management Plan and control as necessary. Intensive weed treatment to commence when Jervois Operations has the personnel and equipment on site.
Appropriate disposal of weed material to prevent further spread.	Biodiversity Management Plan	The weed management practices provided in the Biodiversity Management Plan will be fully implemented when construction commences and there are personnel and equipment on site.
Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the project area.	Biodiversity Management Plan	A full equipment hygiene system will be introduced when there are personnel and equipment on site to achieve this.
Stage clearing and construction activities to minimise area of exposed ground.	Biodiversity Management Plan	Clearing for construction scheduled to commence in 2024. The Biodiversity Management Plan contains a vegetation clearing protocol and permit process
Vegetation clearing / excavation to be subject to internal permitting system.	Biodiversity Management Plan	Clearing and excavation for construction scheduled to commence in 2024. The Biodiversity Management Plan contains a vegetation clearing protocol and permit process

Commitment	MMP Section	Performance against Commitment
<p>Providing appropriate buffer distances between the Project area and surrounding bushland and managing vegetation within the buffer areas to maintain safe fuel loads.</p>	<p>Bushfire Management Plan</p>	<p>Buffers to be considered when construction of infrastructure commences.</p>
<p>Establishing and maintaining a complaints management system for nearby landholders.</p>	<p>SIMP</p>	<p>The SIMP contains a process to report and address complaints. All nearby landholders have contact details for Jervois Operations personnel should they need to make a complaint. To date no formal complaints have been received, site personnel are in regular contact with the landholders from Lucy Creek and Jervois stations.</p>
<p>Limiting vehicle speeds on unsealed haul roads to reduce dust generation.</p>	<p>Dust Management Plan</p>	<p>No haul roads have yet been constructed as mining has not commenced. Current speed limits on site are 45 km/hr for all vehicles on the EL and 10 km/hr in and around the camp, construction sites, drill rigs, pits and plant sites.</p>
<p>The surface water management design to incorporate the following components to control the discharge of run-off and sediment from the Project:</p> <ul style="list-style-type: none"> <li>• Raising of the existing Jervois Dam by approximately 1.5 m and buttressing of the downstream slope;</li> <li>• Backfilling the existing Jervois Dam spillway;</li> <li>• Construction of a new spillway to the south of the main Jervois Dam embankment;</li> <li>• Construction of a diversion bund to the west of the proposed Marshall / Reward waste dump;</li> <li>• Construction of a diversion channel to the east of the eastern perimeter of the TSF to divert water towards the catchment to the south;</li> </ul>	<p>Water Management Plan</p>	<p>This information is contained in the Water Management Plan. None of these water management works have yet commenced on site.</p>

Commitment	MMP Section	Performance against Commitment
<ul style="list-style-type: none"> <li>• Construction of a bund between the eastern face of the Marshall / Reward waste dump and the western perimeter of the Marshall / Reward pit;</li> <li>• Construction of a diversion channel at the northern end of the Marshall / Reward pit;</li> <li>• Construction of two sediment control dams.</li> </ul>		
<p>The existing Jervois Dam will undergo repairs to minimise water losses and maximise water recovery.</p>	<p>Water Management Plan</p>	<p>Repairs on the Jervois Dam have not yet commenced.</p>
<p>Process water will be recycled from thickeners in the process plant and the decant water return from the TSF and topped up from raw water as required.</p>	<p>Water Management Plan</p>	<p>The process plant or TSF have not yet been constructed.</p>
<p>Provide for environmental flows (or base flow) in Unca Creek.</p>	<p>Water Management Plan</p>	<p>The Water Management Plan provides for environmental flows in Unca Creek.</p>
<p>Use of water is within the limits defined by any development approvals or conditions.</p>	<p>Water Management Plan</p>	<p>The Project has been granted water extraction licences under the Water Act – GEOR10338 licence to extract groundwater and 0071012 licence to extract surface water from the Jervois Dam.  Groundwater extraction has been well within the licence limits and to date no surface water has been extracted from the Jervois Dam.</p>
<p>The TSF will be designed in accordance with the ANCOLD “Guidelines on Tailings Dams”.</p>	<p>Section 4.3</p>	<p>Currently undergoing detailed design.</p>
<p>The TSF will be designed to withstand a 1 in 100 year 24 hour storm event in addition to maximum operating volumes.</p>	<p>Section 4.3</p>	<p>Currently undergoing detailed design.</p>
<p>Spills or exceedance of water quality parameters are to be reported to the Environmental Officer, who will take appropriate action.</p>	<p>Waste Management Plan/Biodiversity Management</p>	<p>As no works have commenced under the current MMP and the water management and other site infrastructure has not been constructed, there have been no spills or exceedances of water quality parameters.</p>

Commitment	MMP Section	Performance against Commitment
	Plan/Water Management Plan	
Develop Emergency Overflow Procedures to deal with contamination events.	Environmental Emergency Management Plan	Contained in the Environmental Emergency Management Plan.
<p>On closure of the facility, the tailings will be allowed to dry out and consolidate prior to rehabilitation of the top surface. Rehabilitation of the upper surface will involve:</p> <ul style="list-style-type: none"> <li>• Covering the tailings surface with inert waste rock or overburden;</li> <li>• Shaping the upper surface to most appropriately manage surface water;</li> <li>• Spreading of growth material on shaped surface;</li> <li>• Deep ripping on the contour to assist with water absorption and surface water control;</li> <li>• Application of local seed to ripped surfaces.</li> </ul>	MRCP	Not yet applicable.
Waste rock will be retained within underground voids and pits where possible to minimise the operational footprint requiring rehabilitation.	Section 4.4	Not yet applicable as construction or mining have not yet commenced.
<p>The overburden and waste rock landforms for each pit and underground mine will be rehabilitated. This will involve:</p> <ul style="list-style-type: none"> <li>• Shaping of dump slopes (batters) to shallow angles to control erosion, and appropriate drainage control measures. The exact slopes, top surface profile and drainage measures will be determined at the design stage taking into account waste characterisation, material availability and climatic conditions;</li> <li>• Re-spreading of topsoil on shaped surfaces;</li> <li>• Construction of low bunds at the crest of each batter to assist with surface water control on batters;</li> </ul>	MRCP	Not yet applicable as construction or mining have not yet commenced.

Commitment	MMP Section	Performance against Commitment
<ul style="list-style-type: none"> <li>• Deep ripping on the contour to assist with water management and minimisation of erosion;</li> <li>• Application of seed of local species.</li> </ul>		
<p>Ensure any chemicals used in the Project area are handled and disposed of in accordance with the relevant Safety Data Sheet.</p>	EM Plan	<p>Not yet applicable as the Process Plant, etc has not been constructed.</p> <p>The only chemicals currently used on site are those by the drilling contractors and the camp cleaners.</p>
<p>Ensure access tracks can be used for fire-fighting and other emergency purposes.</p>	Bushfire Management Plan	<p>Access tracks are suitable for use in emergencies.</p>
<p>Implement a Safety Management System and associated framework to record and monitor fire including:</p> <ul style="list-style-type: none"> <li>• incident management framework;</li> <li>• hazard / near miss reporting process;</li> <li>• incident notification; and</li> <li>• crisis management and evacuation framework.</li> </ul>	Bushfire Management Plan	<p>The current exploration works has a Safety Management System to address exploration activities being conducted under Authorisation 0666-01. This will be expanded to include site construction and mining activities under Authorisation 1061-01 prior to these works commencing.</p>
<p>Monitoring program to monitor health of retained vegetation and rehabilitated areas.</p>	Biodiversity Management Plan	<p>As construction has been delayed there have been no works conducted which have the potential to impact local vegetation communities. To commence in accordance with the Vegetation Health Monitoring Program when site works commence and Jervois Operations has the personnel and equipment on site to complete this.</p>
<p>Ongoing implementation and monitoring of offsets.</p>	Biodiversity Management Plan	<p>A Voluntary Offset Strategy and Vegetation Health Monitoring Program have been included in the Biodiversity Management Plan.</p> <p>Offsets will be implemented prior to clearing of significant vegetation communities identified in the Biodiversity Management Plan.</p> <p>Monitoring will commence when offset areas are required and identified.</p>



Commitment	MMP Section	Performance against Commitment
Monitoring of water quality in Unca Creek.	Section 6/Water Management Plan	Monitoring will commence in full when there are qualified staff and equipment on site to conduct monitoring
Monitoring of sediment dams.	Section 6/Water Management Plan	Due to the delay in construction, no sediment dams have yet been constructed.
Monitor the use of water and implement water restrictions, where possible.	Section 6/Water Management Plan	Water use is monitored monthly and there has been no need to implement restrictions.
Ongoing monitoring of the health of the <i>E. camaldulensis</i> riparian vegetation community.	Biodiversity Management Plan	To date no site works that have the potential to impact this riparian habitat have commenced on site. Monitoring to occur when construction/mining activities that have the potential to impact this species commences and Jervois Operations has the personnel and equipment on site to complete this monitoring.
Ongoing water quality monitoring program to assess continued compliance with development approvals and conditions.	Water Management Plan	Water extracted from bore J8 is monitored for volume and quality. The borefield has not yet been set up and water is not being extracted from any other bores nominated on licence GEOR10338. Sediment and other dams have not yet been constructed so monitoring has not commenced. Surface water extraction licence 0071012 was granted in July 2021 and no water has yet been extracted under this licence. Monitoring will commence in full when there are qualified staff and equipment on site to conduct monitoring
Monitoring to be upstream and downstream of release points, as well as at release point.	Water Management Plan	Water management infrastructure has not been constructed, no site works have commenced and no water has been released from the site.
Monitoring of water quality in sediment dams.	Water Management Plan	Sediment dams have not yet been constructed.

Commitment	MMP Section	Performance against Commitment
Maintenance of TSF in accordance with specifications.	Environmental Emergency Management Plan	The TSF has not yet been constructed.
Ongoing testing for contamination of soils surrounding TSF and waste rock storage facilities to detect seepage.	Water Management Plan/AMD Plan	The TSF and waste rock storage facilities have not yet been constructed.
<b>Terrestrial Environmental Quality</b>		
<p>The Erosion and Sediment Control Plan will be implemented and will include the following measures:</p> <ul style="list-style-type: none"> <li>• minimising disturbance footprints;</li> <li>• installation of erosion and sediment control measures prior to construction;</li> <li>• avoiding the clearing of new areas during the wet season;</li> <li>• rehabilitating progressively where practicable;</li> <li>• stripping topsoil from areas to be disturbed and reusing immediately or stockpiling where practicable;</li> <li>• controlling slope gradient;</li> <li>• constructing diversion channels to direct clean runoff around disturbed areas and into natural drainage lines;</li> <li>• providing sediment traps on major drainage channels from disturbed areas;</li> <li>• providing protection in drains (e.g. grass) where water velocity may cause scouring;</li> <li>• installation of sediment traps, silt fences and hay bales where necessary to control sediment movement;</li> <li>• regular inspection and maintenance of sediment control structures, particularly following rainfall events, to ensure their ongoing functionality;</li> </ul>	<p>ESCP MRCP Environmental Emergency Management Plan</p>	<p>The revised ESCP is currently under development in coordination with detailed mine design works and is being prepared by a suitably qualified professional. This ESCP will be available prior to construction works commencing.</p> <p>The site induction and OH&amp;S Plan for construction and operations will address spill clean up and emergency response measures.</p>

Commitment	MMP Section	Performance against Commitment
<ul style="list-style-type: none"> <li>• construction adequate bunds around potential contamination sources, to contain contaminated water in the event of heavy rainfall;</li> <li>• spill clean-up and emergency management procedures developed and implemented;</li> <li>• personnel to be trained in the use of spill kits and emergency response procedures;</li> <li>• providing optimal surface conditions to promote revegetation; and</li> <li>• revegetating final surfaces with fast establishing ground cover.</li> </ul>		
<p>Stripping and re-application schedules and stockpiling inventories will be included in a Topsoil Management Plan.</p>	MRCP	<p>Construction works have not yet commenced so no topsoil stripping has occurred. The Topsoil Management Plan will be developed in consultation with mining and construction contractors when the construction and mining schedules have been finalised.</p>
<p>Wherever practicable, recovered topsoil and subsoil will be spread directly onto disturbed areas that have been prepared for rehabilitation.</p>	MRCP	<p>Not yet applicable as no works have commenced on site. This will be included as an option in the Topsoil Management Plan.</p>
<p>Material will be stockpiled where direct spreading is not practicable. Soil stockpiles will be managed to improve long term viability of the soil resource through implementation of the following management practices:</p> <ul style="list-style-type: none"> <li>• soil stockpiles to be located outside of active mining areas;</li> <li>• stockpiles will be constructed with a rough surface to reduce erosion, improve drainage and promote revegetation;</li> <li>• inactive stockpiles will be fertilised and seeded to maintain soil structure, organic matter and microbial activity; and</li> </ul>	MRCP	<p>Not yet applicable as no works have commenced on site. This will be included in the Topsoil Management Plan.</p>

Commitment	MMP Section	Performance against Commitment
<ul style="list-style-type: none"> <li>soil stockpiles will be deep-ripped to establish aerobic conditions prior to re-use in rehabilitation.</li> </ul>		
<p>A Dust Management Plan will be developed and implemented. The Plan would include as a minimum, application of industry dust control measures including:</p> <ul style="list-style-type: none"> <li>Use of water sprays on haul roads, unsealed surfaces, covering of exposed loads where practicable and maintaining moisture levels in bulk loose construction materials;</li> <li>Reduced vehicle speeds;</li> <li>Minimise open areas exposed to wind erosion;</li> <li>Minimise time between stripping and construction/mining operations;</li> <li>Progressive reinstatement of waste rock and topsoil as construction works are completed;</li> <li>Ongoing dust deposition monitoring program.</li> </ul>	Dust Management Plan	A Dust Management Plan which includes these measures has been included in the EM Plan.
<p>A Mine Rehabilitation and Closure Plan (MRCP) will be prepared for the Project and submitted for approval by NTEPA. This plan will be implemented and will include the following:</p> <ul style="list-style-type: none"> <li>Areas not required for ongoing operations will be progressively rehabilitated.</li> <li>Locate and design landforms to be rehabilitated to optimise blending with the surrounding topography.</li> <li>Stockpile vegetative material and topsoil for later use.</li> <li>Topsoil stockpiled in a designated area away from drainage lines, to prevent erosion or runoff</li> <li>Revegetation with appropriate species, sourced locally where possible</li> <li>Annual monitoring of rehabilitation areas.</li> </ul>	MRCP	<p>The MRCP has been updated in accordance with feedback on the draft EIS and the NT EPA Assessment Report.</p> <p>In accordance with condition 26 of Authorisation 1061-01, the MRCP will be further refined and submitted within 12 months of Project commencement.</p>
<b>Terrestrial Fauna</b>		

Commitment	MMP Section	Performance against Commitment
Land clearing will be undertaken in accordance with site Clearing Procedures to ensure clearing is minimised and is conducted within defined boundaries.	Biodiversity Management Plan	As Project construction has been delayed, no land clearing has been undertaken.  The Biodiversity Management Plan contains a vegetation clearing protocol and permit process.
Ensure there is an appropriately qualified Environmental Officer on-site.	Sections 1 and 2.3	Environmental personnel will be employed when construction activities commence.
Vegetation clearing / excavation to be subject to internal permitting system.	Biodiversity Management Plan	No vegetation clearing or excavation works have commenced on site. The Biodiversity Management Plan contains a vegetation clearing protocol and permit process.
Staging of the works to manage habitat loss.	Biodiversity Management Plan	No construction or mining activities have commenced and there has been no habitat loss or need for staging of works.
Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing.	Biodiversity Management Plan	Areas of vegetation to be retained will be demarcated prior to any clearing works commencing.
Measures to retain mature trees or habitat trees where possible will be implemented.	Biodiversity Management Plan	The management strategies to retain mature or habitat trees outlined in the Biodiversity Management Plan will be implemented upon commencement of construction.
Salvage hollow logs, rocks and large debris removed by construction for habitat enhancement in areas for rehabilitation.	Biodiversity Management Plan	The management strategies to enhance habitats outlined in the Biodiversity Management Plan will be implemented upon commencement of rehabilitation activities.
Collection of native seed from the Project area for use in the rehabilitation program.	Biodiversity Management Plan	Seed collection will occur when Jervois Operations have appropriately qualified personnel on site.
Progressive rehabilitation of the Project area.	MRCP	As no works have commenced, no rehabilitation has occurred.
Offsets for clearing of regionally significant vegetation communities where relevant.	Biodiversity Management Plan	A Voluntary Offset Strategy has been included in the Biodiversity Management Plan and this will be implemented when works affect significant vegetation communities.
Implement any mitigation measures recommended within the Surface Water and Groundwater Management Plans.	Biodiversity Management Plan	These measures will be implemented when works commence on site.



Commitment	MMP Section	Performance against Commitment
Process water will be recycled from thickeners in the process plant and the decant water return from the TSF and topped up from raw water as required.	Water Management Plan	Not yet applicable as the process plant has not been constructed.
Provide for environmental flows (or base flow) in Unca Creek.	Water Management Plan	The Water Management Plan provides for environmental flows in Unca Creek.
Observe established buffer areas and no-go zones to avoid construction and mine activity within sensitive areas.	Biodiversity Management Plan	The Biodiversity Management Plan contains a vegetation clearing protocol and permit process to ensure these areas are avoided. This process will be implemented upon the commencement of construction works.
Ensure redirected portion of Unca Creek is rehabilitated to represent the riparian community and provide connectivity along Unca Creek to areas to the east.	MRCP	The detailed diversion design and MRCP contain guidance on the rehabilitation of Unca Creek. These will be implemented during the construction of the diversion.
Limit Project lighting.	Biodiversity Management Plan	Not yet applicable.
Where lighting is required, use directional lighting to reduce the spill over into surrounding areas.	Biodiversity Management Plan	Not yet applicable.
Blasting to be undertaken (if necessary) during the middle of the day when fauna movement is generally at its lowest.	Biodiversity Management Plan	Not yet applicable as no blasting has occurred.
To minimise noise from construction equipment, equipment to be where practicable the quietest available in existing stock, properly maintained, monitored to ensure noise emissions in accordance with manufacturer's specifications and Australian Standards, and fitted with noise suppression equipment consistent with the requirements of the activity.	Biodiversity Management Plan	Not yet applicable as there is no construction equipment on site.
Use lighting in buildings only as required, i.e. sensor lighting or switch off during non-operational hours.	Biodiversity Management Plan	Not yet applicable.
Provide offsets for the removal of areas of mature <i>Eucalyptus sp.</i> or <i>Corymbia sp.</i> that may provide nesting resources for large	Biodiversity Management Plan	A Voluntary Offset Strategy has been included in the Biodiversity Management Plan which addresses offsets for riparian vegetation which is considered significant.

Commitment	MMP Section	Performance against Commitment
parrots (such as Red-tailed black cockatoo) and feeding resources for Grey honeyeater.		
The existing Jervois Dam wall will undergo repairs to minimise water losses.	Water Management Plan	Not yet applicable as these repairs have not commenced.
Procedures to minimise the risk of imported soil being contaminated (biotic and abiotic).	Biodiversity Management Plan	The Biodiversity Management Plan contains equipment hygiene procedures to address the introduction of weeds via imported soil.
Ensure site waste management measures reduce the potential to attract vermin and other fauna.	Waste Management Plan	The Waste Management Plan contains management practices to address proper waste disposal and containment to avoid attracting pest fauna. The only waste currently generated on site is from the exploration camp. All waste is stored and disposed of to ensure vermin are not attracted to the accommodation camp and surrounds.
Any waste storage facilities associated with the Project to be designed and located to restrict fauna access.	Waste Management Plan	The Waste Management Plan contains management practices to address proper waste containment to restrict fauna access. Waste generated by the exploration camp is stored in lidded bins and containers to deter access by fauna.
Management of feral animals, particularly rabbits and cats.	Biodiversity Management Plan	The Biodiversity Management Plan contains procedures to address pest fauna species. These will be fully implemented when construction commences and Jervois Operations have equipment and appropriately qualified personnel on site.
Fauna, including pest species, will not be fed.	Biodiversity Management Plan	Staff are encouraged not to feed pest fauna species. The Biodiversity Management Plan states that pest fauna are not to be fed.
Implement weed management protocol to prevent degradation of remaining habitat areas and spread of feral animals into degraded areas	Biodiversity Management Plan	Jervois Operations site personnel inspect for the weeds listed in the Biodiversity Management Plan and control as necessary. Intensive weed management practices will commence when Jervois Operations has the personnel and equipment on site.

Commitment	MMP Section	Performance against Commitment
Staff, including contractors, to be inducted in relation to the risks of fauna injury and deaths and how to manage animals that are injured or displaced, including threatened species.	EM Plan	Full environmental induction to be provided to construction and site personnel when construction commences.
Environmental Officer to undertake detailed inspection of areas to be cleared, including hollow trees, immediately prior to clearing, and remove any native fauna prior to any area being cleared of vegetation. Any such fauna relocation to be in accordance with Biodiversity Management Plan / approved permit conditions.	Biodiversity Management Plan	Not yet applicable as construction clearing works have not commenced.
Where practical, retain hollow-bearing trees and large stags as potential nesting and roosting habitat, especially near watercourses and wetland areas.	Biodiversity Management Plan	Not yet applicable, to be implemented when construction clearing works commence.
Breeding places and trees containing hollows to be marked prior to construction and any fauna removed.	Biodiversity Management Plan	Not yet applicable, to be implemented when construction clearing works commence.
Stockpiling of cleared vegetation can provide habitat for native animals, particularly reptiles, echidnas and ground-dwelling mammals.	Biodiversity Management Plan	Not yet applicable, to be implemented when construction clearing works commence.
Appropriate signage in prominent positions to reduce vehicle speeds in the Project area, to promote awareness and to provide safety for fauna crossing or inhabiting the area.	Biodiversity Management Plan	Installation of signage included in Section 6.2.5 of the Biodiversity Management Plan. To be implemented when construction commences. Current vehicle speeds of 45 km/hr for all vehicles on the EL and 10 km/hr in and around the camp, construction sites, drill rigs, pits and plant sites will be adopted as appropriate.
Vehicular traffic generally to be restricted to access tracks and not to exceed speed restrictions	Biodiversity Management Plan	These measures are included in the Biodiversity Management Plan which will be implemented when construction commences.
Measures to minimise fauna entrapment in trenches or pits.	Biodiversity Management Plan	The Biodiversity Management Plan contains measures to manage fauna entrapment, including a Trench Inspection

Commitment	MMP Section	Performance against Commitment
		Procedure for the borefield pipeline construction phase which will be implemented when construction commences.
Record incidences of fauna mortality to inform future management.	Biodiversity Management Plan	The Biodiversity Management Plan includes a process for recording, review and analysis of native fauna injuries and deaths and their causes.
Design of tailings dams to follow best practice guidelines currently recommended for the Northern Territory.	MMP Section 4.3 Biodiversity Management Plan	The TSF is being designed following the ANCOLD “Guidelines on Tailings Dams”. The Biodiversity Management Plan includes a commitment to construct the tailings storage facility and the process water dam in accordance with approved design guidelines.
Reduce the attractiveness of the dam landscape for wildlife via design that includes, but is not limited to, the reduction of the dam surface area, removing dam bank vegetation, creating steep dam walls and avoiding the creation of islands in the dam.	Biodiversity Management Plan	First and foremost, the TSF will be constructed in accordance with best practice and ANCOLD guidelines to ensure the structure is stable. Where practical, these additional measures will be implemented to deter wildlife and fauna. The active tailings beach will be regularly rotated to promote de-watering of the tailings and volume minimisation of the supernatant pond. As vegetation on the banks may affect the stability of the TSF walls, it will be actively controlled.
Fencing off the tailings dams to prevent ground-dwelling fauna from accessing the water.		Fencing is not an option due to access for maintenance requirements.
Ongoing implementation and monitoring of offsets.	Biodiversity Management Plan	The Voluntary Offset Strategy in the Biodiversity Management Plan will be implemented when construction and operations commence. This Strategy contains provisions for monitoring and reporting.
Monitor Unca Creek riparian habitat and rehabilitation area.	MRCP/Biodiversity Management Plan	Monitoring will commence when construction and operations commence when Jervois Operations have the personnel on site to conduct/manage this monitoring.
Monitor the use of water and implement water restrictions, where possible.	Water Management Plan	Water use is continually monitored in accordance with the conditions of the groundwater extraction licence GEOR10338.

Commitment	MMP Section	Performance against Commitment
Ongoing monitoring of fauna species present in the Project area.	Biodiversity Management Plan	Monitoring will commence in accordance with the Biodiversity Management Plan when construction and operations commence when Jervois Operations have the personnel on site to conduct/manage this monitoring.
Ongoing monitoring of bird species utilising Jervois Dam	Biodiversity Management Plan	Monitoring will commence in accordance with the Biodiversity Management Plan when construction and operations commence when Jervois Operations have the personnel on site to conduct/manage this monitoring.
<b>Hydrological Processes</b>		
Implement the Water Management Plan which details a description of the water management and monitoring measures to address each of the Project impacts and maintain the effective operation of the control strategies	Water Management Plan	The Water Management Plan will be implemented when construction and operations commence.
Construction of low bunds at the crest of each batter to assist with surface water control on batters; <ul style="list-style-type: none"> <li>• Deep ripping on the contour to assist with water management and minimisation of erosion;</li> <li>• Shaping the upper surface to most appropriately manage surface water; and</li> <li>• Deep ripping on the contour to assist with water absorption and surface water control.</li> </ul>	MRCP	These measures will be implemented when rehabilitation commences.
The quality of water stored in each mine water storage will be sampled regularly as part of the proposed water quality monitoring program to identify trends in water quality over time, inform mine water management decisions and comply with the WDL.	Water Management Plan	When the water storage facilities are constructed, monitoring in accordance with the Water Management Plan will commence.
<b>Inland Waters Environmental Quality</b>		



Commitment	MMP Section	Performance against Commitment
Storage of diesel at the mine site in self-bunded tanks.	Water Management Plan	Storage of all hazardous materials will be accordance with AS1940 Storage and Handling of Flammable and Combustible Liquids At present there are only two diesel storage tanks on site, one 18,000 L tank and a 53,000 L tank. The larger tank is self bunded and the small tank is surrounded by an earthen bund.
Clean water will be diverted around the site.	Water Management Plan	The Water Management Plan has been designed to limit the quantity of surface water that is contaminated and minimise the likelihood of uncontrolled releases by and from the Project.
Groundwater monitoring.	Groundwater Management Plan	Currently the SWLs of the bores on EL25429 are monitored monthly. Water quality monitoring of bore J8 is also conducted monthly. Groundwater monitoring will fully commence in accordance with the Groundwater Management Plan when construction and operations commence when the Project has the potential to impact local groundwater resources and Jervois Operations have the personnel and equipment on site to conduct this monitoring.
<b>Air Quality and Greenhouse Gases</b>		
Unsealed internal roads traversed by vehicles associated with Jervois Mine will be watered as required. The rate of watering is increased during dry periods or during periods of high winds.	Dust Management Plan	Road watering will commence when construction and operations commence when the Project has the potential to generate excessive dust and Jervois Operations have the personnel and equipment on site.
Vehicular access within the site is strictly limited to authorised vehicles and designated routes.	Dust Management Plan/ Biodiversity Management Plan	Due to site safety requirements, only authorised vehicles will be permitted on site. Access will also be restricted to designated routes.
Dump truck routes will be kept as short as practicable.	Dust Management Plan	Not yet applicable as mining has not commenced and there are no dump trucks on site.

Commitment	MMP Section	Performance against Commitment
Vehicles (other than mining machinery) are not permitted on overburden dumps except for the purposes of planning, rehabilitation or monitoring.	Dust Management Plan	Not yet applicable as overburden dumps have not been constructed and there is no mining machinery on site.
Wet dust suppression measures in the form of high pressure, low volume water sprays are to be used for crushing plant, conveyors, screening plant and stockpiles.	Dust Management Plan	Not yet applicable as the process plant has not been constructed.
To minimise exposed material and associated dust generation progressive rehabilitation of mined areas will occur in accordance with the mine schedule to minimise exposed material and dust generation.	MRCP	Not yet applicable as mining or rehabilitation has not commenced.
Minimise drop heights into hoppers, onto stockpiles and into haul trucks.	Dust Management Plan	Not yet applicable as stockpiles and the process plant have not been constructed.
The Erosion and Sediment Control Plan will be finalised and implemented prior to the commencement of development.	ESCP	The revised ESCP is currently under development in coordination with detailed mine design works and is being prepared by a suitably qualified professional. This ESCP will be available prior to construction works commencing.
All milling and ore processing are to be completed using wet processes.	Dust Management Plan	Not yet applicable as the process plant has not been constructed.
Crushing and conveying equipment for dry material shall have dust controls.	Dust Management Plan	Not yet applicable as the process plant and associated infrastructure has not been constructed.
Burning of cleared vegetation will be limited and shall not occur during periods of high winds.	Bushfire Management Plan	Not yet applicable as no clearing activities for construction or operations has not commenced.
Rehabilitation will be performed in accordance with accepted industry best practice and conducted in accordance with an approved MMP.	MRCP	Not yet applicable as rehabilitation has not commenced.
Minimise use of air brakes in residential areas.	Traffic Management Plan	Not yet applicable as construction or operation of the Project has not commenced and does not have any heavy vehicles trafficking residential areas.

Commitment	MMP Section	Performance against Commitment
Air monitoring will be undertaken where necessary to further investigate a valid complaint, where standard mitigation strategies have not resolved the issues that resulted in the complaint, and at the request of the Administering Authority (NT EPA).	Dust Management Plan/EM Plan/SIMP	No complaints regarding dust or air quality have been received. Incident and complaints management processes have been included in the EM Plan and SIMP.
All monitoring will be completed by an appropriately qualified person, and all analysis completed by a NATA accredited laboratory.	Dust Management Plan	As no complaints regarding dust or air quality have been received, air quality monitoring has not been conducted.
Monitoring will be completed in accordance with the relevant Australian Standards (relevant to the pollutant being measured).	Dust Management Plan	As provided in the Dust Management Plan, monitoring will be in accordance with the latest version of <i>AS/NZS 3580.10.1 - Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method</i>
The MRCP will include a post-mining monitoring and reporting program to evaluate rehabilitation success and progress toward achieving closure objectives, and contingency measures to be implemented in the event that monitoring demonstrates that rehabilitation closure objectives are not being met.	MRCP	Section 12 of the MRCP addresses closure monitoring of rehabilitation success, erosion, water quality and air quality.
The MRCP will be reviewed regularly to ensure that the plan will be relevant to the activities being undertaken and planned to be undertaken.	MRCP	In accordance with Authorisation condition 26, the MRCP will be updated and submitted for approval within 12 months of Project commencement. In accordance with Authorisation condition 27, subsequent MRCPs will be submitted for approval on a reporting period to be advised. The MRCP states that it will be reviewed, and if necessary revised each year in conjunction with the MMP.
Noise monitoring will be undertaken where necessary to further investigate a valid complaint, where standard mitigation strategies have not resolved the issues that resulted in the	EM Plan/SIMP	No complaints regarding noise have been received. Incident and complaints management processes have been included in the EM Plan and SIMP.

Commitment	MMP Section	Performance against Commitment
complaint, and at the request of the Administering Authority (NT EPA).		
Monitoring will be completed in a timely fashion in accordance with the relevant Australian Standards (AS 1055.1 Acoustics – Description and measurement of environmental noise – General procedures). A written response will be provided within 28 days.	Dust Management Plan	Not yet applicable as no noise monitoring has been completed.
The post-mining monitoring and reporting will include continued dust monitoring in the Project site in accordance with the methodology outlined in Section 4.6.5	MRCP	Section 12 of the MRCP includes closure monitoring of air quality.
<b>Social, Economic and Cultural Surrounds</b>		
Project impacts will be managed in accordance with the Social Impact Management Plan (SIMP) provided in Section 5 which addresses all stages of construction, mining, processing and transport of concentrate.	SIMP	Not yet applicable as the Project has not commenced and there have been no social impacts applicable to Project activities.  The original SIMP provided in the draft EIS has been updated in accordance with feedback from stakeholders during the draft EIS consultation period.
Incorporate feedback into Project planning processes, specifically in relation to the impacts of trucks on the Plenty Highway, local employment opportunities, capacity to manage health, safety and emergency responses on site, economic opportunities and water use.	SIMP	The original SIMP provided in the draft EIS has been updated in accordance with feedback from stakeholders during the draft EIS consultation period.  The SIMP will continue to be reviewed and updated on a regular basis to incorporate stakeholder feedback and improve the social performance of the Project.
Continue to engage with key stakeholders to keep them informed through meetings, newsletters and the KGL website.	SIMP	As progress of the Project has been delayed, stakeholder engagement activities have not been to the full extent as outlined in the Stakeholder Engagement Plan. Throughout 2023 regular contact has been made with the NT Government, the Bonya community, the CLC and local pastoralists.  The KGL website is kept up to date with company announcements and reports.

Commitment	MMP Section	Performance against Commitment
Provide clear and up-front information to stakeholders and the wider community to avoid misinformation.	SIMP	Not yet applicable as construction and operations have been delayed. Key stakeholders as listed above have been kept informed of Project activities.
Campaign the NTG for improved telecommunications in the region.	SIMP	Not yet commenced. Jervois Operations have completed preliminary works to install their own telecommunications system which includes discussions on how this may benefit the local community.
Pursue the option, in conjunction with other project proponents, to construct a rail siding on the Ghan Railway Line where it crosses the Plenty highway north of Alice Springs to prevent local traffic impacts in Alice Springs.	SIMP	Not yet commenced as the focus to date has been on the completion of the Project Feasibility Study and a final investment decision.
Regular liaison and communication with the community, pastoralists and key tourism stakeholders.	SIMP	Regular contact has been maintained with the NT Government, the Bonya community, the CLC and local pastoralists. Regular liaison with key tourism stakeholders will commence when Project traffic increases during construction.
Liaison with the NT and Federal Governments on early sealing of the Plenty Highway.	SIMP	Not yet commenced as the focus to date has been on the completion of the Project Feasibility Study and a final investment decision.
Implementation of the Local Industry Participation Plan.	SIMP	Not yet applicable as Project construction has been delayed.
Continued work with ICN NT, NT Government departments, the Chamber of Commerce and the REDC to promote tenders which suit local capacity, boost skills, prepare businesses for an increase in competition and standards required by Kentor Minerals.	SIMP	Not yet applicable as Project construction has been delayed. KGLs Chief Executive Officer provided a presentation at the Alice Springs Chamber of Commerce Mining Energy and Resources Forum in April 2021.
Joint training initiatives to address backfilling.	SIMP	Not yet applicable as Project construction has been delayed.
A recruitment strategy focusing on locals and the encouragement of FIFO workers to relocate.	SIMP	Not yet applicable as Project construction has been delayed. Recruitment will continue to focus on the employment of locals as much as possible. Whilst FIFO workers will be encouraged to relocate, the success of this will depend on the



Commitment	MMP Section	Performance against Commitment
		availability of accommodation in Alice Springs which has been reported as very low in 2021.
Occupational Health and Safety Management Plans.		Site exploration works currently have Safety Management Plans and SOPs in place. These will be updated to address Project construction and operations prior to works commencing.
Transporting workers directly to site.	SIMP	As detailed in the SIMP and Traffic Management Plan, the vast majority of workers will be flown or bussed to site to reduce the potential for accidents on public roads. To date there have been minimal workers on site who consisted of drilling contractors, Jervois Operations exploration and camp employees and contractors. Charter flights to site commenced in 2021. Staff and contractors rarely drive to site unless necessary.
<p>A Worker Code of Conduct to address:</p> <ul style="list-style-type: none"> <li>• Adherence to the MOU with the Bonya community;</li> <li>• Offsite behaviour; and</li> <li>• Requirements to remain on site at all times to avoid trespassing on culturally significant areas or interfering with pastoral activities.</li> </ul>	SIMP	<p>These Codes have been developed and are available on the KGL website.</p> <p>This conduct will also be reinforced in the site induction.</p>
Cross cultural training of workers.	SIMP/CHMP	<p>The exploration induction includes a section on Cultural Heritage protection and cultural respect. A construction and operations induction will be developed prior to these works commencing and will include more information on cultural awareness.</p> <p>During 2021 discussions have been held with the CLC and Rural and Remote Health NT regarding full cultural awareness training as required by the ILUA.</p>

Commitment	MMP Section	Performance against Commitment
Liaison with the CLC, the AAPA and Traditional Owners.	SIMP	<p>Jervois Operations have been in regular communication with the CLC and the Bonya community throughout 2023 to keep them updated with the Project timetable and our obligations under the ILUA.</p> <p>Updated AAPA certificates have been applied for and issued based on changes to Project exploration activities. AAPA certificate C2021-068 was issued for the borefield and pipeline works and Unca Creek exploration activities in September 2021.</p>
Implementation of an Environmental Management Plan including a Cultural Heritage Management Plan.	CHMP	This CHMP will be fully implemented when construction and operations commence.
Restricting the use of private vehicles to travel to site, particularly from Alice Springs.	SIMP	Not yet applicable as there are minimal workers on site who consist of drilling contractors, Jervois Operations exploration and camp employees and contractors. Charter flights to site commenced in 2021. Staff and contractors rarely drive to site unless necessary.
Continuing the strict no alcohol policy on site.	SIMP	The strict no alcohol policy on site remains in place and will not change as this is part of the ILUA requirements.
Working with the CLC to place limitations on cash payments in preference for education programs, community development and social infrastructure investments.	SIMP	As Project construction has been delayed, no payments in accordance with the ILUA have been made.
Implementation of a Traffic Management Plan which will address: <ul style="list-style-type: none"> <li>• Speed limits for workers and contractors;</li> <li>• Road watering to manage dust;</li> <li>• Stakeholder liaison practices; and</li> <li>• Road safety initiatives.</li> </ul>	Traffic Management Plan/Dust Management Plan/SIMP	<p>These issues are addressed within the Traffic Dust and Social Impact Management Plans.</p> <p>As Project commencement has been delayed, the full implementation of the Traffic Management Plan has not yet commenced.</p>
Access roads to the Project will be designed in accordance with Austroads Guide to Road Design Part 3: Geometric Design (2010).	MMP Section 4.3	Not yet applicable as the construction of the site access roads has not commenced.

Commitment	MMP Section	Performance against Commitment
Minimum 8.7 metre wide access roads to the Project will be provided, consisting of a single 3.7 metre wide unsealed lane with 2.5 metre shoulders.	MMP Section 4.3	Not yet applicable as the construction of the site access roads has not commenced. These design criteria have been included in the Traffic Management Plan.
Access roads will be located to achieve appropriate site distances on the Lucy Creek Access Road and on the access roads.	MMP Section 4.3/Traffic Management Plan	Not yet applicable as the construction of the site access roads has not commenced. These design criteria have been included in the Traffic Management Plan.
Passing opportunities sufficient to allow two road trains to pass will also be provided on the access road.	MMP Section 4.3	Not yet applicable as the construction of the site access roads has not commenced. These design criteria have been included in the Traffic Management Plan.
Implementation of a public relations strategy regarding road safety around haul trucks and to promote the use of radio channels on the Plenty Highway.	SIMP/Traffic Management Plan	Not yet applicable as construction or operation of the Project has not commenced and no haul trucks are on the Plenty Highway. The public relations strategy will commence when Project traffic increases during construction.
On site health and emergency response and implementation of an Emergency Response Plan in consultation with local Police and health service providers.	Occupational health and Safety Plan	Site exploration works currently have an Emergency Response Plan in place. This will be expanded to address Project construction and operations prior to works commencing and will include the involvement of the local Police and emergency service providers.
Construction of fire breaks and safety precautions to reduce the risk of bushfires.	Bushfire Management Plan	Not yet applicable as construction has not commenced.
Maintenance of records of the locations of Aboriginal archaeological sites protected under the NT Heritage Act.	CHMP	A record of the locations of all Aboriginal archaeological sites is maintained by Jervois Operations to ensure these are protected.
Mine planning to include the consideration of recorded sites and employee inductions to address the protection of Aboriginal archaeological sites and Aboriginal culture and history.	CHMP	To date mine planning and Project field works have taken into consideration sacred sites as recorded on the AAPA certificates.

Commitment	MMP Section	Performance against Commitment
		<p>The exploration induction includes a section on Cultural Heritage protection and cultural respect. A construction and operations induction will be developed prior to these works commencing and will include more information on Aboriginal culture and history.</p> <p>Cultural awareness training will also be provided as required by the ILUA.</p>
<p>The Cultural Heritage Management Plan will include procedures for the discovery of unrecorded surface and sub-surface archaeological sites.</p>	<p>CHMP</p>	<p>Section 6.3 of the CHMP contains these procedures.</p>
<p>If the automobile and associated parts identified in the archaeological assessment report as having a low-medium significance under the NT Heritage Act are to be disturbed by the construction of Project infrastructure, they will be relocated to a secure area. Kentor Minerals will also consider donating the vehicle to the NT Transport Museum in Alice Springs.</p>	<p>CHMP</p>	<p>The Vulcan automobile parts were relocated to a safer location adjacent to the exploration camp in July 2021.</p> <p>The WWII GMC 6x6 truck was also relocated in October 2021 to an area on the access track to the camp.</p>
<p>Annual stakeholder surveys.</p>	<p>SIMP</p>	<p>As works have not yet commenced the stakeholder survey has been postponed.</p>
<p>Implementation of grievance procedure or complaints system.</p>	<p>EM Plan/SIMP</p>	<p>This procedure has been developed and is available on the KGL website.</p>
<p>Community complaints will be reported on a monthly basis to management and the Project operators and workforce to maintain an awareness of community feedback.</p>	<p>EM Plan/SIMP</p>	<p>Not yet applicable as no complaints have been received.</p>
<p>Changes in conditions and emerging issues will be tracked and monitored with complaints addressed through a formal complaints system to they can be addressed in a timely manner and reported internally.</p>	<p>EM Plan/SIMP</p>	<p>Not yet applicable as no complaints have been received. Complaints management processes have been included in the SIMP.</p>
<p><b>Human Health</b></p>		

Commitment	MMP Section	Performance against Commitment
A manual handling procedure will be implemented to mitigate the risks associated with manual handling.	Occupational health and Safety Plan	Construction and operational procedures to be developed prior to the commencement of construction. Manual handling procedures are currently in place for site based exploration personnel.
Risk assessments will be undertaken to incorporate Project changes at different stages of the Project and task related risk assessments such as Job Safety Analyses will be carried out.	Occupational health and Safety Plan	Not yet applicable due to the Project delay. An updated risk assessment will be completed prior to the commencement of construction.
Safe Operating Procedures will be developed to manage risks associated with specific tasks on site and be included in the Project Health and Safety Management System.	Occupational health and Safety Plan	Construction and operational SOPs to be developed prior to the commencement of construction. SOPs are currently in place for site based exploration personnel.
The Project workforce will be provided with updates and the appropriate training to ensure risks are effectively managed.	Occupational health and Safety Plan	Not yet applicable to construction or operational workforce. Exploration personnel on site are currently trained to manage risks and ensure their safety.
A positive attitude towards human health and safety will be adopted on site to promote proactive involvement by the workforce.	Occupational health and Safety Plan	Jervois Operations maintain a positive attitude toward the protection of human health and safety. A dedicated Health and Safety Manager will be employed on site to actively promote the importance of safety and involve the workforce. Site health and safety will be a focus of the construction and operations site induction. The health and safety of site based exploration personnel is regularly discussed and actioned in weekly staff meetings. Staff provide a safety share at each meeting.
Where possible and practical during the design stage of the Project, controls higher in the hierarchy will be applied.	Occupational health and Safety Plan	These controls will be investigated during the development of the construction and operational OH&S management system to be implemented upon commencement of construction.
Kentor Minerals will develop an Emergency Management Plan as part of the Health and Safety Management System for emergency response in the event of an emergency or accident. A	Occupational health and Safety Plan	The current exploration Health and Safety Management System contains an SOP for emergency situations.



Commitment	MMP Section	Performance against Commitment
site emergency response team will be set up by qualified staff and regular training will be provided.		This will be expanded to address Project construction and operations prior to works commencing and will include the development of an emergency response team.
Specific Emergency Plans will be developed for possible emergency scenarios such as traffic accidents, fire, chemical spills, explosions, etc.	Occupational health and Safety Plan/Environmental Emergency Management Plan/Bushfire Management Plan	The emergency plan to be developed for construction and operations will address these scenarios.
The management system will follow the hierarchy of control to ensure the appropriate safeguards are implemented and human health and safety risks are either eliminated, substituted, isolated or engineered as reasonably practicable.	Occupational health and Safety Plan	The site induction and OH&S Plan for construction and operations will be designed to address this hierarchy.
Ongoing monitoring and periodic review of the risk management process will be undertaken as part of the Project Health and Safety Management System.	Occupational health and Safety Plan	Ongoing monitoring and reviews will be incorporated into the construction and operations OH&S Plan.
<b>Cumulative Impacts</b>		
Regular stakeholder engagement and communication.	SIMP	As progress of the Project has been delayed, stakeholder engagement activities have not been to the full extent as outlined in the Stakeholder Engagement Plan. Throughout 2023 regular contact has been made with the NT Government, the Bonya community, the CLC and local pastoralists. The KGL website is kept up to date with company announcements and reports.
Collaboration with other proponents.	SIMP	Due to delays in several projects across the region, this collaboration has not yet occurred.
Working with industry groups such as ICN NT, Regional Economic Development Corporations and the Chamber of Commerce.	SIMP	Not yet applicable as Project construction has been delayed.

Commitment	MMP Section	Performance against Commitment
		KGLs Chief Executive Officer provided a presentation at the Alice Springs Chamber of Commerce Mining Energy and Resources Forum in April 2021.
Liaison with the Northern Territory and Australian Governments.	SIMP	KGLs Chief Executive Officer maintains regular contact with the NT government to ensure they are kept up to date on the progress of the Project.
Development of a Local Industry Participation Plan.	SIMP	A draft Local Industry Participation Plan has been included in the SIMP and will be further developed in association with the Department of Industry, Tourism and Trade. This plan will be implemented after Project construction commences.
Implementation of employment and training plans.	SIMP	Not yet applicable, these plans will be implemented when Project construction commences and there is a need for the employment of a workforce. The SIMP contains an Indigenous Employment and Training Strategy.
Road safety initiatives.	Traffic Management Plan	Road safety initiatives have been incorporated into the Traffic Management Plan. These initiatives will be implemented when construction commences and Project traffic increases.
Lobbying the NT Government for early sealing of the Plenty Highway.	SIMP	Not yet commenced as the focus to date has been on the completion of the Project Feasibility Study and a final investment decision.
Kentor Minerals will cooperate with the NT Government through the Five Mines Project and also liaise with other proponents to provide joint planning of activities if possible or to transition workers and contractors from one project to the next.	SIMP	No action has been taken regarding this project due to the delay in the construction timetable. The NT government has been contacted recently regarding the status of this project and whether it is still in place.
Training programs will be developed through consultation with local organisations and employment service providers to address skills shortages.	SIMP	Not yet applicable due to the delay in Project construction.

Commitment	MMP Section	Performance against Commitment
Site accommodation and FIFO workforce will be part of the mitigation measures to manage pressure on staffing, accommodation and services in the region.	SIMP	Site based accommodation and a FIFO workforce remains a focus for Jervois Operations, particularly with the Alice Springs accommodation shortage being experienced.

### Supplement to the draft EIS

Commitment	MMP Section	Performance against Commitment
<b>Terrestrial Flora and Fauna</b>		
The MRCP will be updated to include more detailed information on outcomes and completion criteria for the Unca Creek diversion and specifically address habitat quality and connectivity.	MRCP	In accordance with Authorisation condition 26, the MRCP will be updated and submitted for approval within 12 months of Project commencement.
The community of Mulga in the south-east of the Project EL will be physically demarcated as an exclusion zone.	Biodiversity Management Plan	As no construction or operational works have commenced on site, this community is not under threat. Site personnel have attempted to locate the Mulga community but the coordinates provided do not appear to match the exact location. The area will be demarcated prior to construction commencing.
The area of <i>E. cordatisepala</i> in the west of the Project will be physically demarcated as an exclusion zone.	Biodiversity Management Plan	The near threatened <i>E. cordatisepala</i> at location J06 was flagged off in July 2021 to avoid potential disturbance from exploration surveying activities. As no works are being conducted in the other locations, they are not under threat from disturbance. The remainder of the areas containing <i>E. cordatisepala</i> will be flagged off prior to any works being conducted at these locations (J02, J04, J14, P03, P05).
Kentor Minerals will collect genetic material from the <i>S. rigens</i> species east of the Jervois Mine Dam for use in rehabilitation works prior to repair works on the dam wall.	Biodiversity Management Plan	Postponed as the repair works have not commenced.
Athel Pine infestations will be managed and potential damage to environmental, cultural and agricultural values mitigated in accordance with the requirements of the Weed Management Plan for Athel Pine.	Biodiversity Management Plan	Site exploration personnel have been made aware of the previously recorded Athel Pine sites and the need to manage these. Exploration works have an SOP to address weed control. Management of any infestations will begin in earnest when Jervois Operations have the personnel and equipment on site and the potential for the introduction and spread of weeds is increased.

Commitment	MMP Section	Performance against Commitment
All personnel, contractors and visitors to the Project will be educated on the Bushfire Management Plan during the site induction process and at staff meetings.	EM Plan/Bushfire Management Plan	The content of the Bushfire Management Plan will be included in the construction and operations site induction. Site management meetings will address bushfire potential and prevention during the high season.
Permits to burn will be obtained if necessary or as directed by Bushfires NT.	Bushfire Management Plan	This strategy has been included in the Bushfire Management Plan. To date there has been no requirement for permits to burn.
Monitoring of the Mulga community will be integrated into the regular monitoring program outlined in the Environmental Management Plan.	Biodiversity Management Plan	Exploration personnel have located the Mulga community and the correct gps coordinates recorded. Regular monitoring of this site in accordance with the Biodiversity Management Plan will commence when Jervois Operations have the personnel on site to conduct this monitoring. At present there is no risk to this community.
Monitoring of the <i>E. cordatisepala</i> in the west of the Project will be integrated into the regular monitoring program outlined in the Environmental Management Plan.	Biodiversity Management Plan	Regular monitoring of this site has been integrated into the Biodiversity Management Plan. Monitoring will commence when Jervois Operations have the personnel on site to conduct this monitoring. At present there is no risk to this community.
<b>Surface Water</b>		
The risk associated with any flocculant use associated with ore processing or production of potable water will be minimised or avoided through the confinement of these substances within the mine water management system and recycling through the process water dam. No process water that has been in contact with flocculants will be released to the environment.	Water Management Plan	As Project construction has been delayed there is no flocculant on site. The Water Management Plan classifies this water as mine affected water. This water will be collected in the process water dam, contained by bunding of chemical stores and oil and grease separators. It will be re-used within the water management system. Mine affected water is the first preference for use in mine operating purposes.
The final ESCP will ensure that erosion and sediment control measures are appropriate for an arid zone climate.	ESCP	In accordance with Authorisation condition 14, a revised ESCP is under development in coordination with detailed mine design works.

Commitment	MMP Section	Performance against Commitment
The final ESCP will be prepared by a suitably qualified and experienced professional and will be approved by a Certified Professional in Erosion and Sediment Control.	ESCP	In accordance with Authorisation condition 14, the revised ESCP is being prepared and certified by suitably qualified professionals.
Implementation of the ESCP will be regularly monitored by a suitably qualified third-party auditor to the satisfaction of the Consent Authority.	ESCP	Not yet applicable due to the delay in Project construction.
Implement and adhere to the Surface Water Monitoring Program.	Water Management Plan	The full extent of the site water monitoring has not yet been implemented as no water management infrastructure has been constructed due to the delay of the Project.
<b>Groundwater</b>		
Kentor Minerals will implement actions to conform with the application of the Water Act as recommended, including the development of a Water Abstraction Management Plan.	Groundwater Management Plan	The Project has been granted a groundwater extraction licence under the Water Act – GEOR10338. Water extraction is continually monitored in accordance with the conditions of this licence and reported quarterly. Groundwater extraction has been well within the licence limits. The Water Abstraction Management Plan will be developed prior to the commencement of construction works when the demand for water increases.
The ongoing review of groundwater data and modelling will be assessed by an independent technical specialist during operations and post-closure.	Groundwater Management Plan	Not yet applicable, to commence during operations when the Project has the potential to impact local groundwater resources and Jervois Operations have the personnel and equipment on site to conduct the monitoring.
Should unacceptable impacts to groundwater from TSF leachate be measured, specific contingency options will be undertaken.	Groundwater Management Plan	Not yet applicable as the TSF has not been constructed.
<b>Acid Rock Drainage</b>		
The S distribution model will be continually developed as the Project progresses.	AMD Plan	In accordance with Authorisation condition 18, further sulphur testing is underway to infill gaps and validate model predictions.



Commitment	MMP Section	Performance against Commitment
Identified PAF materials will preferentially be placed in final locations as per the follow up geochemical assessment report.	AMD Plan	Not yet applicable as site operations have not commenced.
Complete column leachate testing.	AMD Plan	In accordance with Authorisation condition 18, this work is underway.
Conduct ongoing geochemical water monitoring and modelling.	AMD Plan	In accordance with Authorisation condition 18, this work is underway.
<b>Rehabilitation</b>		
The Mine Rehabilitation and Closure Plan will ensure that there is more intense management of the Unca Creek diversion to support the growth and recruitment of native groundcovers, minimise the mortality of planted juvenile shrubs and canopy trees and manage exotic weeds.	MRCP	Since the Supplement to the draft EIS was prepared, the Biodiversity Management Plan and the MRCP were updated to include more intensive rehabilitation management of the diversion in accordance with recommendations in the NT EPA Assessment Report. The MRCP will continue to be developed based on field work and the progress of rehabilitation works.
Kentor Minerals will undertake progressive rehabilitation in accordance with the practices outlined in the draft EIS Mine Rehabilitation and Closure Plan.	MRCP	Not yet applicable due to the delay in Project commencement.
Contingency measures to be implemented in the event that monitoring demonstrates that rehabilitation closure objectives are not met <ul style="list-style-type: none"> <li>• review of rehabilitation completion criteria to take into consideration additional information obtained about environmental and other constraints;</li> <li>• changes in mine planning;</li> <li>• consideration of feedback from future stakeholder consultations;</li> <li>• regular review of the risk assessment throughout the life of the Project; and</li> <li>• review of management strategies to ensure the early identification of issues.</li> </ul>	MRCP	The MRCP was updated in 2020 to include adaptive management and trigger action responses to be used to identify early warning signs that rehabilitation will be unsuccessful.

Commitment	MMP Section	Performance against Commitment
<b>Air Greenhouse Gases and Noise</b>		
Additional dust monitoring locations will be added during the construction and operational phases and include locations in the south adjacent to the proposed Bellbird waste rock stockpile and in the north adjacent to the Reward waste rock and topsoil stockpiles.	EM Plan	The number of dust monitoring locations was increased to nine to account for these additional locations. The dust gauges will be installed prior to operations commencing.
<b>Social, Economic and Cultural Surrounds</b>		
Kentor Minerals will continue with ongoing engagement with stakeholders to address any emerging issues and to provide continued input to decision making by those stakeholders that may be impacted by the Project.	SIMP	As progress of the Project has been delayed, stakeholder engagement activities have not been to the full extent as outlined in the Stakeholder Engagement Plan. Throughout 2023 regular contact has been made with the NT Government, the Bonya community, the CLC and local pastoralists.
Kentor Minerals will maintain good communication and engagement with stakeholders through numerous measures such as: <ul style="list-style-type: none"> <li>• Providing Project updates to key stakeholders through various means including emails and community noticeboards;</li> <li>• Posting regular updates and community reports on the KGL website;</li> <li>• Ongoing liaison with pastoralists and the Bonya community;</li> <li>• Annual satisfaction surveys;</li> <li>• The maintenance of easily accessible public enquiry methods; and</li> <li>• Communication with the Gemtree Caravan Park and other tourism bodies during peak tourist season.</li> </ul>	SIMP	As progress of the Project has been delayed, stakeholder engagement activities have not been to the full extent as outlined in the Stakeholder Engagement Plan. Throughout 2023 regular contact has been made with the NT Government, the Bonya community, the CLC and local pastoralists. The KGL website is kept up to date with company announcements and reports. The stakeholder survey has been postponed. Regular liaison with key tourism stakeholders will commence when Project traffic increases during construction.
The annual report to be provided to the Community Liaison Committee will include the measurement of environmental indicators against baseline data.	SIMP	Postponed as the Committee has not yet been set up due to the lack of site progress to date.
A summary of the company’s social and environmental performance will be included as part of the Annual Report for shareholders.	SIMP	As operations have not yet commenced this has been postponed when a summary of Project performance is available.

Commitment	MMP Section	Performance against Commitment
Kentor Minerals will ensure the SIMP is stand-alone document which is communicated in a community-friendly format.	SIMP	The SIMP was updated in accordance with this feedback on the draft EIS.
The SIMP will be updated to include aspects of the MOU such as cooperating and working together with the Bonya community throughout the life of the Project.	SIMP	As the specific content of the MOU is confidential, this level of detail has not been included
The SIMP will be updated to include training and awareness in relation to Free Prior and Informed Consent.	SIMP	The SIMP has been updated to include this training. Jervois Operations s human resources policies also address Free Prior and Informed Consent.
Management actions will include the development of a Communication Strategy which will be specific and include methods for proactive and open communications with relevant and affected stakeholders.	SIMP	The SIMP contains a Community and Stakeholder Engagement Plan which will be fully implemented throughout when site operations commence.
A Socio-Economic Management Plan will form part of the MMP's for the Project.	SIMP	The SIMP forms part of the MMP for the Project and addresses socio-economic impacts such as community benefit and invigoration, employment, training, education and benefits to local businesses and regional economies.
Kentor Minerals will keep relevant stakeholders informed of any Project updates prior to an assessment decision being made.	SIMP	Complete – assessment decision made by the NT government in late 2020 with the grant of Authorisation 1061-01.
Kentor Minerals will further investigate the indicator of self-harm incidence and mitigation of good FIFO rosters along with additional measures such as awareness campaigns, communications systems, support programs and counselling services to ensure the wellbeing of the workforce.	SIMP	Not yet applicable as operations and the FIFO arrangements have not commenced. Jervois Operations have numerous human resources policies in place which address mental health of the Project workforce. Major contractors will also have their own policies in place for their workers.
A Traffic Management Plan, procedures and bus driver guidelines will be implemented to mitigate road safety risks.	Traffic Management Plan	The Traffic Management Plan contains a Driver Code of Conduct which applies to all employees, suppliers, contractors, subcontractors. This Plan will be fully implemented upon the commencement of construction.

Commitment	MMP Section	Performance against Commitment
Kentor Minerals will continue to consult with the NT Government and relevant stakeholders regarding road safety strategies.	SIMP/Traffic Management Plan	Road safety initiatives have been incorporated into the Traffic Management Plan. These initiatives will be implemented and stakeholders will be further consulted when construction commences and Project traffic increases.
Kentor Minerals will ensure Traditional Owners are provided reasonable access to all cultural or significant sites on the Mineral Leases and be provided reasonable access to all sites on the borefield area.	SIMP/ILUA	It is a condition of the ILUA that Traditional Owners have freedom of access to the ILUA area. Jervois Operations have no rights to deny access of any persons or Traditional Owners to the borefield area.
All agents, employees, contractors and sub-contractors will be made aware of the conditions and their obligations under the Northern Territory Aboriginal Sacred Sites Act 1989.	CHMP/EM Plan	All exploration personnel and Jervois Operations staff and contractors are made aware of Jervois Operations s restrictions and obligations under the AAPA certificates. Further clarification will be provided for all site personnel and contractors in the construction and operations induction.
Information regarding sacred sites and heritage information will be kept strictly confidential.	CHMP	The specific locations and details of sacred sites are kept strictly confidential and used only for internal purposes.
Kentor Minerals will consult with native title holders regarding the management of artefacts prior to permits being issued to disturb these sites.	CHMP	A permit to Carry Out Work on a Heritage Place or Object under Section 75 of the Heritage Act was issued in September 2021. This permit contains a condition that the Bonya community form a team representing Traditional Owners to oversee and approve the recording and relocation of objects. This work was carried out by Jervois Operations archaeologists, Earthsea, in December 2021 with the assistance of several Traditional Owners from Bonya.
Kentor Minerals will provide training opportunities for the local Aboriginal community which will be tailored to individuals and equip them with the skills necessary to gain employment.	SIMP	The SIMP contains and Indigenous Training and Employment Strategy which will be implemented when site personnel are employed during construction and operations. It is a condition of the MOU with Bonya and the ILUA that training and employment opportunities are made available to Traditional Owners.

Commitment	MMP Section	Performance against Commitment
<b>Human Health</b>		
Kentor Minerals and the Project contractors and subcontractors will comply with the Department of Health’s requirements for the accommodation village facilities.	Occupational health and Safety Plan	It will be a condition of engagement that contractors used to construct the accommodation facilities will be aware of their obligations under the NT legislation for the design and construction of mining camps. Construction on the camp has not yet commenced. Contractors to be engaged to run and manage the accommodation facilities will also be experienced and aware of the health and hygiene standards for such facilities.
A detailed Emergency Management Plan will be developed and managed by appropriately qualified health and safety representatives.	Occupational health and Safety Plan	Site exploration works currently have an Emergency Response Plan in place. This will be expanded to address Project construction and operations prior to works commencing and will be managed by appropriately qualified health and safety staff.
The Health and Safety Management System will be based on AS/NZS 4801:2001 Occupational Health and Safety Management Systems and will adopt the relevant NT Worksafe Codes of Practice.	Occupational health and Safety Plan	The site induction and OH&S Plan for construction and operations will use this as a basis.
The Environmental Management Plan will be updated to address mosquito monitoring and control in accordance with the Department of Health Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites.	Occupational health and Safety Plan	This will be included in the OH&S Plan for construction and operations rather than the EM Plan.
Ongoing monitoring and periodic reviews of the Health and Safety Management System will be conducted.	Occupational health and Safety Plan	To be implemented when the construction and operations system is in place.
<b>Licensing and Regulation</b>		
Both the MMPs and the EM Plan will be updated as necessary in order to maintain compliance with any revised mining and environmental regulatory regimes.	MMP/EM Plan	The MMP and EM Plan will be audited and updated annually to ensure they remain in line with current regulatory regimes and guidelines.

Commitment	MMP Section	Performance against Commitment
Monitoring and management strategies will continue to be updated in accordance with best practice strategies in order to comply with regulatory requirements.	EM Plan	The EM Plan and subordinate management plans contain monitoring and review strategies to ensure they remain compliant with regulatory requirements. Annual audits will also confirm that they are kept up to date.

### NT EPA Assessment Report Recommendations

As construction works were delayed from 2021 and no construction or operational works under the original MMP have commenced, some performance results are not yet available. Whilst the recommendations have all been addressed, performance in relation to the conditions of approvals will be provided in subsequent MMPs.

No.	Recommendation	MMP Section	Performance against Recommendation
1	<p>That the Proponent KGL Resources Limited ensures that the Jervois Base Metal Project is implemented in accordance with all environmental commitments and safeguards:</p> <ul style="list-style-type: none"> <li>• identified in the final Environmental Impact Statement for the Jervois Base Metal Project (draft Environmental Impact Statement, Supplement to the draft Environmental Impact Statement and additional information)</li> <li>• recommended in this Assessment Report 90</li> <li>• to the satisfaction of the relevant regulator.</li> </ul> <p>The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are binding commitments made by the Proponent.</p>	All	Refer to responses provided throughout this document.
2	<p>That the Proponent provides written notice in advance to the Northern Territory Environment Protection Authority and the Responsible Minister if it alters the Jervois Base Metal Project and/or commitments, safeguards or mitigation measures in the Environmental Impact Statement in such a manner that the environmental significance of the action may change, in accordance with clause 14A of the Environmental Assessment Administrative Procedures 1984.</p>	N/a	No alterations have been made to the Project that would change the level of significance of the action.



No.	Recommendation	MMP Section	Performance against Recommendation
3	That the Proponent’s Groundwater Management Plan must include assessment and management of any stock or drinking water bores that could be impacted by the Proposal, in agreement with the owners and/or operators of those bores. This is to include:		<p>Complete.</p> <p>The Groundwater Management Plan was updated to include this information and submitted with the 2020 MMP.</p>
	<ul style="list-style-type: none"> <li>conducting a condition survey of local groundwater users to establish baseline conditions prior to commencing construction</li> </ul>	Groundwater Management Plan Section 4.2.3	
	<ul style="list-style-type: none"> <li>a program to monitor water levels at those bores to detect whether levels are within the range of predicted drawdown</li> </ul>	Groundwater Management Plan Section 6	
	<ul style="list-style-type: none"> <li>procedures for applying clear, quantitative and measureable trigger levels for groundwater drawdown and an outline of specific adaptive management responses that would be implemented if necessary</li> </ul>	Groundwater Management Plan Sections 7.1 and 7.2	
	<ul style="list-style-type: none"> <li>proposed mitigation and management responses in the event that trigger levels are exceeded</li> </ul>	Groundwater Management Plan Sections 7.7 and 7.8	
	<ul style="list-style-type: none"> <li>measures to ensure identified groundwater user bores remain operational or provide an alternative water bore or supplies if required, to ensure original daily flow quantities are maintained.</li> </ul>	Groundwater Management Plan Section 7.1 identifies triggers and Section 7.8 mitigation	
	The Groundwater Management Plan must be updated to the satisfaction of the relevant regulator, prior to the commencement of mining.		
4	That approvals and decisions for the Proposal have conditions that require the Proponent to:		<p>Complete.</p> <p>As recommended, this is condition 12 of Authorisation 1061-01 – The Operator must</p>
	<ul style="list-style-type: none"> <li>allocate clear responsibilities and accountabilities for water use and management</li> </ul>	Section 1.1	
	<ul style="list-style-type: none"> <li>set annual water use targets that are approved by the relevant regulator</li> </ul>	Water Management Plan	

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>provide annual updates of the projected water balance for the Proposal in the Groundwater Management Plan, including detailed estimates for the various phases of the Proposal and specifying the source and quantity of the water to be used</li> </ul>	Groundwater Management Plan Section 4.1/ Water Management Plan	ensure the mine is developed and operated in accordance with the environmental commitments and safeguards identified and or recommended in the NT EPA Assessment Report 90, September 2019  The listed Management Plans were updated to include this information and submitted with the 2020 MMP.  As the Project has been delayed and no works that have the ability to impact local groundwater resources have occurred, the annual report and Groundwater Management Report have been postponed.
	<ul style="list-style-type: none"> <li>demonstrate how water saving considerations are integrated in Proposal planning including final design and technologies</li> </ul>	Water Management Plan	
	<ul style="list-style-type: none"> <li>report annually on continual improvement initiatives in water use efficiency including a comparison with relevant water use targets</li> </ul>	SIMP - Annual Reports	
	<ul style="list-style-type: none"> <li>provide details in an annual Groundwater Management Report on how water will be effectively managed during proposed operations, including minimising water consumption, maximising water reuse and minimising waste water</li> </ul>	SIMP - Annual Reports	
	<ul style="list-style-type: none"> <li>extract water from bores only when equipped with operating flow meters</li> </ul>	Groundwater Management Plan Section 6.3.3	
	<ul style="list-style-type: none"> <li>record the volume of water extracted from the borefield and mine site bores</li> </ul>	Groundwater Management Plan Section 6.3.3	
	<ul style="list-style-type: none"> <li>report water use performance in relation to targets, and any change to approved targets in an annual Groundwater Management Report to stakeholders.</li> </ul>	SIMP - Annual Reports	
	The Groundwater Management Plan and annual Groundwater Management Report should be made publicly available on the websites of (as applicable), the Proponent, the Operator and relevant regulatory authorities.	SIMP Engagement Strategy	
5	That approvals and decisions for the Proposal have conditions that require the Proponent to update the Groundwater Management Plan to the satisfaction of the relevant regulator prior to mining. The Plan should:		Complete.  As recommended, this is condition 12 of Authorisation 1061-01 – The Operator must ensure the mine is developed and operated in accordance
	<ul style="list-style-type: none"> <li>include a framework identifying the location, timing, methods and parameters for the collection of groundwater hydrology information</li> </ul>	Groundwater Management Plan Section 6.2 and section 6.3	

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>establish comprehensive and robust groundwater hydrology datasets</li> </ul>	Groundwater Management Plan Section 6.4	with the environmental commitments and safeguards identified and or recommended in the NT EPA Assessment Report 90, September 2019  The Water and Groundwater Management Plans were updated to include this information and submitted with the 2020 MMP.  An independent peer review of the Groundwater Management and Monitoring Plan was completed by Hydrogeologic in April 2020
<ul style="list-style-type: none"> <li>include additional monitoring locations in the groundwater monitoring program to measure impacts to all third party groundwater users including communities and pastoralists</li> </ul>	Groundwater Management Plan Section 4.2.3 and section 6.2.1		
<ul style="list-style-type: none"> <li>include a framework, with timeframes, for progressing to a Class 2 numerical groundwater model consistent with the Australian Groundwater Modelling Guidelines</li> </ul>	Groundwater Management Plan Section 6.5 and 8.3		
<ul style="list-style-type: none"> <li>actively and continually seek to improve knowledge of aquifers, groundwater levels and groundwater flows affected by the Proposal and incorporate these into the groundwater models at least annually</li> </ul>	Groundwater Management Plan Section 7.7 when triggers exceeded and section 8.3		
<ul style="list-style-type: none"> <li>provide details on how groundwater will be effectively managed during proposed operations including storage, consumption and minimising wastewater</li> </ul>	Water Management Plan		
<ul style="list-style-type: none"> <li>incorporate measures to monitor and assess density driven outflow from final voids and impacts on surrounding groundwater quality</li> </ul>	Groundwater Management Plan Section 5.3.5 describes impacts and section 6.2.5 indicates monitoring sites Table 6.3		
<ul style="list-style-type: none"> <li>include an independent peer review by a suitably qualified independent professional</li> </ul>	N/a		
<ul style="list-style-type: none"> <li>include a schedule for reporting of all water monitoring data and an assessment of the impacts on groundwater hydrology in a Groundwater Management Report. The report is to be provided to the relevant regulator within six months of commencement of construction and on an agreed reporting period thereafter</li> </ul>	Section 5.8		

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>• be updated at least annually.</li> </ul>	Groundwater Management Plan Section 8.1	
	At a minimum, the Groundwater Management Report must disclose groundwater extraction and use, performance against targets, and any proposed changes to approved targets.	Section 5.8	
6	<p>That before approvals or decisions are given or made for the Proposal, the Proponent or Operator shall provide to the relevant regulator an updated Unca Creek diversion design and associated modelling and monitoring plan that includes:</p> <ul style="list-style-type: none"> <li>• information on the hydrologic conditions of the existing watercourse and results from hydrologic, hydraulic and sediment transportation modelling used in the design of the diversion</li> <li>• information that demonstrates how the diversion would maintain the existing regional hydrologic regime by effectively delivering the natural flows of Unca Creek to downstream reaches</li> <li>• details on how the diversion would prevent surface and sub-surface flows reporting to the Reward pit, in a 1000 year average recurrence interval flood event (1000 year ARI event) during mining and to the Probable Maximum Flood (PMF) event post closure</li> <li>• measures to minimise impacts on channel morphology upstream and downstream of the diversion, and sediment erodibility on diversion channels banks</li> <li>• the location, function and description of geomorphic and riparian vegetation features within the proposed watercourse diversion</li> <li>• details on how the diversion would incorporate similar habitats as the existing channel and be revegetated to re-establish riparian vegetation in accordance with leading practice</li> </ul>	<p>Refer to the Unca Creek Diversion Design Report (WRM, 2020) sections as detailed for each recommendation below</p> <p>Diversion Design Report Section 2.1.2, Section 4.4 and 4.5</p> <p>Diversion Design Report Section 3.6 and Section 5.1</p> <p>Diversion Design Report Section 5.1</p> <p>Diversion Design Report Section 5.2</p> <p>Diversion Design Report Section 3.6</p> <p>Diversion Design Report Section 5.3 MRCP</p>	<p>The Unca Creek Diversion Design Report was submitted with the 2020 MMP. This design report is in the process of being further refined to provide a detailed design to be submitted for approval prior to the commencement of construction of the diversion.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>• details on how sediment transport and water quality regimes would be maintained while minimising any impacts to upstream and downstream water quality or geomorphology</li> </ul>	Diversion Design Report Section 5.2	
	<ul style="list-style-type: none"> <li>• a program for monitoring and assessment of the performance of the diversion and methods for detecting any upstream or downstream impacts.</li> </ul>	Diversion Design Report Section 6.0	
	<ul style="list-style-type: none"> <li>• engineering drawings depicting the physical attributes and dimensions of the diversion, and plans and specifications sufficient to complete construction and revegetation in accordance with the design</li> </ul>	Refer to TMM drawings and specifications	
	<ul style="list-style-type: none"> <li>• all investigation and other reports relied on by the design</li> </ul>	Refer to Appendix A of the Diversion Design Report and to the draft EIS and Supplement Report	
	<ul style="list-style-type: none"> <li>• a requirement for review and assessment of the long term stability of the diversion and performance of the diversion against the detailed design objectives, at least 2 years prior to mine closure</li> </ul>	Diversion Design Report Section 6.0	
	<ul style="list-style-type: none"> <li>• a strategy for the long term management of the creek diversion post-closure and a requirement for the strategy to be incorporated into the Mine Rehabilitation and Closure Plan.</li> </ul>	Diversion Design Report Section 7.0	
	<p>The hydraulic, hydrologic and sediment transport models should be updated with monitoring data to improve knowledge of surface water flows impacted by the Proposal. The updated modelling results should be provided to the relevant regulator on an agreed reporting period that is appropriate for local conditions.</p>	Diversion Design Report Section 6.0	
	<p>The detailed diversion design is to be peer reviewed by an appropriately qualified and experienced independent professional with relevant expertise in watercourse diversions, and implemented to the satisfaction of the relevant regulator.</p>	Refer to Byrne Consulting review report	
7	That approvals and decisions for the Proposal have conditions that ensure, to the satisfaction of the relevant regulator, that all water supply pipeline and access track construction activities, including the removal of vegetation and subsequent	Section 4.3.6	Complete.

No.	Recommendation	MMP Section	Performance against Recommendation
	<p>rehabilitation, are conducted in a manner that does not cause a material change to the shape, volume, speed and flow direction of any waterway or cause an alteration to the stability of any bed or banks of a waterway.</p>		<p>As recommended, this is condition 12 of Authorisation 1061-01 – The Operator must ensure the mine is developed and operated in accordance with the environmental commitments and safeguards identified and or recommended in the NT EPA Assessment Report 90, September 2019. Authorisation condition 34 also requires that rehabilitation commences as soon as practicable and that a rehabilitation monitoring report is provided to the Department annually until rehabilitation objectives are met.</p>
8	<p>That the Proponent ensure the design, construction and ongoing operation of the Jervois Dam is in accordance with ANCOLD guidelines (2012) or any updates. Compliance with ANCOLD guidelines must be monitored and reported by an independent engineer with appropriate qualifications and experience. The appointment of the independent engineer should be endorsed by the relevant regulator.</p> <p>A report on compliance with the ANCOLD guidelines should be provided to the relevant regulator and placed on the websites of (as applicable) the Proponent, the Operator and the relevant regulator.</p> <p>When the dam is no longer required for the Proposal, the Proponent should reduce the dam spillway to the current level (367.4mAHD), unless it can</p>	Section 4.7	<p>The design of the Jervois Dam upgrades have not yet commenced.</p> <p>Authorisation condition 35 includes these ANCOLD design requirements and the requirement that the design be approved by an independent certifying engineer and an “as</p>



No.	Recommendation	MMP Section	Performance against Recommendation
	demonstrate by an independent expert approved by the relevant regulator that the environmental benefits of leaving the upgraded dam in place outweigh impacts to downstream ecosystems.		constructed” report be provided.
9	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to:</p> <ul style="list-style-type: none"> <li>• undertake kinetic leach and batch water extraction testing in accordance with leading practice AMD procedures recommended in the Australian Government guidelines for preventing acid and metalliferous drainage (DIIS 2016a)</li> <li>• include in the above testing as a minimum:                             <ul style="list-style-type: none"> <li>o materials representative of key lithology/alteration types, covers and tailings</li> <li>o different material blends (e.g. acid-generating and acid-neutralising materials) to identify management options</li> <li>o marginal NAF/PAF materials to confirm PAF segregation criteria</li> </ul> </li> <li>• undertake kinetic testing in the field in addition to the laboratory based column leach testing, to better reflect site climatic conditions and particle size distributions</li> <li>• commence testing as soon as feasible with results assisting the development of the Acid and Metalliferous Drainage Management Plan (Recommendation 10)</li> <li>• undertake further targeted sulfur testing to infill gaps in coverage for the S block models to validate model predictions and support planning of waste rock management</li> <li>• incorporate the results of geotechnical and geochemical testing into a soil oxygen flux model to inform detailed cover designs for waste rock and/or tailings</li> <li>• use geotechnical and geochemical testing results to regularly refine and update the hydrogeochemical models to improve understanding of the post closure risks of AMD and saline drainage.</li> </ul>	<p>EGi Document Number 349/1354</p> <p>EGi Document Number 349/1354</p> <p>EGi Document Number 349/1354, Table 1</p> <p>EGi Document Number 349/1354, Table 1</p> <p>EGi Document Number 349/1354, Table 1</p> <p>EGi Document Number 349/1354, Table 1</p> <p>EGi Document Number 349/1354, Table 1</p>	<p>Complete.</p> <p>As recommended, this is conditions 18, 19 and 20 of Authorisation 1061-01.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	Results of all investigations and testing should be reported to the relevant regulator for endorsement within six months of commencement of the Proposal and on an agreed reporting period thereafter, and inform the development of any proposed management measures.		
10	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to develop an Acid and Metalliferous Drainage Management Plan to the satisfaction of the relevant regulator prior to ground disturbing works that:</p> <ul style="list-style-type: none"> <li>• is prepared in accordance with leading practice Acid and Metalliferous Drainage management recommended in the Australian Government guidelines for preventing acid and metalliferous drainage (DIIS 2016a)</li> <li>• incorporates all commitments made by the Proponent in the Environmental Impact Statement for Acid and Metalliferous Drainage prevention, monitoring, management and mitigation</li> <li>• covers all phases of the Proposal, including pre-operation, operation, care and maintenance, rehabilitation/closure, post-closure and relinquishment</li> <li>• ensures all historic metalliferous materials and their leachates are contained and isolated from the receiving environment during all stages of the Proposal</li> <li>• includes a program for ongoing testing and classification of waste rock and tailings (solids, leachates and decant water) to inform appropriate management strategies</li> <li>• incorporates the results of ongoing mine waste characterisation and classification into the sulfur block, geochemical and hydrogeochemical models at least once every six months, to refine the models, validate model predictions and enable ongoing assessment of potential Acid and Metalliferous Drainage water quality impacts</li> <li>• establish targets for acid and metalliferous drainage acids, salts or metals/metalloids and identifies mitigation strategies to enable compliance with the targets should they be exceeded.</li> </ul>	<p>AMDMP, Section 10</p> <p>AMDMP, Section 10</p> <p>AMDMP, Section 10</p> <p>AMDMP, Section 10</p> <p>AMDMP EGi Document Number 349/1354, Table 1</p> <p>EGi Document Number 349/1354, Table 1</p>	<p>Complete.</p> <p>The Acid and Metalliferous Drainage Management Plan was updated to include this information and submitted with the 2020 MMP.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	The Acid and Metalliferous Drainage Management Plan should be submitted to the relevant regulator within six months of the commencement of the Proposal as part of the Mining Management Plan, and updated at least annually.		
11	That approvals and decisions for the Proposal have conditions that require the Proponent to:		Complete.
	<ul style="list-style-type: none"> <li>design, construct and operate the process water dam in accordance with ANCOLD guidelines (2012)</li> </ul>	WMP Section 6.3.3	As recommended, this is condition 36 of Authorisation 1061-01.
	<ul style="list-style-type: none"> <li>update the draft Water Management Plan prior to commencement of mining, to the satisfaction of the relevant regulator</li> </ul>	WMP Section 7	
	<ul style="list-style-type: none"> <li>adopt the recommendations of the surface water monitoring program independent peer review including:                             <ul style="list-style-type: none"> <li>the addition of boron, chromium, cobalt, molybdenum, selenium, silver, uranium, vanadium, hardness and total recoverable hydrocarbons to the testing suite</li> <li>the addition of in-situ field testing for electrical conductivity, pH and turbidity</li> <li>the addition of up-gradient and lowland reference sampling points in a neighbouring stream with similar geology and hydrology</li> </ul> </li> </ul>	WMP Section 7	The Water Management Plan was updated to include this information and submitted with the 2020 MMP.  The Water Management Plan is being further updated to include up-gradient and lowland reference sampling locations in a neighbouring stream in accordance with Authorisation condition 37(ii).
	<ul style="list-style-type: none"> <li>contain all mine-affected water within the mine site until monitoring indicates that controlled discharge, if necessary, can occur without adverse impacts</li> </ul>	WMP Section 4.4.6	
	<ul style="list-style-type: none"> <li>ensure that water quality meets discharge criteria appropriate to maintain a 95% level of species protection</li> <li>undertake an assessment of all chemicals used in mining activities (e.g. processing and water treatment), including an assessment of their behaviours and breakdown products in tailings and tailings decant/seepage and their potential to contaminate the environment</li> </ul>	WMP Section 3.4, Section 4.4.5 and Section 4.4.6  Chemical behaviour will be part of ongoing assessment through development and operation.	Jervois Operations is in the process of preparing an application for a Waste Discharge Licence under the Water Act 1992.
	<ul style="list-style-type: none"> <li>have all chemicals used in mining activities approved by the relevant regulator, clearly identified in the Mining Management Plan and included in monitoring</li> </ul>	WMP Section 7	

No.	Recommendation	MMP Section	Performance against Recommendation
	<p>programs of water storages and receiving environments as part of the Water Management Plan</p> <ul style="list-style-type: none"> <li>demonstrate that discharge water quality can be effectively managed to prevent adverse impacts on the receiving environment in terms of the declared beneficial uses and water quality objectives.</li> </ul> <p>Should discharge of water from the mineral lease be required, the Proponent must apply for a Waste Discharge Licence under the Water Act 1992.</p>	<p>WMP Section 4.4.5 and Section 4.4.6</p>	
12	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to update the surface water monitoring program, as part of the Water Management Plan, to the satisfaction of the relevant regulator prior to commencement of the Proposal. The program should:</p> <ul style="list-style-type: none"> <li>be developed by a suitably qualified professional with experience in aquatic ecosystems of the arid region of Central Australia</li> <li>be developed specifically for the arid region of Central Australia and, in the absence of specific guidelines for the arid region, take into account the guiding principles of Australian &amp; New Zealand Guidelines for Fresh &amp; Marine Water Quality (ANZG 2018) and other relevant guidelines</li> </ul>	<p>WRM have experience in the NT on projects including:                      Alice Springs Flood Study (NT Government, 2015)                      Timber Creek Flood Study (NT Government, 2018)                      Tennant Creek Trunk Drainage Study (NT Government, 2018)                      McArthur River Mine EIS (Glencore, 2017)</p> <p>WMP Section 3.4</p>	<p>Complete.</p> <p>As recommended, this is condition 37 of Authorisation 1061-01.</p> <p>The Water Management Plan was updated to include this information and submitted with the 2020 MMP.</p> <p>Due to the delay in construction, the Water Management Report has not yet been prepared. It will be prepared within six months of commencement of construction as required by Authorisation condition 37(j).</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>• be updated based on an assessment of the receiving environment water quality and include clear objectives, targets, indicators, performance criteria, locations and timing</li> </ul>	WMP Section 7	The Water Management Plan will continue to be updated annually.
	<ul style="list-style-type: none"> <li>• be capable of detecting changes in receiving environment water and alluvial sediment quality and potential impacts associated with the Proposal, to inform appropriate management and mitigation measures</li> </ul>	WMP Section 7	
	<ul style="list-style-type: none"> <li>• be capable of establishing baseline water and alluvial sediment quality and distinguishing between historic and Proposal related mining impacts</li> </ul>	WMP Section 7	
	<ul style="list-style-type: none"> <li>• include site specific trigger levels as recommended in Australian &amp; New Zealand Guidelines for Fresh &amp; Marine Water Quality (ANZG 2018)</li> </ul>	WMP Section 7	
	<ul style="list-style-type: none"> <li>• incorporate a review system to determine the adequacy of the program to meet its monitoring objectives</li> </ul>	EGi Document Number 349/1354, Table 1	
	<ul style="list-style-type: none"> <li>• establish comprehensive and robust surface water quality datasets using event based monitoring records</li> </ul>	WMP Section 7	
	<ul style="list-style-type: none"> <li>• be updated at least annually</li> </ul>	WMP Section 7.6	
	<ul style="list-style-type: none"> <li>• report all monitoring data with an assessment of the impacts on the receiving environment in a Water Management Report to be provided to the relevant regulator within six months of commencement of construction and on an agreed reporting period thereafter.</li> </ul>	Section 5.8 WMP Section 7.6	
	Public disclosure of the Water Management Plan and Water Management Reports should be provided on the websites of (as applicable) the Proponent, the Operator and relevant regulatory authorities.	Section 5.8 SIMP Appendix A2	
13	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to include in the Mine Rehabilitation and Closure Plan (referred to in Recommendation 25):</p> <ul style="list-style-type: none"> <li>• closure objectives and completion criteria for pit voids that are acceptable to the relevant regulator</li> </ul>	MRCP	As recommended, this is condition 31 of Authorisation 1061-01.

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>• a robust monitoring program designed to validate and update modelling and determine whether or not the trajectory for pit water quality indicates closure criteria for final pit void condition can be met</li> </ul>	Groundwater Management Plan Sections 5.3.5 and 5.3.6 describe impacts and section 6.2 indicates monitoring sites Tables 6 -.3 and 6-4	In accordance with condition 26 of Authorisation 1061-01, the MRCP will be further refined and submitted within 12 months of Project commencement.
	<ul style="list-style-type: none"> <li>• an assessment of the timing and impacts of density driven outflows of pit void water on surrounding groundwater quality</li> </ul>	Modelling to be completed and Groundwater Management Plan Section 6.2.5	
	<ul style="list-style-type: none"> <li>• an assessment of the long term (up to 1000 years or equilibrium, whichever is sooner) groundwater quality impacts of full/partial backfilling of pits with tailings and PAF waste rock at closure</li> </ul>	Preliminary modelling to be completed	
	<ul style="list-style-type: none"> <li>• analysis of the risk to Unca Creek environmental values of diversion failure taking into account an above-ground TSF and the Reward Pit void, including any backfill scenario</li> </ul>	Water Management Plan	
	<ul style="list-style-type: none"> <li>• a contingency plan outlining trigger levels for actions, specific responses and mitigation measures, and consequences for rehabilitation and closure activities</li> </ul>	To be determined following modelling	
	<ul style="list-style-type: none"> <li>• a requirement for an independent external audit of the pit void monitoring program and modelling by a suitably qualified and experienced auditor prior to relinquishment. The appointment of the auditor is to be endorsed by the relevant regulator. The auditor is to assess if closure criteria can be met at closure and post-closure. The auditor is to report to the relevant regulator.</li> </ul>	MRCP Table 2	
	The Mine Rehabilitation and Closure Plan must be submitted for approval by the relevant regulator on the advice of the Northern Territory Environment Protection Authority prior to mining and on an agreed reporting period thereafter.	MRCP	



No.	Recommendation	MMP Section	Performance against Recommendation
14	That approvals and decisions for the Proposal require, the Proponent or Operator to provide to the relevant regulator an updated erosion and sediment control plan for the Proposal. The plan must outline all permanent and temporary erosion and sediment control measures proposed to be installed for the Proposal. The updated plan must be prepared by a suitably qualified person and approved by a Certified Professional in Erosion and Sediment Control, in accordance with the International Erosion Control Association Best Practice Erosion and Sediment Control guideline (as amended from time to time) or higher standard. An independent, suitably qualified and experienced auditor must be engaged to review and approve the plan, and to inspect and approve that the work is undertaken according to the plan.	Draft ESCP provided, ESCP is under development in coordination with detailed mine design works by a suitably qualified professional and will be available prior to ground breaking	As recommended, this is conditions 13 to 16 of Authorisation 1061-01.
15	That the design, construction, management and closure of the waste rock dumps and tailings storage facility should be overseen by an appropriately qualified and experienced independent technical expert, approved by the relevant regulator, to provide:		Due to the delay in Project commencement construction of the waste rock dumps and tailings storage facility have been delayed.
	<ul style="list-style-type: none"> <li>• objective and independent expert review to the relevant regulator:</li> <li>• on the adequacy of the design of the waste rock dumps and tailings storage facility to ensure long-term containment of waste and leachate</li> <li>• on the proposed performance monitoring program for the waste storages including potential seepage and leachates</li> <li>• on decommissioning and final rehabilitation to minimise long-term risks and consequences to the environment, community and future land use from the waste storages</li> </ul>	Section 5.8	
	<ul style="list-style-type: none"> <li>• regular independent inspection and audit reports to the relevant regulator to ensure construction, management and closure is in accordance with the endorsed design and design objectives</li> </ul>	MMP Section 4.4.5	
<ul style="list-style-type: none"> <li>• an independent assessment of the Proposal’s management of tailings and waste rock, based on performance monitoring results, in an annual report to the relevant regulator and the Proponent</li> </ul>	Section 5.8		

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>an independent assessment of the quality assurance and quality control methods, procedures and tests used to verify that the technical specifications are met during construction</li> <li>assurance that the waste storages, if left to remain as landforms in perpetuity, are constructed and rehabilitated to an agreed suitable standard to achieve the closure objectives.</li> </ul> <p>The independent expert review and associated reporting and auditing should be made publicly available on the websites of (as applicable) the Proponent, the Operator and the relevant regulator.</p>	<p>Section 4.3.5</p> <p>MRCP</p> <p>SIMP Engagement Strategy</p>	
16	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to:</p> <ul style="list-style-type: none"> <li>establish water quality criteria for any mine affected water used for dust suppression, to the satisfaction of the relevant regulator</li> <li>assess for and treat any soil contamination on the mine site consistent with the National Environment Protection (Assessment of Site Contamination) Measure 1999 prior to mine closure.</li> </ul>	<p>Section 6.3.2.1</p> <p>MRCP Section 7.1</p>	<p>The Water Management Plan contains quality criteria for dust suppression water – section 4.4.3.2.</p> <p>As recommended, this is condition 31(ix) of Authorisation 1061-01.</p>
17	<p>The Proponent’s voluntary offset strategy should be developed and implemented in consultation with the Department of Environment and Natural Resources Flora and Fauna Division prior to the clearing of sensitive or significant vegetation.</p>	<p>Biodiversity Management Plan</p>	<p>Complete.</p> <p>The Voluntary Offset Strategy was approved as part of the 2020 MMP. It is yet to be implemented.</p>
18	<p>That all approvals and decisions in relation to the Proposal include conditions that require the Proponent to implement measures to avoid, manage and mitigate the risk of fauna vehicle strikes and other traffic related incidents in a Biodiversity Management Plan. As a minimum, the Plan should:</p>	<p>Traffic Management Plan and related Journey Planner</p>	<p>Complete.</p> <p>The Biodiversity Management Plan was updated to address</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>• be based on an identification and assessment of vehicle-related risks to native fauna associated with a 24 hour hauling operation</li> <li>• require internal recording and reporting of fauna injuries and deaths, with regular audits of this data to determine whether additional management measures are required.</li> </ul> <p>If any threatened fauna species are impacted by Proposal-related traffic, additional traffic management measures should be implemented in consultation with the Department of Environment and Natural Resources Flora and Fauna Division.</p>	<p>Biodiversity Management Plan</p> <p>EM Plan incident reporting process and Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p>	<p>these points and approved as part of the 2020 MMP.</p>
19	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to prepare and implement a Vegetation Health Monitoring and Management Plan to the satisfaction of the relevant regulator, on advice from the Department of Environment and Natural Resources, prior to mining. The Plan should include:</p> <ul style="list-style-type: none"> <li>• a detailed baseline map of all riparian vegetation and groundwater dependent vegetation communities potentially impacted by the Proposal, including riparian vegetation along Unca Creek downstream of the Jervois Dam and <i>Eucalyptus camaldulensis</i> and <i>Corymbia opaca</i> trees in the cone of drawdown associated with mine dewatering and groundwater extraction</li> <li>• methods and procedures for monitoring vegetation health and condition using measurable attributes appropriate for semi-arid vegetation communities</li> <li>• a program to detect significant vegetation stress potentially attributable to the Proposal and assess whether there has been adverse impact (significant alteration beyond natural variation)</li> <li>• a vegetation management trigger-response framework</li> <li>• corrective action measures to be implemented if triggers are exceeded</li> </ul>	<p>Section 2.1.3 and Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p>	<p>Complete.</p> <p>The Biodiversity Management Plan was updated to include a Vegetation Health Monitoring Plan and approved as part of the 2020 MMP.</p> <p>Monitoring will commence after constructions commences.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>requirements for regular reporting including a detailed summary of monitoring, analysis of results, contingency actions undertaken and an evaluation of the effectiveness of the program.</li> </ul>	Biodiversity Management Plan	
	Reports should be provided to the relevant regulator and placed on the websites of (as applicable) the Proponent, the Operator and the relevant regulator.	Section 5.8 SIMP Appendix A2	
20	<p>That approvals and decisions in relation to the Proposal include conditions that require the Proponent to provide an updated Biodiversity Management Plan prior to authorisation. The updated Plan shall include:</p> <ul style="list-style-type: none"> <li>methods for monitoring changes in fauna habitat quality related to the Unca Creek channel diversion and groundwater drawdown</li> <li>methods and criteria that will be used to identify hollow bearing trees</li> <li>methods on how appropriate habitat for fauna will be determined</li> <li>methods to measure parameters such as presence of dieback; tree condition; regeneration; dust accumulation on foliage; thinning of ground cover; plant establishment, growth, diversity and cover; weed density and distribution; and feral fauna abundance</li> <li>the number, distribution and size of monitoring sites, sampling frequency, methods to collect baseline data and selection of control/reference sites</li> <li>a strategy for management and monitoring of potential impacts to the grey falcon</li> <li>a strategy for management and monitoring of potential impacts to the Australian painted snipe.</li> </ul> <p>The updated Plan should be prepared and implemented in consultation with the Department of Environment and Natural Resources Flora and Fauna Division, and approved by the relevant regulator.</p>	<p>Biodiversity Management Plan</p> <p>Groundwater Management Plan – drawdown.</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p> <p>Biodiversity Management Plan</p>	<p>Complete.</p> <p>The Biodiversity Management Plan was updated to address these recommendations and approved as part of the 2020 MMP.</p> <p>Monitoring will commence after construction commences.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
21	That approvals and decisions in relation to the Proposal include conditions that require the Proponent to prepare and implement a Trench Inspection Procedure, to the satisfaction of the relevant regulator, in consultation with the Department of Environment and Natural Resources.	Biodiversity Management Plan	Complete.  The Biodiversity Management Plan was updated to include a Trench Inspection Procedure and approved as part of the 2020 MMP.
22	That prior to commencement of the Proposal, the Proponent must, to the satisfaction of the relevant regulator:		Complete/Underway.
	<ul style="list-style-type: none"> <li>• develop and implement a Community and Stakeholder Engagement Plan providing for:                             <ul style="list-style-type: none"> <li>o information on recruitment to maximise local employment and training opportunities and to manage impacts on demand for local workers</li> <li>o publication of a community complaints telephone contact number and email to allow community members to contact the Proponent in the event of any issues or concerns</li> <li>o development and implementation of a complaints management procedure that requires complaints to be recorded, investigated and abatement measures to be carried out if required, for handling community complaints and grievances for the duration of the Proposal</li> <li>o effective ongoing stakeholder engagement and consultation on key mining operations (such as hydrological studies) and agreed post-mining closure, rehabilitation, land uses and access</li> <li>o a commitment to prioritise local businesses in procurement processes and to identify and implement actions for additional benefits for the affected communities</li> </ul> </li> <li>• update the Social Impact Management Plan for approval by the relevant regulator, and then update it regularly during construction and operation. The</li> </ul>	SIMP	<p>The Social Impact Management Plan was updated to address these recommendations and approved as part of the 2020 MMP.</p> <p>The SIMP will undergo regular reviews (at least annually) to ensure it remains relevant and effective.</p> <p>The Social Impact Management Report for 2021 was submitted to the Department of Industry, Tourism and Trade in March 2022. Due to the lack of project progress and associated social impacts, KGL was provided an exemption from submitting a</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<p>Social Impact Management Plan is to be informed by details of the matters outlined in the Traffic Management Plan and the Community and Stakeholder Engagement Management Plan listed above</p> <ul style="list-style-type: none"> <li>• publish a social impact management report prior to commencement of construction and then annually during operation of the Proposal. The report is to detail the effectiveness of the Social Impact Management Plan measures to manage the social impacts and benefits of the Proposal. The report will also detail the effectiveness of community and stakeholder engagement.</li> </ul> <p>The reports should be provided to the relevant regulator and placed on the websites of (as applicable) the Proponent, the Operator and the relevant regulator.</p>	<p>SIMP</p> <p>Section 5.8 SIMP Appendix A2</p>	<p>report for 2022. A similar exemption will be sought for 2023.</p>
23	<p>As soon as practicable and within six months (or a longer period agreed in writing with the relevant regulator) of completion of the water supply pipeline, the Proponent or Operator must:</p> <ul style="list-style-type: none"> <li>• reshape all disturbed land in the pipeline corridor to a stable landform similar to that of surrounding undisturbed areas</li> <li>• ensure that all disturbed land in the pipeline corridor is reinstated to the pre-disturbed land condition</li> <li>• take all reasonable and practicable measures to:                             <ul style="list-style-type: none"> <li>o re-establish surface drainage lines</li> <li>o reinstate the top layer of the soil profile</li> <li>o promote establishment of vegetation of the same species and density of cover to that of the surrounding undisturbed areas</li> </ul> </li> <li>• ensure that the maintenance requirements of rehabilitated land in the pipeline corridor are no greater than that required for the land prior to disturbance</li> <li>• ensure that the water quality of any water courses intersecting the pipeline corridor meets criteria for subsequent uses and does not have potential to cause environmental harm</li> </ul>	<p>Section 4.3.6</p> <p>Section 4.3.6</p> <p>Section 4.3.6</p> <p>Section 4.3.6</p> <p>Section 4.3.6</p>	<p>The construction of the water pipeline has not yet commenced.</p>



No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>commence a program of rehabilitation monitoring and reporting for three years after completion of pipeline construction, or until demonstration by an independent suitably qualified person, that rehabilitation objectives have been met. Rehabilitation monitoring reports must be submitted to the relevant regulator at least annually until rehabilitation objectives have been met.</li> </ul>	Section 4.3.6 and MRCP Table 2	
24	<p>That approvals and decisions for the Proposal have conditions that require the Proponent to backfill tailings and potentially acid-forming waste rock into mine voids, unless otherwise approved by the relevant regulator.</p> <p>PAF waste rock that is to be returned to mine voids should be stored temporarily in a safe, stable and non-polluting manner.</p> <p>Subject to the outcomes of Recommendation 13 in this Report, tailings stored in the TSF should be backfilled to pit voids for long term storage.</p>	Acid Mine Drainage Plan and MRCP Table 1, Sections 8.2.1 and 9.4	<p>As recommended, this is conditions 31(x) and 31(xi) of Authorisation 1061-01.</p> <p>As construction of the Project has been delayed, this work has not commenced.</p>
25	<p>Prior to the commencement of mining, the Proponent must prepare an updated Mine Rehabilitation and Closure Plan (MRCP), that demonstrates the closure option has been determined based on a thorough and transparent evaluation of the benefits, risks and costs of all options. The MRCP should demonstrate that the chosen closure option delivers a superior environmental outcome to other options, measured against the principles of Ecologically Sustainable Development. The MRCP should be approved by the relevant regulator with advice from the NT EPA. This updated Plan must:</p> <ul style="list-style-type: none"> <li>contain approved Closure Objectives that provide concrete, site-specific and typically measurable statements of what closure activities or measures aim to achieve</li> <li>address all aspects of rehabilitation and mine closure, including post- mining land use and rehabilitation objectives as agreed with stakeholders, landform designs, schedules for rehabilitation, completion criteria and monitoring of rehabilitation success</li> <li>demonstrate that there would be no ongoing costs borne by the community and government in future in relation to post-mining land use</li> </ul>	<p>MRCP Sections 5 and 6</p> <p>MRCP Sections 4, 5, 6 and 12</p> <p>MRCP Section 13</p>	<p>Complete.</p> <p>The MRCP has been updated to address these recommendations. It will be further refined to address the information in recommendation 13 and submitted for approval.</p>

No.	Recommendation	MMP Section	Performance against Recommendation
	<ul style="list-style-type: none"> <li>include site-specific closure criteria taking into account external threats, physical conditions of the site, species composition, structural diversity and ecosystem functionality of the revegetation, external exchanges and landscape integrity, and an overall condition of the final landform and rehabilitated ecosystems that is similar to the pre-mining condition</li> </ul>	MRCP Sections 4, 5, 6 and 9	
	<ul style="list-style-type: none"> <li>include details of the rehabilitation trials and investigations that would inform appropriate landform covers and target ecosystems for all areas to be rehabilitated</li> </ul>	MRCP Section 9	
	<ul style="list-style-type: none"> <li>provide for ongoing monitoring and maintenance of the site post-mining, in accordance with an approved monitoring and maintenance program that includes a trajectory to achieving closure criteria, until closure criteria are achieved and the site has been relinquished</li> </ul>	MRCP Section 12	
	<ul style="list-style-type: none"> <li>include details of reporting requirements to the relevant regulator on the performance of progressive rehabilitation works to inform decision-making to ensure successful post-mining rehabilitation</li> </ul>	MRCP Section 12	
	<ul style="list-style-type: none"> <li>include provisions for independent external audits by suitably qualified and experienced auditors of the development and implementation of the plan at least annually following commencement of operations, at closure and prior to relinquishment of the mineral lease</li> </ul>	MRCP Table 2	
	<ul style="list-style-type: none"> <li>include investigation of the long-term settling process of tailings and waste rock to inform construction of appropriate landform covers</li> </ul>	MRCP Table 2	
	<ul style="list-style-type: none"> <li>require independent periodic external audits by suitably qualified and experienced auditors approved by the relevant regulator of any backfilling of mine voids including the backfill design, geotechnical information, placement, compaction, drainage and settlement of material layers and placement of any PAF material below the lowest expected groundwater level.</li> </ul>	MRCP Table 2	

#### **A4 Supporting Information for Statutory Requirements and Non-Statutory Obligations**

As Project construction works have been delayed from 2021 and no works were undertaken under the original MMP monitoring reports for the previous reporting period are not applicable.

## A5 Abbreviations

Abbreviation	Description
AA	Access Authority
AAPA	Aboriginal Areas Protection Authority
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
ALEC	Arid Lands Environment Centre
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
AMD	Acid and Metalliferous Drainage
ANZECC	Australian and New Zealand Environment and Conservation Council
ARD	Acid Rock Drainage
ARI	Average Recurrence Interval
ASC	Australian Soil Classification
AS/NZS	Australia and New Zealand Standards
ASSA	Aboriginal Sacred Sites Act 1989
AusRivAS	Australian Rivers Assessment System
BFMP	Bushfire Management Plan
BHDP	Biobased High-Density Polyethylene
BIBO	Bus in Bus Out
BMP	Biodiversity Management Plan
C&M	Care and Maintenance
CDF	Cumulative Damage Factor
CDRC	Central Desert Regional Council
CHMP	Cultural Heritage Management Plan
CLC	Central Land Council
CLPSI	Contaminated Land Preliminary Site Investigation
cm	Centimetre
CO <sub>2</sub>	Carbon Dioxide
COD	Chemical Oxygen Demand
COPC	Chemicals of Potential Concern
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual Site Model
CSS	Closed side-setting
DEE	Commonwealth Department of Environment and Energy

Abbreviation	Description
DEM	Digital Elevation Model
DENR	Department of Environment and Natural Resources
DFS	Definitive Feasibility Study
DHCS	Department of Health and Community Services
DHEM	Down Hole Electromagnetic (Exploration Surveying)
DIDO	Drive in Drive Out
DLPE	Department of Lands Planning and Environment
DME	Department of Mines and Energy
DO	Dissolved Oxygen
DoEE	Department of the Environment and Energy
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DTED	Digital Terrain Elevation Data
EA Act	Environmental Assessment Act 1982
EAAP	Environmental Assessment Administrative Procedures 1984
EAU	Environmental Assessment Unit
EC	Electrical Conductivity
ECEC	Effective Cation Exchange Capacity
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
ELDO	European Launcher Development Organisation
ELR	Exploration Licence in Retention
EML	Extractive Mineral Lease
EMEL	Extractive Mineral Exploration Licence
EM Plan	Environmental Management Plan
EOP	Environmental Offset Policy
EOY	End of Year
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPBC Regulation	Environmental Protection and Biodiversity Conservation Regulations 2000
ERA	Environmental Risk Assessment
ERMP	Emergency Response Management Plan
ESA	Equivalent Standard Axle
ESCP	Erosion and Sediment Control Plan

Abbreviation	Description
ESD	Ecologically Sustainable Development
ESIA	Economic and Social Impact Assessment
ESP	Exchangeable Sodium Percentage
FEL	Front End Loader
FIFO	Fly-in Fly-out
FSL	Full Storage Level
FTE	Full Time Equivalent
g	Gram
GDE	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
GIS	Geographic Information System
GL	Gigalitres
GWP	Global Warming Potential
ha	Hectares
HLDS	Authorised Holdings
HV	Heavy Vehicle
IAPP	International Association for Public Participation
IBRA	Interim Biogeographical Regionalisation for Australia
ICMM	International Council on Mining and Metals
ICN	Industry Capability Network
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreement
ISO	International Organisation for Standardisation
JBMP	Jervois Base Metal Project
JORC	Joint Ore Reserves Committee
KCl	Potassium Chloride
kg	Kilogram
kL	Kilolitre
km	Kilometre
Km <sup>2</sup>	Square Kilometre
Km/h	Kilometres Per Hour
ktpa	Kilo Tonnes Per Annum
L	Litre
L/s	Litres Per Second



Abbreviation	Description
Lcm	Loose cubic metres
LGA	Local Government Area
LOM	Life of Mine
m	Metre
m <sup>3</sup>	Cubic Metre
Ma	Mega-annum/Million Years
MA	Mineral Authority
mAHD	Metres Above Australian Height Datum
mBGL	Metres Below Ground Level
MIA	Mine Infrastructure Area
mg	Milligram
ML	Megalitre
ML	Mineral Lease
MLA	Mineral Lease Application
mm	Millimetres
MM Act	Mining Management Act 2001
MMP	Mining Management Plan
MM Regs	Mining Management Regulations
MNES	Matters of National Environmental Significance
MOU	Memorandum of Understanding
MRCP	Mine Rehabilitation and Closure Plan
MSDS	Material Safety Data Sheet
MT Act	Mineral Titles Act
Mtpa	Million Tonnes Per Annum
MT Regs	Mineral Titles Regulations
MW	Megawatt
MWh	Megawatt Hour
NAF	Non-Acid Forming
NAFI	North Australia Fire Information
NAG	Net Acid Generation
NAGpH	pH of NAG solution before titration
NAG <sub>(pH4.5)</sub>	NAG acidity titrated to pH 4.5 in kg H <sub>2</sub> SO <sub>4</sub> /t
NAG <sub>(pH7.0)</sub>	NAG acidity titrated to pH 7.0 in kg H <sub>2</sub> SO <sub>4</sub> /t
NARP	Northern Australia Roads Program

Abbreviation	Description
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NGA	The National Greenhouse Accounts
NGER	National Greenhouse and Energy Reporting Act 2007
NGGERA	National Greenhouse Gas and Energy Reporting Act 2007
NGO	Non-Government Organisation
NNTT	National Native Title Tribunal
NOI	Notice of Intent
NPI	National Pollution Inventory
NT	Northern Territory
NTCA	Northern Territory Cattlemen's Association
NTDIPL	NT Department of Infrastructure, Planning and Logistics
NT EPA	Northern Territory Environment Protection Authority
NTFRES	Northern Territory Fire and Rescue Emergency Services
NTG	Northern Territory Government
NTGS	Northern Territory Geological Survey
NTPFES	Northern Territory Police Fire and Emergency Services
PAF	Potentially Acid Forming
PAM	Polyachrylamide
PCB	Polychlorinated Biphenyls
PER	Public Environmental Report
PFA	Project Facilitation Agreement
PFS	Pre-Feasibility Study
PM <sub>10</sub>	Particulate Matter 10 Micrometres or Less in Diameter
PM <sub>2.5</sub>	Particles Matter Less Than 2.5 µm (0.0025 mm) in Diameter
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool (EPBC Act)
PSI	Preliminary Site Investigation
PWC	Power and Water Corporation
PWD	Process Water Dam
RC	Reverse Circulation
REDC	Regional Economic Development Committee
RO	Reverse Osmosis
ROM	Run of Mine

Abbreviation	Description
S	Sulphur
SAG	Semi-Autogenous Grinding
SES	State Emergency Services
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SO <sub>4</sub>	Sulphate
SoBS	Sites of Botanical Significance
SoCS	Sites of Conservation Significance
SRTM	Shuttle Radar Topography Mission
SSDS	security sensitive dangerous substances
SVOC	Semivolatile Organic Compounds
TDS	Total Dissolved Solids
TECs	Threatened Ecological Communities
ToR	Terms of Reference
TPWC Act	Territory Parks and Wildlife Conservation Act 2000
TPWC Regs	Territory Parks and Wildlife Conservation Regulations
TSSC	Threatened Species Scientific Committee
TSF	Tailings Storage Facility
UNFCCC	United Nations Framework Convention on Climate Change
VDU	Visual display unit
VOC	Volatile Organic Compound
WBM	Water Balance Model
WHS Act	Work Health and Safety (National Uniform Legislation) Act
WHS Regulations	Work Health and Safety (National Uniform Legislation) Regulations
WM Act	Weeds Management Act 2001
WM Regs	Weeds Management Regulations
WMPCA	Waste Management and Pollution Control Act
WoNS	Weeds of National Significance
WRD	Waste Rock Dump