FEDERATION PROJECT

PRELIMINARY HAZARD ASSESSMENT
Federation Mine & Federation Plant (Hera Mine)

Prepared for:

HERA Resources
The Peak
Burthong Road
Nymagee NSW 2831

SLR Ref: 660.30090.0004-R01
Version No: -v1.1
December 2021

PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with HERA Resources (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.3090.00004 R01-v1.0	13 December 2021	Craig Simpson	Peter Georgiou	Craig Simpson
610.3090.00004 R01-v0.1	8 December 2021	Craig Simpson	Peter Georgiou	Craig Simpson

CONTENTS

DOCUMENT REFERENCES

TABLES

CONTENTS

FIGURES

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Hera Resources Pty Limited (Hera Resources) to undertake a Preliminary Hazard Analysis for the proposed underground metalliferous mine development located in central-western NSW, approximately 15km south of the Nymagee township and 10km south of Hera Resources' Hera Mine. The Federation Project (the Project) comprises underground mining activities and surface infrastructure at the Federation Site, amendments at Hera Mine to facilitate processing of ore from the Federation Site, and a Services Corridor connecting the Federation Site with Hera Mine.

Hera Resources is evaluating the development of a satellite underground mine at the Federation Site that leverages established infrastructure at the Hera Mine to minimise environmental impacts and allow for the continuation of mining operations in the Nymagee area. Mining at Hera Mine is expected to cease by 2024. Mining of the Federation deposit will allow for a transition of mining operations from Hera Mine to Federation, as ore from the Federation deposit replaces ore from the Hera Mine.

This Preliminary Hazard Analysis forms part of the supporting documentation in accordance with the Project's SEARs requirements for a Preliminary Hazard Analysis.

The Preliminary Hazard Analysis was prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis'*(HIPAP 6) and Multi-Level Risk Assessment (MLRA).

HIPAP 6 provides guidance on the general approach recommended for hazard analysis. The objective of hazard analysis is to develop a comprehensive understanding of the hazards and risks associated with an operation or facility and of the adequacy of safeguards. The hazard analysis process may include qualitative and quantitative methods. Consideration should include:

- the nature and quantities of hazardous materials stored and processed on the site;
- the type of plant and equipment in use;
- the adequacy of proposed technical, operational and organisational safeguards;
- the surrounding land uses or likely future land uses; and
- the interactions of these factors.

The MLRA provides guidance on the criteria for using the results of the screening, classification and prioritisation steps to determine which of three levels of further analysis is appropriate.

Level 1 is an essentially qualitative approach based on comprehensive hazard identification to demonstrate that the activity does not pose a significant off-site risk.

Level 2 supplements the qualitative analysis by sufficiently quantifying the main risk contributors to show that risk criteria will not be exceeded.

Level 3 is a full quantitative analysis.

The MLRA guidance states a Level 1 qualitative assessment may suffice provided all or most of the following conditions are met:

- screening and risk classification and prioritisation indicate there are no major off-site consequences and societal risk is negligible;

- the necessary technical and management safeguards are well understood and readily implemented; and
- there are no sensitive surrounding land uses.

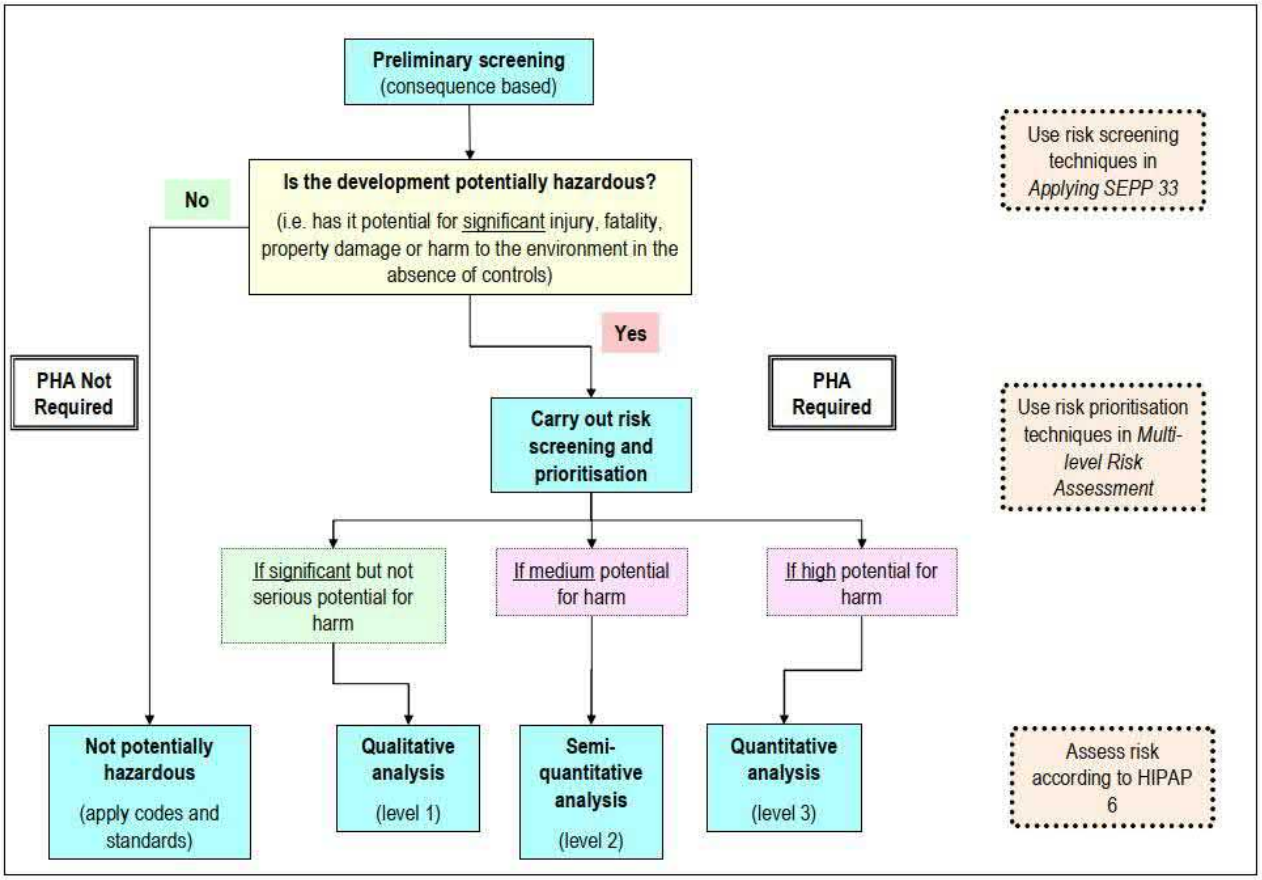
The current Preliminary Hazard Analysis study for the Project met the MLRA criteria for a Level 1 assessment as the activity does not pose a significant off-site risk.

It further states the following three stages are used in the assessment process:

- preliminary screening
- risk classification and prioritisation
- risk analysis and assessment.

The overall MLRA approach can be seen in Figure 1 below.

Figure 1 The Multi-Level Risk Assessment Approach*



(* Source Planning NSW, 2011a Multi-Level Risk Assessment, New South Wales Government, figure 3)

The Preliminary Hazard Analysis should estimate the cumulative risks from the existing and proposed development. To determine the level of risk to people, property and the environment at the proposed location and in the presence of controls.

If the risk levels exceed the criteria of acceptability and/or if the controls are assessed as inadequate, or unable to be readily controlled, then the development is classified as 'hazardous industry'. Where it is unable to prevent offensive impacts on the surrounding land users, the development is classified as 'offensive industry'.

A development may also be considered potentially hazardous with respect to the transport of dangerous goods. A proposed development may be potentially hazardous if the number of generated traffic movements (for significant quantities of hazardous materials entering or leaving the site) is above the cumulative annual or peak weekly vehicle movements. *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* (NSW Department of Planning, 2011), outlines the screening thresholds for transportation.

This report presents information pertaining to the Preliminary Hazard Analysis for the Project.

2 Federation Project Description

2.1 Overview

Hera Resources is a wholly owned subsidiary of Aurelia Metals Limited (Aurelia). Hera Resources currently own and operate the Hera Mine located approximately 80km south-east of Cobar and approximately 5km south of the township of Nymagee in western NSW. Aurelia owns and operates the Peak Gold Mine (PGM) near Cobar in western NSW.

Hera Resources is evaluating the development of the Project, a proposed underground metalliferous mine development. The Project comprises underground mining activities and surface infrastructure at the Federation Site, amendments at Hera Mine to facilitate processing of ore from the Federation Site, and a Services Corridor connecting the Federation Site with Hera Mine. The Federation Site is located approximately 15km south of the Nymagee township and 10km south of the Hera Mine.

The Federation Project will be a State Significant Development (SSD) (the Project) as defined by the *State Environmental Planning Policy (State and Regional Development) 2011 (the SRD SEPP*).

2.2 Background

Hera Mine has been operational since 2012 and produces gold and silver doré (unrefined bars) and a zinc/lead concentrate. Waste rock and metalliferous ore are extracted using underground open stope mining methods and underground load and haul operations. Hera Mine is approved to process up to 505,000 tonnes of ore on site annually, with lead/zinc concentrate transported to the Hermidale rail siding located approximately 75km to the north-east. The Hera Mine Project Approval was modified in June 2021 to allow for operations up to 31 December 2025.

In April 2019 high grade lead, zinc and gold mineralisation was discovered at the Federation deposit. Subsequent surface drilling programs have delineated a substantial gold-lead-zinc-copper-silver mineral deposit. Hera Resources is evaluating the development of a satellite underground mine at the Federation Site that leverages established infrastructure at the Hera Mine to minimise environmental impacts and allow for the continuation of mining operations in the Nymagee area. Mining of the Federation deposit will allow for a transition of mining operations from Hera Mine to Federation, as ore from the Federation deposit replaces ore from the Hera Mine.

2.3 Project Overview

The Project, as shown in **Figure 2** comprises:

- The establishment and operation of underground gold and metalliferous mining activities, with supporting surface infrastructure, mining approximately 6.95 million tonnes (Mt) of ore over a period of 12 to 14 years, referred to as the Federation Site.
- Amendments at the Hera Mine to facilitate mining and processing of Federation ore, including new process plant and disposal of tailings in the Hera Mine tailings storage facility (TSF).
- Services Corridor between the Federation Site and Hera Mine, including powerline, water pipeline, access track, and potentially a tailings pipeline.

The majority of ore produced will be sent to Hera Mine for processing. However up to 200 ktpa will be transported to PGM during the initial four years of processing (total of 750 kt over this period), whilst the new processing plant at Hera Mine is being commissioned and ramped up.

Access to the underground mine will be via a portal developed through the base of a box cut. The main decline will be developed to gain access to all production levels, where stopes will be excavated. The loosened ore from the stopes will be brought to the surface via underground truck and placed on the Federation Site run of mine (ROM) ore stockpile near the boxcut. Ore will then be transported by surface trucks via Burthong Road to the Hera Mine ROM stockpile at the Hera Mine process plant.

Hera Mine infrastructure is proposed to be modified to facilitate the Project including a new 750 ktpa processing plant and solar farm. The existing processing plant will continue to operate at Hera Mine until the commissioning of the new plant. The new plant will be within the existing approved footprint of Hera Mine. The new processing plant will produce silver and gold doré and separate lead, zinc and copper concentrates.

A total of 5.8 Mt of tailings will be generated from the processing of the ore from Federation. Of this approximately 5.2 Mt will be produced at Hera Mine, with the remaining 0.6 Mt at PGM. Approximately 60% of total tailings produced will be returned to Federation Site to backfill underground stopes.

Hera Mine and Federation Site will be connected by a Services Corridor. The nominated width of the corridor is 23m with an approximate length of 14.3km. Clearing of existing vegetation will be required to install the proposed services infrastructure, including a power transmission line, water pipeline, access track and potentially a tailings slurry pipeline. The access track will be used for maintenance and inspection requirements and will not be used for haulage of ore.

Concentrate from Hera Mine will be trucked to the Hermidale rail siding for transport, as per the current concentrate transport methods and truck sizing. Concentrate from PGM will be transported to Hermidale or Dubbo rail sidings, as per the current concentrate transport methods and truck sizing.

2.4 Transitional Period

It is anticipated that approval for the Federation Project will be obtained in early 2023. Prior to the construction and operation of the Federation Project, an Exploration Decline Program will be undertaken. This activity will be undertaken under a separate approval to that being sought for the Federation Project. The main objectives of the Exploration Decline Program are to further define the mineral resources associated with the Federation deposit, including permitting drilling of exploration drill holes from underground.

Key components of the Exploration Decline Program include:

- Establishment of a surface infrastructure area required to support the exploration decline.
- Development of a box cut, portal, exploration decline, two ventilation rises and one escapeway.
- Transportation to and storage of waste rock within the Surface Infrastructure Area, with subsequent transport of waste rock to Hera Mine.
- Establishment and use of an approximately 14.8km surface pipeline to transfer water from the exploration decline to Hera Mine.
- Exploration drilling from the exploration decline.
- Extraction of one or more bulk samples together totaling no more than 20,000t and transportation of that material to Hera Mine processing plant via Burthong Road.

It is anticipated that the Exploration Decline Program will commence in November 2021 with the surface infrastructure area established and waste rock being generated from the decline. It is anticipated that ore from the bulk sample will be mined and processed between the third quarter of 2022 and first quarter of 2023. Based on the current schedule for the Federation Project, there will be a transitional period between Exploration Decline Program activities, mining operations at Hera Mine, and Federation Project construction and operations. Following approval of the Federation Project:

- construction of Federation Project infrastructure (including the new process plant) will commence in the first half of 2023
- Exploration Decline Program activities will transition into mining operations at the Federation Site
- Hera Mine operations may continue over a period of 6 to 12 months.

From early 2024, it is anticipated that all activities will be related to the Federation Project operations. The operational workforce numbers will be transitioned from Hera Mine operations to Federation Project operations.

2.5 Federation Project Detailed Overview

Provided in **Table 1** is a detailed overview of aspects of the Federation Project.

Table 1 Detailed Project Overview

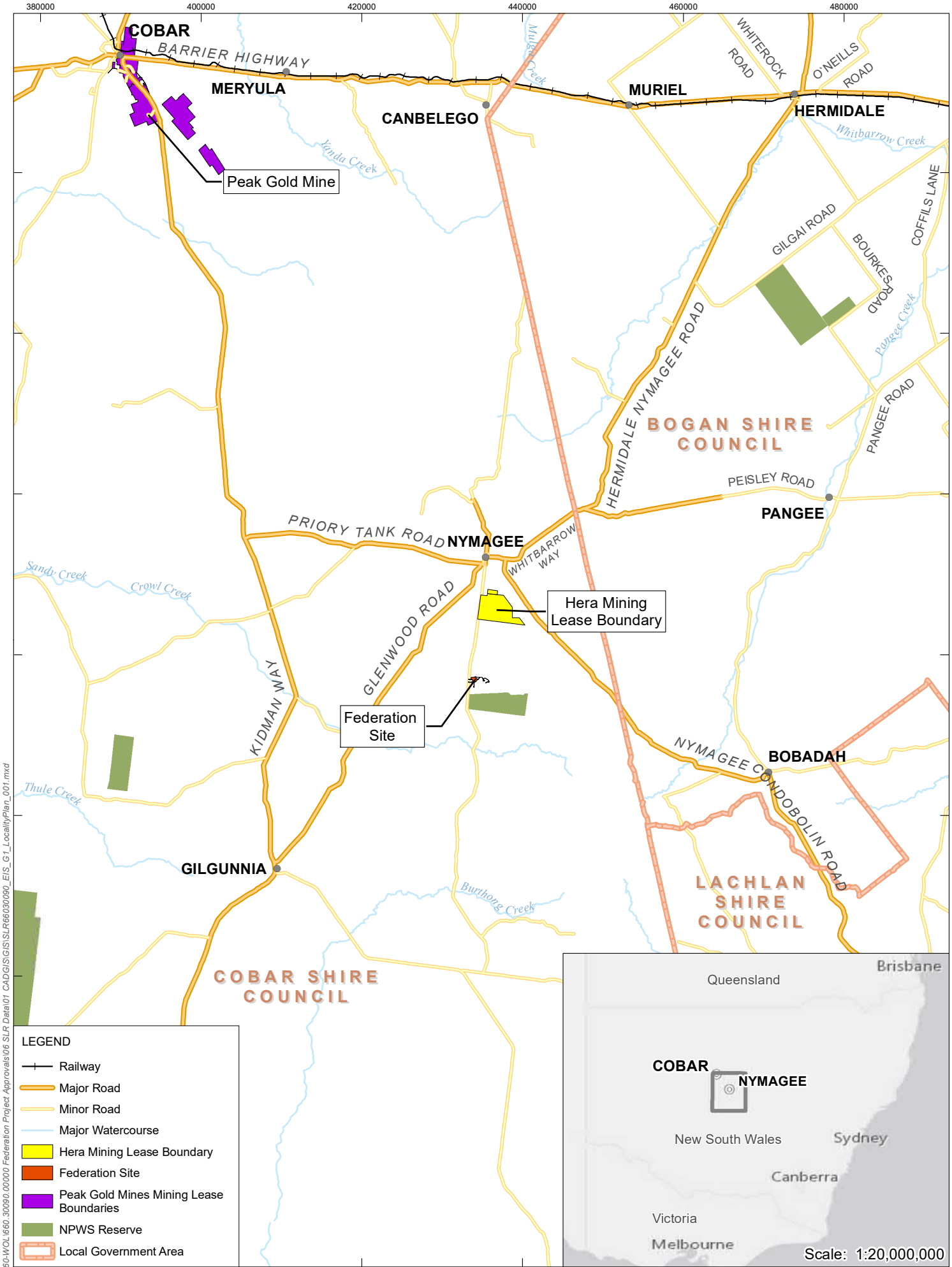
Project Aspect	Project Details
Tenements	**Hera Mine and Federation Project** Mining Lease 1686 Mining Lease 1746 Exploration Licence 6162 Exploration Licence 7447
Current Approvals	**Hera Mine** Major Project Approval - (PA) 10_0191 Environment Protection Licence 20179 **Hera Mine Accommodation Village** Development Consent 2012/LD-00004 Development Consent 2021/LD-00010
Federation Deposit	The July 2021 Mineral Resource Estimate (MRE) reports that the Federation deposit has an estimated combined Indicated and Inferred MRE totalling 5.1Mt at 5.5% Pb, 9.3% Zn, 0.9g/t Au, 7g/t Ag and 0.3% Cu. There is an additional 1.9 Mt of unclassified material, bringing the total potential mineralisation to 7 Mt.
Mining Method	Underground mine stoping method. Access to the underground mine will be via a portal developed through the base of a box cut and decline. The proposed mining method requires excavation via drilling to a depth of approximately 530m to access areas of economically viable mineral resource deposits. Once the mineral deposit is accessed, stopes will be excavated via drilling and blasting. Bench stopes will be progressively backfilled with waste rock and returned tailings from Hera Mine, which will be processed by a pastefill plant located on the Federation Site.
Mine Ventilation	The ventilation infrastructure is subject to further detailed design and is expected to be staged. One or two potential ventilation risers will be established (depending on the diameter of the vent rises) along with an escape way and a fresh air intake. The ventilation rise will have a diameter of approximately 5m (if only one vent rise) or approximately 3 m diameter (if 2 vent rises)

Project Aspect	Project Details
Processing	A new 750 ktpa process plant design is proposed to be commissioned at Hera Mine. The existing processing plant will continue to operate at Hera until the completion of the new plant. The new plant will be within the existing approved footprint of Hera Mine. The new processing plant involves: • Three stages of crushing followed by ball milling with hydrocyclone classification. • Gravity separation to recover gold from the milling circuit recirculating load, followed by cyanide leaching of the gravity concentrate. • Sequential flotation to produce separate copper, lead and zinc concentrates. • Concentrate thickening and filtration. • Tailings thickening and disposal by underground backfill placement in the stopes at the Federation Site and surface storage in the Hera Mine TSF. The primary difference between the proposed plant and the current plant, is that each concentrate (e.g. zinc concentrate) will be produced through dedicated processing circuits.
Waste Rock Management	Two waste rock stockpiles will be located at the Federation Site to store waste rock generated from the development of the boxcut, decline and the lateral and vertical development. One stockpile will be for the storage of potential acid forming (PAF) and non-acid forming (NAF) materials, and the other for (PAF) materials. PAF waste rock will be stored on surface with drainage to lined leachate ponds and used as backfill underground during or post mine life. NAF waste rock will be stored on surface for later use in rehabilitation, such as backfilling the box cut.
Ore Transport	Ore from the Federation deposit, that will be processed at Hera Mine, is proposed to be transported approximately 11km along Burthong Rd. Ore proposed for processing at PGM will be transported along Burthong Rd, Priory Tank Rd and Kidman Way (the same as the currently approved alternate concentrate haulage route). Ore will be transported in trucks with an approximate 50t payload.
Tailings Storage	The approved Hera Mine TSF will continue to be used to store tailings from the Hera processing plant which will process ore from the Federation Site. It is estimated over the life of the Project 5.2 Mt of tailings will be produced from Federation, of which 3.5 Mt will be returned to the Federation Site to be used as backfill. The remaining 1.7 Mt will be placed into the approved TSF.

Project Aspect	Project Details
Surface Infrastructure – Federation Site	Site roads, laydown and access control Explosives magazines x 2 Mobile equipment maintenance workshop and warehouse Hydrocarbon storage Heavy and light vehicle washdown facilities Administration building Change house and laundry Sewerage treatment plant Potable Water Treatment Plant Substation Soil stockpiles Pastefill Plant Batch Plant Communications Tower Quarry
Water Supply	Water will primarily be supplied from dewatering of the underground workings. As part of the mine development, a new borefield will be established for the supply of water from production bores. There are existing water supply bores supplying water to Hera Mine, which will continue to operate. Aurelia holds WAL 43173, which permits the extraction of 543ML of water annually. There is no planned increase to this limit as part of the Project.
On-site water management	The Project will have an integrated water management system across the Federation Site and Hera Mine. A water pipeline within the Services Corridor, and pumps at the Federation Site and Hera Mine, will allow for transfer of water. Water management infrastructure to be constructed at the Federation Site includes: • Mine water dam for dewatering the underground workings with approximate dimensions of 50m x 50m with a capacity of 10 ML. • Leachate ponds for collection of runoff from the PAF waste rock pads and ROM pad. Water from the leachate pond will be pumped to the mine water dam. • Sediment retention dam designed to limit fugitive sediment emissions, which will collect runoff from disturbed areas that do not contain contaminants. The dam has been sized to collect a 1:100-year 72-hour rainfall event from a catchment of approximately 25 ha. • Potentially other minor sediment dams, which would flow to the primary sediment dam. • Drainage infrastructure to separate clean water, sediment water and potentially contaminated water. The catchment areas, which store potentially contaminating materials such as the fuel, hydrocarbons or PAF waste rock will have their own contained catchments and have been limited in extent to minimise the generation of contaminated surface run-off.

Project Aspect	Project Details
Power Supply	A new solar farm will be commissioned at Hera Mine, which will be located 200m south of the existing heavy vehicle access road. The solar farm will be connected to the gas fired power plant on site via a new transmission line. The new plant will increase power production to meet the additional requirements of the Federation Site, as well as the anticipated increase in demand at the Hera Mine from increased processing plant capacity.
Concentrate Transport	Concentrate from Hera Mine will be trucked to the Hermidale rail siding for transport, as per the current concentrate transport methods and truck sizing (50 tonne payload). Concentrate from PGM will be transported to Hermidale or Dubbo rail sidings, as per the current concentrate transport methods and truck sizing.
Hours of Operation	Construction activities will be undertaken 7 days per week during daylight hours, unless a particular aspect of construction requires 24/7 activities. Transport of ore along Burthong Road will be undertaken during daylight hours. Operations at the Federation Site and Hera Mine will be 24 hours per day 7 days per week.
Workforce	It is estimated that a workforce of approximately 100 people will be employed during construction, with a workforce of 200 - 250 for Project operations, depending on the mining and processing production rates. There is a workforce of approximately 150 people for the current Hera Mine operations. Other than the 12 month construction phase, the Project maintains a reasonably consistent workforce, with some increases in the transition from Hera Mine to the Project.
Mining Equipment	Twin boom jumbo Production drill rig 50t trucks 17t loaders Shotcrete sprayer Shotcrete agitator Explosives charging unit Integrated toolcarrier (IT) Service truck Grader Water truck Truck and Loader
Decommissioning and Rehabilitation	Rehabilitation and decommissioning of the Project, including the Hera Mine site, would be undertaken on completion of extraction of the Federation deposit, with underground exploration continuing at Hera Mine during extraction from the Federation deposit. Backfilling of the stope voids will occur throughout operations. A Rehabilitation Management Plan will be developed for the Project which will outline the rehabilitation objectives and final landform for the project.

The Federation Project Location Plan is shown in **Figure 2**. The Indicative Federation and Hera Project Boundary is set out in **Figure 3**. **Figure 4** shows the Federation Site plan and **Figure 5** shows Hera Mine.



Scale: 1:600,000 at A4
Coordinate System: GDA 1994 MGA Zone 55

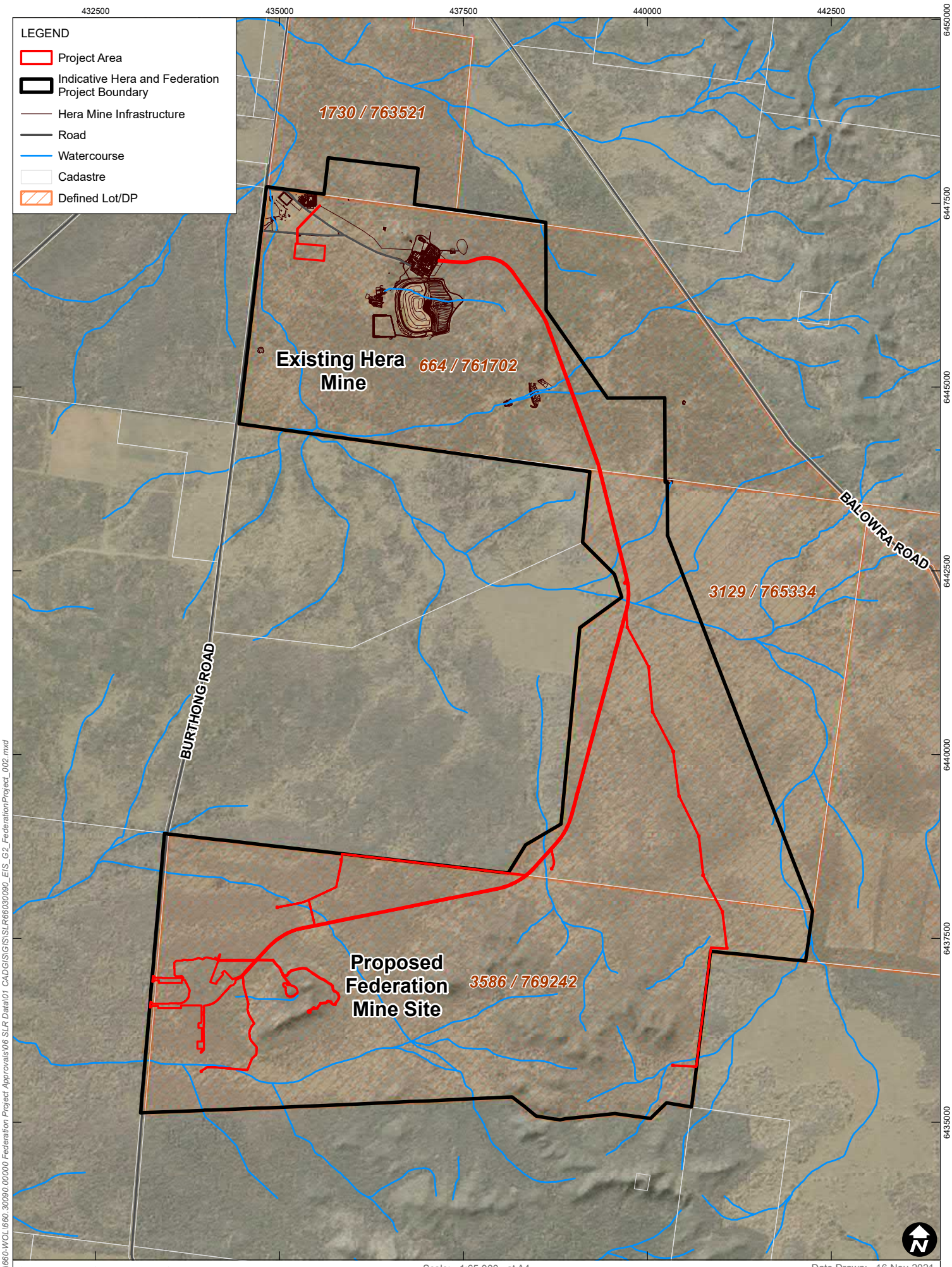
Date Drawn: 16-Nov-2021
Project Number: 660.30090.00000

Data Source: Basedata NSW SS, 2019, Geoscience Australia
Aerial imagery supplied by © Department of Customer Service 2020

H:\Projects-SLR\660-SrvWOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G1_LocalityPlan_001.mxd

FEDERATION PROJECT LOCATION PLAN

FIGURE 2



Scale: 1:65,000 at A4
Coordinate System: GDA 1994 MGA Zone 55

Date Drawn: 16-Nov-2021
Project Number: 660.30090.00000

Data Source: Basedata NSW SS, 2019
Aerial imagery supplied by © Department of Customer Service 2020

H:\Projects-SLR\660-SnyWOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G2_FederationProject_002.mxd

Figure 3

INDICATIVE HERA AND FEDERATION PROJECT BOUNDARY

433000 433500 434000 434500 435000 435500

6437500 6437000 6436500 6436000

DIESEL POWER AND TANKS
DEWATER POND (10ML)
WORKSHOP AND STORE
TOPSOIL STOCKPILE
POTABLE WATER TREATMENT
10L TANKS
STORMWATER RETENTION POND
BOX CUT
ACCESS ROAD
SEWERAGE EFFLUENT IRRIGATION
LAYDOWN
U/G VENTS
SEWERAGE TREATMENT
INTERNAL ACCESS ROAD
PAD 01
ROAD TO COMMUNICATION TOWER
SUBSTATION
PAD 02
PAD 03
TOPSOIL STOCKPILE
ABLUTION
OFFICE, CRIB, ADMIN
U/G VENTS
BURTHONG ROAD
ROM PAD
PAF & NAF WASTE ROCK DUMP
MOBILE TAILINGS PASTE PLANT
UNDERGROUND GO-LINE
PAF WASTE ROCK DUMP
BATCH PLANT
HAUL ROAD
FUEL FARM
SURFACE EXTRACTION AREA
PAD SEDIMENT BASIN
INTERNAL ACCESS ROAD
TOPSOIL STOCKPILE
LINED LEACH POND
LINED LEACH POND
TELECOMMUNICATION TOWER
PAD 04 MAGAZINE
SECOND MAGAZINE
INDICATIVE PIPELINE

LEGEND
- Project Area
- Haul Road/Internal Access
- Indicative Pipeline Network
- PAD
- Services Corridor
- Approximate Location of Stoping Areas (Projected at Surface)

0 250 500 m

Scale: 1:7,500 at A4
Coordinate system: GDA 1994 MGA Zone 55

Date drawn: 06-Dec-2021
Project number: 660.30090.00000

Data Source: Basedata NSW SS, 2019
Aerial imagery supplied by © Department of Customer Service 2020 & Aerometrex Pty Ltd, 2019

SLR

Figure 4
FEDERATION SITE PLAN

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G3_FederationSitePlan_003.mxd

435000
436000
437000
438000
6447000
6446000

EXISTING AND EXPANDED ACCOMODATION VILLAGE

PROPOSED OVERHEAD TRANSMISSION LINE

EXISTING OVERHEAD TRANSMISSION LINE

NEW PROCESS PLANT

EXISTING PROCESS PLANT

Surface Extraction Area

SERVICES CORRIDOR

BURTHONG ROAD

PROPOSED SOLAR FARM

APPROVED MINE SITE INFRASTRUCTURE

RELOCATED MAGAZINE

TSF

TO FEDERATION MINE

WATER MANAGEMENT DAM

LEGEND

- Haulage Route - Hera Mine
- Hera Mine Infrastructure
- Hera Mine, Proposed New Process Plant
- Hera Mine Site Boundary
- Services Corridor
- Proposed Overhead Transmission Line
- Solar Farm

0 250 500 m

Scale: 1:10,000 at A4
Coordinate system: GDA 1994 MGA Zone 55

Date drawn: 16-Nov-2021
Project number: 660.30090

Data Source: Basedata NSW SS, 2019
Aerial imagery supplied by © Department of Customer Service 2020 & Aerometrex Pty Ltd, 2019

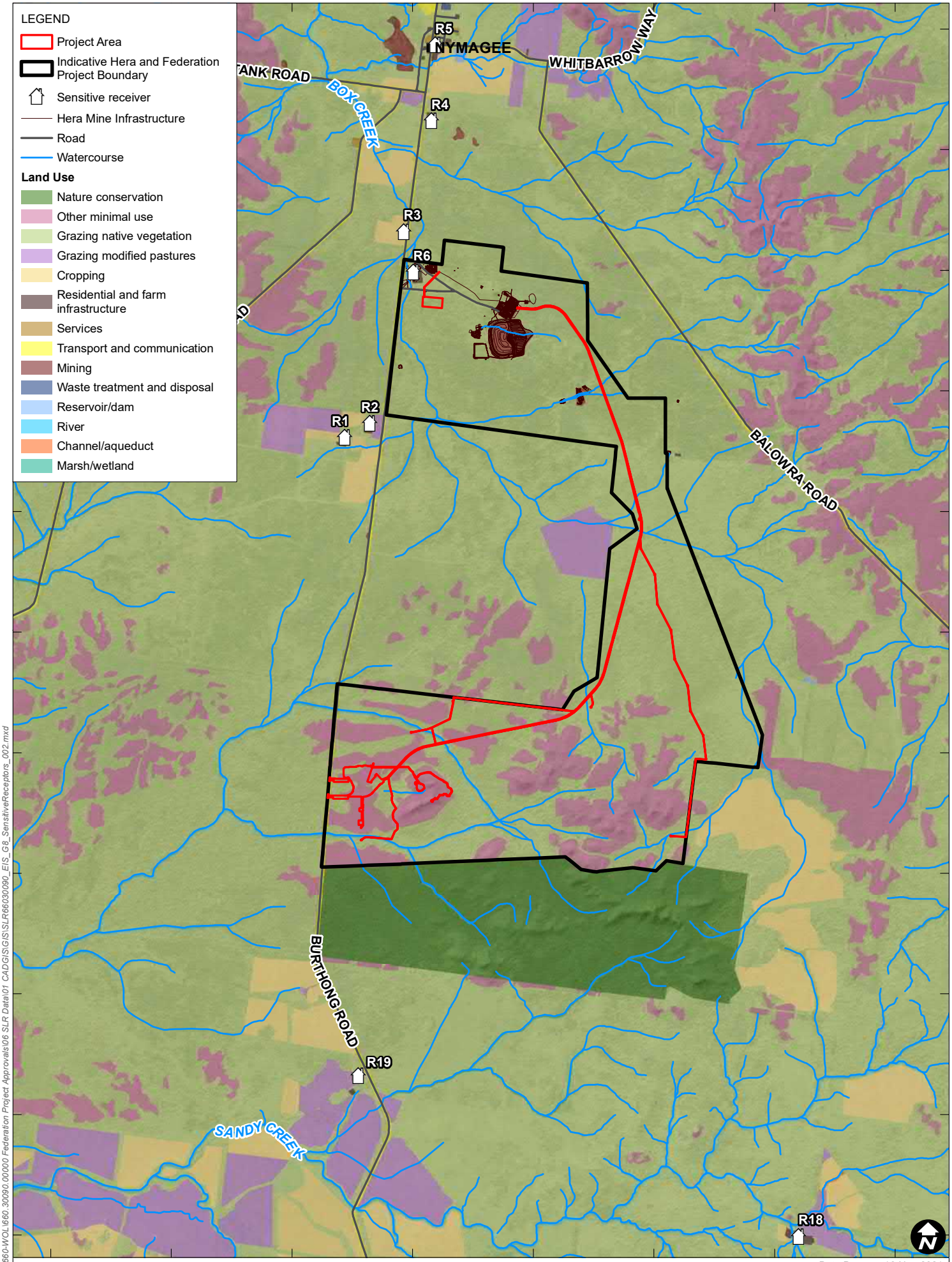
Figure 5
HERA MINE SITE

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G4_HeraSitePlan_001.mxd

2.6 Nearest Receivers

There are sensitive receptors within the vicinity of the Hera Mine and along haul routes between Federation Site and Hera Mine. The closest sensitive receptors to Hera Mine are receptors R3 and R2/R1, which are located approximately 2.5 km north west of the mine infrastructure area and 3.0 – 3.5 km south west of the mine infrastructure area, respectively.

Figure 6 presents the location of nearby sensitive receptors. **Table 2** presents the detailed list of sensitive receptors (ERM, 2021).



Scale: 1:100,000 at A4
Coordinate System: GDA 1994 MGA Zone 55

Date Drawn: 16-Nov-2021
Project Number: 660.30090.00000

Data Source: Basedata NSW SS, 2019
Aerial imagery supplied by © Department of Customer Service 2020
Land Use © State Government of NSW and Department of Planning, Industry and Environment 2020

Figure 6
SENSITIVE RECEIVERS

H:\Projects-SLR\660-SrvWOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G8_SenstiveReceptors_002.mxd

Table 2 Surrounding Sensitive Receivers

Receptor ID	Easting (mE, MGA94)	Northing (mN, MGA94)
R1	433589	6444039
R2	434110	6444329
R3	434812	6448309
R4	435384	6450597
R5	435468	6452177
R18	442991	6427477
R19	433869	6430813

Source: ERM, 2021

3 PRELIMINARY RISK SCREENING

Preliminary risk screening of the proposed Project is required under SEPP 33 to determine the need for a Preliminary Hazard Analysis. The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant, off-site effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations as well as transported to and from the site.

3.1 Dangerous Goods Storage

In this report the term “Federation Plant (Hera site)” refers to the proposed processing plant at Hera Mine to process ore from the Federation Mine Site (i.e. Federation Site). The proposed inventory of Dangerous Goods (DG) in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) is provided in **Table 3** (Federation Plant (Hera site) and **Table 4** (Federation Mine Site) below.

The information contained in the tables compares the total storage quantity of the required dangerous goods classes against the storage screening threshold in Table 3, and Figure 9 of Applying SEPP 33 (NSW Department of Planning, 2011).

The dangerous goods to be stored on the site were grouped into their respective ADG classes. If more than one packaging group was present in an ADG class it was assumed that the total amount for that class was the more hazardous packing group.

Diesel fuel to be stored on both sites, is not classed as a Dangerous Goods, but is classed as a C1 Combustible Liquid provided no flammable liquids are stored with the diesel.

SLR has been advised that no flammable liquids will be stored with the diesel. Therefore, in the Project diesel will be classed as a C1 Combustible Liquid.

Note that C1 combustible liquids are not a dangerous good under UN (United Nations) classification. However, they are defined as dangerous goods under NSW workplace legislation. Where dangerous goods are used or stored in volumes greater than the manifest quantities specified in schedule 11 of the *Work Health and Safety Regulation 2017*, Safework NSW must be notified, which will include manifests and lodgement an emergency plan to Fire and Rescue NSW. Further advice on these requirements may be sought from Safework NSW.

It should be noted that the *Protection of the Environment Operations Act 1997*, Schedule 1, Clause 9(1) indicates that 'petroleum products storage', which would include diesel fuel storage, is a Scheduled Activity. Capacity to store greater than 2,000 tonnes requires an environment protection licence under the *Protection of the Environment Operations Act 1997* (POEO Act), from the NSW Environmental Protection Authority (EPA).

The proposed inventory of dangerous goods and other hazardous materials at the Federation Plant (Hera Mine Site) is set out below in **Table 3**.

The proposed inventory of dangerous goods and other hazardous materials at the Federation Mine Site is set out below in **Table 4.**

Table 3 Dangerous Goods in Storage – Federation Plant (Hera Mine Site)*

Substance	Hazardous Class	Packing Group	Total Storage on Site	SEPP 33 Threshold Quantity	SEPP 33 Threshold Level Findings
LPG	Dangerous Goods 2.1		7.5m^3 (Elgas storage)	10 t or 16m^3	Below
Methyl Isobutyl Carbinol (MIBC)	Dangerous Goods 3	III	4.2 t	9 m separation from other uses	Below
Sodium Isobutyl Xanthate	Dangerous Goods 4.2	III	4.9 t	1 t	Above
Hydrogen peroxide (50% w/w sol)	Dangerous Goods 5.1	II	20,000 L (24 t)	5 t	Above
Sodium cyanide	Dangerous Goods 6.1	II	7.5 t	2.5 t	Above
Nitric acid	Dangerous Goods 8	II	2,000 L (2.4 t)[1]	25 t	Below
Sodium hydroxide (50% w/w sol)	Dangerous Goods 8	III	0.8 t[2]	50 t	Below
Copper Sulphate Pentahydrate	Dangerous Goods 9	III	34 t	Not applicable	Not applicable
Diesel	C 1		250,000 L (212 t)[3]	Manifest Quantity Safework NSW 100,000kg or litres PEOP Act 2,000 t	Safework NSW notification required Environmental Protection Licence under (POEO Act) not required from NSW EPA
Sodium Metabisulphite	Poison S5		93.8 t	Not applicable	Not applicable

Note: * Information supplied by Aurelia Metals Ltd
1 Based on density of 1.2g/ml
2 Based on density of 1.2g/ml
3 Based on density of 1,182 L per tonne for automotive diesel

The following dangerous goods to be stored on Federation Plant (Hera Mine site) are above the screening thresholds and therefore are considered potentially hazardous:

- Sodium Isobutyl Xanthate
- Hydrogen peroxide (50% w/w sol)
- Sodium cyanide

Table 4 Dangerous Goods in Storage – Federation Mine Site*

Substance	Hazardous Class	Packing Group	Total Storage on Site	SEPP 33 Threshold Quantity	SEPP 33 Threshold Level Findings
ANFO	Dangerous Goods 1.1		Up to 40 t	550 m separation from all uses	Below, but requires further explanation of design in PHA
ANE	Dangerous Goods 5.1		Up to 10 t	5 t	Above
Diesel	C 1		160,000 L (135 t)[1]	Manifest Quantity Safework NSW 100,000kg or litres PEOP Act 2,000 t	Safework NSW notification required Environmental Protection Licence under (POEO Act) not required from NSW EPA

Note: * Information supplied by Aurelia Metals Ltd
1 Based on density of 1,182 L per tonne for automotive diesel

The following dangerous goods to be stored on Federation Mine Site are above the screening thresholds and therefore are considered potentially hazardous:

- ANE
- ANFO is within the screening threshold but requires further explanation of storage design in the PHA.

3.2 Dangerous Goods Transport

In applying SEPP 33 a proposed development may be deemed potentially hazardous if the numbers of generated traffic movements for significant quantities of dangerous goods entering and leaving the site, are above the cumulative vehicle movements shown in the SEPP 33 guideline (Table 2).

The levels of maximum proposed annual movements at the Federation Plant (Hera Mine Site) is set out below in **Table 5**.

The levels of maximum proposed annual movements at the Federation Mine Site is set out below in **Table 6**.

Table 5 Dangerous Goods Transport– Federation Plant (Hera Mine Site)

Substance	Hazardous Class	Packing Group	Predicted Vehicle Movements per Year	SEPP 33 Transportation Screening Thresholds	Approximate Load Size	Threshold Level Findings
LPG	Dangerous Goods 2.1		26	>500	7.5m^3	Below
Methyl Isobutyl Carbinol (MIBC)	Dangerous Goods 3	III	26	>1000	1.9 t	Below

Substance	Hazardous Class	Packing Group	Predicted Vehicle Movements per Year	SEPP 33 Transportation Screening Thresholds	Approximate Load Size	Threshold Level Findings
Sodium Isobutyl Xanthate	Dangerous Goods 4.2	II	26	>100	2.3 t	Below
Hydrogen peroxide (50% w/w sol)	Dangerous Goods 5.1	II	26	>500	11.1 t	Below
Sodium cyanide	Dangerous Goods 6.1	II	6	All	7.5 t	Above
Nitric acid	Dangerous Goods 8	II	26	>500	1.1 t	Below
Sodium hydroxide (50% w/w sol)	Dangerous Goods 8	III	26	>500	0.4 t	Below
Copper Sulphate Pentahydrate	Dangerous Goods 9	III	26	>1000	15.5 t	Below
Diesel	C 1		Not applicable	Not applicable	Not applicable	Not applicable
Sodium Metabisulphite	Poison S5		Not applicable	Not applicable	Not applicable	Not applicable

Note: * Information supplied by Aurelia Metals Ltd.

Table 6 Dangerous Goods Transport– Federation Mine Site *

Substance	Hazardous Class	Packing Group	Predicted Vehicle Movements per Year	SEPP 33 Transportation Screening Thresholds	Approximate Load Size	Threshold Level Findings
ANFO	Dangerous Goods 1.1		26	All	All	Above
ANE	Dangerous Goods 5.1		26	> 500	1 t	Below
Diesel	C 1		Not applicable	Not applicable	25,000 L	Not applicable

Note: * Information supplied by Aurelia Metals Ltd.

The majority of proposed dangerous goods transportation were below the screening thresholds for vehicle movements per year and therefore are not considered potentially hazardous. The exception was the transport of the following which exceeded screening thresholds for vehicle movements per year:

- ANFO at Federation Mine Site
- Sodium cyanide at Federation Plant (Hera Mine Site)

4 PRELIMINARY RISK SCREENING CONCLUSION

This report has reviewed and applied the requirements of SEPP 33 in order to determine whether the policy applies to the Project.

The SEPP 33 screenings for storage of dangerous goods indicate that the development may be classified as a hazardous or offensive industry indicating a more detailed assessment of the hazards listed below be undertaken in the following Preliminary Hazard Analysis.

The following dangerous goods storage and transport are considered potentially hazardous at either site as set out below:

Federation Plant (Hera Mine Site)

- Sodium Isobutyl Xanthate
- Hydrogen peroxide (50% w/w sol)
- Sodium cyanide (storage and transport)

Federation Mine Site

- ANFO (storage and transport)

5 PRELIMARY HAZARD ANALYSIS

A Preliminary Hazard Analysis must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DoP, 2011). The Preliminary Hazard Analysis should estimate the cumulative risks from the existing and proposed development.

Where SEPP 33 identifies a development as potentially hazardous and/or offensive, developments are required to undertake a Preliminary Hazard Analysis to determine the level of risk to people, property and the environment at the proposed location and in the presence of controls.

The purpose of the Preliminary Hazard Analysis is to assess whether the proposed development impacts on the current surrounding land uses and/or if the development is offensive or hazardous, thereby posing an unacceptable risk to the surrounding community or if the proposed development may be potentially subject to hazards or risks from existing development in the surrounding area.

In the context of the current report as stated previously (Section 2.1) the proposed development comprises underground mining activities and surface infrastructure at the Federation Site, amendments at Hera Mine (Federation Plant) to facilitate processing of ore from the Federation Site, and a Services Corridor connecting the Federation Site with Hera Mine. The Federation Site is located approximately 15km south of the Nymagee township and 10km south of the Hera Mine.

5.1 Hazard Identification

The hazard analysis and quantified risk assessment approach developed and recommended in HIPAP relies on a systematic and analytical approach to the identification and analysis of hazards and the quantification of off-site risks to assess risk tolerability and land use safety implications. HIPAP advocates a merit-based approach, the level and extent of analysis must be appropriate to the hazards present and therefore, need only progress to the extent necessary for the particular case.

5.1.1 Methodology

The procedures adopted by this study for assessing hazardous impacts involve the following steps:

Step 1: Hazard identification;

Step 2: Hazard analysis (consequence and probability estimations); and

Step 3: Risk evaluation and assessment against specific criteria.

The following sections of the report discuss the hazard identification and analysis process as prescribed in HIPAP.

5.1.2 Hazard Identification

This is the first step in the risk assessment. It involves the identification of all theoretically possible hazardous events as the basis for further quantification and analysis. This does not in any way imply that the hazard identified or the theoretically possible impact will occur in practice. Essentially, it identifies the particular characteristics and nature of hazards to be further evaluated in order to quantify potential risks.

To identify hazards, a survey of operations was carried out to isolate the events which are outside normal operating conditions and which have the potential to impact outside the boundaries of the site. These events do not include occurrences that are a normal part of the operation cycles of the site but rather the atypical and abnormal.

5.1.3 Hazard analysis

After a review of the events identified in the hazard identification stage and the prevention/protection measures incorporated into the design of the site, any events which are considered to have the potential to result in impacts off-site or which have the potential to escalate to larger incidents are carried to the next stage of analysis.

5.1.4 Consequence Estimation

This aspect involves the analysis and modelling of the credible events carried forward from the hazard identification process in order to quantify their impacts outside the boundaries of the site. These events typically include explosion, fire fume, dispersion/propagation and stormwater contamination and their potential effects on people and/or damage to property.

5.1.5 Probability Likelihood Estimation

Where necessary, the likelihood of incidents quantified as a result of Section 4.1.4 are determined by adopting probability and likelihood factors derived from published data.

5.1.6 Risk Evaluation and Assessment

The risk analysis includes the consequences of each hazardous event and the frequencies of each initiating failure. The results of consequence calculations (radiation and overpressure contours, and toxic exposure levels) together with the probabilities and likelihood's estimated are then compared against the accepted criteria, as specified by the HIPAP series applicable for the site. Whether it is considered necessary to conduct the predictions would depend on the probabilities and likelihood estimated and if the risk criteria are exceeded.

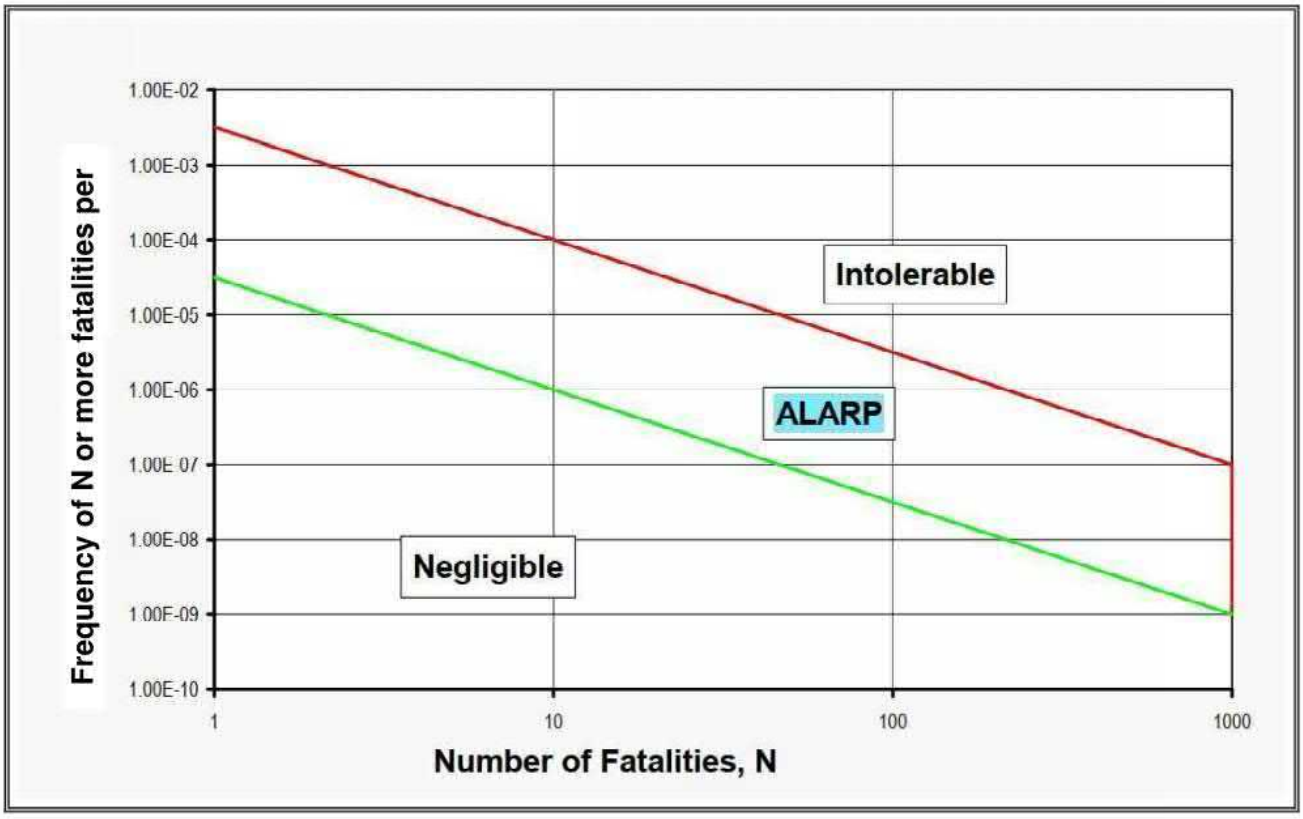
5.1.7 Risk Criteria

As part of the MLRA, hazards are identified and the risk from the hazards estimated. Risk criteria take into consideration surrounding land uses, and the category of risk. They encompass such elements as injury/ irritation, individual and societal risk of fatality, property damage and harm to the biophysical environment. Criteria may be expressed in qualitative or quantitative terms. (Planning NSW, 2011a) A key concept in the risk criteria is that societal risks should be "as low as reasonably practical", known as the ALARP principle.

ALARP is a principle that may be applied in relation to the degree of risk reduction that may be sought from a particular activity. It has been described by the UK Health and Safety Executive (HSE) in the following terms: 'In weighing the costs of extra safety measures the principle of reasonable practicability (ALARP) applies in such a way that the higher or more unacceptable a risk is, the more, proportionately, an employer is expected to spend to reduce it'.

The indicative societal risk criteria reflect these regions as three societal risk bands: negligible, ALARP and intolerable, as shown in the example below in **Figure 7**.

Figure 7 Indicative Societal Risk Criteria



(* Source Planning NSW, HIPAP 4, New South Wales Government, figure 3)

Below the negligible line, provided other individual criteria are met, societal risk is not considered significant. Above the intolerable level, an activity is considered undesirable, even if individual risk criteria are met. Within the ALARP region, the emphasis is on reducing risks as far as possible towards the negligible line. Provided other quantitative and qualitative criteria are met, the risks from the activity would be considered tolerable in the ALARP region.

The risk assessment in the current study was based on hazard identification, consequence assessment and likelihood assessment, to create an overall risk assessment. Descriptors for the qualitative risk assessment at the various levels of consequence of a particular event, and the likelihood (or probability) of such an event occurring are presented in **Table 7** and **Table 8**.

Table 7 Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances
C	Possible	Could occur
D	Unlikely	Could occur but not expected
E	Rare	Conceivable, but only in exceptional circumstances

Table 8 Qualitative Consequence Rating

Level	Descriptor	People	Environment	Asset / Production
5	Catastrophic	Multiple fatality	Extreme environmental harm, eg. widespread catastrophic impact	More than $5M ($5 million) loss or production delay
4	Major	Permanent total disabilities, single fatality	Major environmental harm, eg. Widespread substantial impact	$1M to $5M loss or production delay
3	Moderate	Major injury or health effects, eg. major lost workday case/permanent disability	Serious environmental harm, eg. widespread and significant impact	$500k ($500k thousand) to $1M loss or production delay
2	Minor	Minor injury or health effects, eg. restricted work or minor lost workday case	Material environmental harm, eg. localised and significant impact	$50k to $500k loss or production delay
1	Insignificant	Slight injury or health effects, eg. first aid/minor medical treatment level	Minimal environmental harm, eg. interference or likely interference to an environmental value	Less than $50k loss or production delay

The risk ratings are defined as the following:

- Tolerable – The risk is acceptably low
- ALARP – As Low As Reasonably Practical, the risk has been reduced to as low a level as possible and all feasible controls and mitigation strategies are implemented.
- Intolerable - The risk cannot be reduced to an acceptable level with residual impacts likely to have significant impact on the local environment or stakeholders. Intolerable risk would preclude the development of the Project.

Th risk rating matrix has been set out below in **Table 7**.

Table 9 Risk Rating Matrix

			Risk Rating		
Likelihood			**Consequence**		
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	ALARP	ALARP	Intolerable	Intolerable	Intolerable
Likely	Tolerable	ALARP	ALARP	Intolerable	Intolerable
Possible	Tolerable	Tolerable	ALARP	ALARP	Intolerable
Unlikely	Tolerable	Tolerable	Tolerable	ALARP	ALARP
Rare	Tolerable	Tolerable	Tolerable	Tolerable	ALARP

In assessing the tolerability of risk from potentially hazardous development, the relevant general principles set out in HIPAP 6 are:

- the avoidance of all avoidable risks;
- the risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low;
- the effects of significant events should, wherever possible be contained within the site boundary; and
- where the risk from an existing installation is already high, further development should not pose any incremental risk.

5.1.8 Risk of Property Damage and Accident Propagation

The siting of an installation must account for the potential for propagation of an accident causing a "domino" effect on adjoining premises. This risk would be expected within an industrial estate where siting of hazardous materials on one site may potentially cause hazardous materials on an adjoining premises to further develop the size of the accident.

In the current study, the risk of property damage and accident propagation to adjoining property outside both the Federation Mine Site and Federation Plant (Hera Mine) Site is considered unlikely. Based on the significant distances between the sites and the nearest sensitive receivers.

5.1.9 Criteria for Risk Assessment to the Biophysical Environment

The siting of potentially hazardous developments also needs to consider the risk from accidental releases into the biophysical environment.

The suggested criteria for sensitive environmental areas relate to the potential effects of an accidental release or emission on the long-term viability of the ecosystem or any species within it and are expressed as follows:

- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the effects or consequences of the more likely accidental emissions may threaten the long-term viability of the ecosystem or any species within it; and

- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the likelihood or probability of impacts that may threaten the long-term viability of the ecosystem or any species within it is not substantially lower than the existing background level threat to the ecosystem.

In the current study, the risk of biophysical damage outside both the Federation Mine Site and Federation Plant (Hera Mine) Site is considered unlikely based on the engineering and design controls that will be in place and the nature of the surrounding environment.

5.2 Potential Hazardous Incidents Identified for Further Discussion

Following a review of surrounding land use a series of potentially hazardous events or scenarios were considered to identify if further comprehensive qualitative analysis is required. Each event or scenario shall be discussed in detail.

The following dangerous goods storage and transport listed below exceeded SEPP 33 Preliminary Risk Screening as such required more comprehensive analysis:

Federation Plant (Hera Mine Site):

- Sodium Isobutyl Xanthate
- Hydrogen peroxide (50% w/w sol)
- Sodium cyanide (storage and transport)

Federation Mine Site:

- ANFO (storage and transport).

The Hazard Identification Word Diagram listing hazards considered can be found in **Table 8.**

ANFO storage details are assessed separately below.

5.2.1 ANFO Storage

AS2187.1 (Parts 0,1,2) 1998: Explosives – storage, transport & use (Section 3 Segregation and Separation Distances, Table 3.2.3.2) sets out distances required for the separation of explosive storage facilities from Protected Works – Class A and Protected Works – Class B, Vulnerable Facilities and Other Explosives Storage.

The definition of Protected Works Class A and Class B provided in AS2187.0 is as follows:

Class A: Public street, road or thoroughfare, railway, navigable waterway, dock, wharf, pier or jetty, marketplace, public recreation and sports ground or other open place where the public is accustomed to assemble, open place of work in another occupancy, river-wall, seawall, reservoir, water main (above ground), radio or television transmitter, main electrical substation, private road which is the principal means of access to a church, chapel, college, school, hospital or factory.

Class B: Dwelling house, public building, church, chapel, college, school, hospital, theatre, cinema or other building or structure where the public is accustomed to assemble, shop, factory, warehouse, store, building in which any person is employed in any trade or business, depot for the keeping of flammable or dangerous goods, major dam.

Under the definitions provided above, Federation Mine Site facilities are classed as follows:

- Protected Works – Class A: the public road to the west of the site; and
- Protected Works – Class B: the fuel farm, administration buildings and workshops

Protected Works – Class B is the most sensitive category with the greatest separation distance requirements. As such Class B was used to assess separation distances proposed for the Federation Mine storage.

The proposed ANFO storage consist of two purpose built explosive facilities set out as Pad 1 and Pad 2. Both facilities will be designed to be licensed by SafeWork NSW. The combined storage of Pad 1 and Pad 2 will be 40 t of ANFO /ANE.

The Pad 1 storage is located 550m from Protected Works – Class B. Accordingly in the current location, the Pad 1 storage may be limited to 17 t of ANFO to ensure adequate separation distances from Protected Works – Class B. If Pad 1 storage is to include 20 t of ANFO then the separation distance will need to be increased to 603 m from Protected Works – Class B.

The Pad 2 storage will be located at a distance greater than 200 m from Pad 1 storage and approximately 760 m from Protected Works – Class B. This will facilitate the storage of an additional 20 t of ANFO or ANE and an additional 5 t of boosters and/or Explosive, Blasting, Type E (Powergel or equivalent).

The risks associated with the proposed ANFO storage, in two purpose built explosive facilities, Pad 1 and Pad 2 are considered to be “Tolerable” (i.e. the risk is acceptably low).” with control measures in place.

The controls measures to instigated will include the following:

- The technical and management safeguards required are standard industry practice and readily implemented as part of safety engineering.
- Both facilities will be designed to be licensed by SafeWork NSW.
- The separation distances from Protected Works – Class B to meet requirements set out in AS2187.1.

5.2.2 Incident Scenarios and Control Measures

The control measures, provided below, are designed to maintain and contain the risks within the boundaries of the two sites and reduce the risk to areas outside the boundaries. The technical and management safeguards required are self-evident and readily implemented as part of plant safety engineering. Following these safeguards, including codes and standards will ensure the risk level is ALARP and that the Project design meets the principles of:

- the avoidance of all avoidable risks;
- the risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low;
- the effects of significant events should, wherever possible be contained within the site boundary; and
- where the risk from an existing installation is already high, further development should not pose any incremental risk.

Major incidents possible at both sites along with potential outcomes, consequences and control measures and residual risk after the implementation of control measures have been outlined the Hazard Identification Word Diagram can be found in **Table 10**.

SLR has been advised that hazards and risk associated with the TSF have been covered elsewhere in a separate report. Accordingly, these details are not covered in the table below.

Table 10 Summary of Potential Major Incident Scenarios & Residual Risk after Implementation of Controls

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Sodium Isobutyl Xanthate						
Storage Facility	Accident	Accident within the storage area	Storage of material only in manufacturer's original packaging. Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. Storage of appropriate spill-clean up and equipment and materials in the vicinity of the storage location. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented.	Unlikely	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Storage Facility	Spill	Inadequate maintenance and/or design resulting in spillage. Handling error by personnel.	Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. Storage of appropriate spill-clean up and equipment and materials in the vicinity of the storage location. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in routine handling of chemical. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hydrocarbon, Chemical and Reagent Management Plan implemented. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Accident	Accident within the Processing Plant area resulting in spillage	Restricted access to the Processing Plant area enforced. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Rare	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Spill	Inadequate maintenance and/or design resulting in spillage. Operator error by personnel.	Processing Plant contained within a bunded area capable of retaining any spill Restricted access to the Processing Plant area enforced. Regular inspections of the plant completed and any maintenance requirements reported and enacted. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Hydrogen peroxide (50% w/w sol)						
Storage Facility	Accident	Accident within the storage area	All hydrogen peroxide solution stored within adequately bunded and ventilated area. Bunding constructed to relevant construction standard. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Storage Facility	Spill	Inadequate maintenance and/or design resulting in spillage. Handling error by personnel.	Bunding constructed of impermeable material. Bunding constructed to relevant construction standard. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in routine handling of chemical. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Accident	Accident within the Processing Plant area resulting in spillage	Restricted access to the Processing Plant area enforced. Processing Plant contained within a bunded area capable of retaining any spill. Maintenance and monitoring of containment capacities. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Rare	Minor	Tolerable

Ore Treatment and Processing	Spill	Inadequate maintenance and/or design resulting in spillage. Operator error by personnel.	Processing Plant contained within a bunded area capable of retaining any spill Restricted access to the Processing Plant area enforced. Regular inspections of the plant completed and any maintenance requirements reported and enacted. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable
Lead Nitrate						

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Storage Facility	Accident	Accident within the storage area	Storage of material only in manufacturer's original packaging. Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Storage Facility	Spill	Inadequate maintenance and/or design resulting in spillage. Handling error by personnel.	Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. Storage of appropriate spill-clean up and equipment and materials in the vicinity of the storage location.. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in routine handling of chemical. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Accident	Accident within the Processing Plant area resulting in spillage	Restricted access to the Processing Plant area enforced. Processing Plant contained within a bunded area capable of retaining any spill. Maintenance and monitoring of containment capacities. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Rare	Minor	Tolerable

Ore Treatment and Processing	Spill	Inadequate maintenance and/or design resulting in spillage. Operator error by personnel.	Processing Plant contained within a bunded area capable of retaining any spill Restricted access to the Processing Plant area enforced. Regular inspections of the plant completed and any maintenance requirements reported and enacted. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area – Advise senior site management of the spill.	Unlikely	Minor	Tolerable
Sodium Cyanide						

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Transport to the Project Site	Accident	Traffic accident resulting in spillage and possible pollution.	Driver Code of Conduct implemented. Only designated transport route to be followed by driver. UN number and Dangerous Goods Class information for sodium cyanide clearly displayed on the Integrated Bulk Container (IBC). Material Safety Data Sheet (MSDS) and other relevant information on sodium cyanide from ChemAlert retained by driver and relevant Project Site personnel. Effective communication between driver and site personnel established. Transport Management Plan implemented. Emergency Management Plan for dealing with cyanide spill developed and implemented. The Plan will include the following. – Advise emergency services of the spill. – Isolate the spill area (if possible). – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill (as per current Hera Mine management procedure).	Rare	Major	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Transport to the Project Site	Spill	Operator error/poor maintenance leading to leak or spill.	MSDS and ChemAlert information retained by driver and Proponent's staff. Driver to have completed relevant training in emergency response or HAZMAT. Effective communication between driver and site personnel established. Transport Management Plan implemented. Emergency Management Plan for dealing with cyanide spill developed and implemented. The Plan will involve the following. – Advise emergency services of the spill. – Isolate the spill area (if possible). – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill.	Unlikely	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Transport to the Project Site	Fire	Accident resulting in fire resulting in the generation of hydrogen cyanide (HCN) gas.	MSDS and ChemAlert information retained by driver and relevant Project Site personnel. UN number and Dangerous Goods Class information for sodium cyanide clearly displayed on the IBC. Only designated transport route to be followed by driver. Driver to have completed relevant training in emergency response or HAZMAT. Effective communication between driver and site personnel established. Transport Management Plan implemented. Emergency Management Plan for dealing with fire developed and implemented. The Plan will include the following. – Advise emergency services of the fire and toxic nature of sodium cyanide and HCN. – Evacuate the area. – Evacuate (or assist in evacuation) all persons within 1.3 km of the incident.	Rare	Major	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Storage Facility	Accident	Accident within the storage area	Storage of material only in manufacturer's original packaging. Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. All cyanide solution stored within adequately bunded and ventilated area. Bunding constructed to relevant construction standard. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hazardous Materials Management Plan implemented.	Unlikely	Moderate	Tolerable

Storage Facility	Spill	Inadequate maintenance and/or design resulting in spillage. Handling error by personnel.	Storage of material in an appropriately designed facility under cover and with adequate access for vehicles and personnel. Storage of appropriate spill-clean up and equipment and materials in the vicinity of the storage location. All cyanide solution stored within adequately bunded and ventilated area. Bunding constructed to relevant construction standard. MSDS and ChemAlert information retained by Project Site personnel. Environmental inspections and reporting completed regularly. Operational personnel to have completed relevant training in routine handling of chemical. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Hydrocarbon, Chemical and Reagent Management Plan implemented. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following.	Unlikely	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
			Advise emergency services of the spill. – Evacuate the area. – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill.			
Storage Facility	Fire	Fire resulting in the generation of hydrogen cyanide (HCN) gas.	Appropriate design of storage locations, including limitation of ignition sources and separate storage of flammable materials. Installation of appropriate fire management facilities, including sprinklers, extinguishers and fire hoses in accordance with relevant design standards. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. Advise emergency services of the spill. – Evacuate the area. – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill.	Rare	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Accident	Accident within the Processing Plant area resulting in spillage	Restricted access to the Processing Plant area enforced. Processing Plant contained within a bunded area capable of retaining any spill. Maintenance and monitoring of containment capacities. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Advise emergency services of the spill. – Evacuate the area. – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill.	Unlikely	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Ore Treatment and Processing	Spill	Inadequate maintenance and/or design resulting in spillage. Operator error by personnel.	Processing Plant contained within a bunded area capable of retaining any spill Restricted access to the Processing Plant area enforced. Regular inspections of the plant completed and any maintenance requirements reported and enacted. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. – Evacuate the area. – Advise senior site management of the spill. – Consider evacuation of the site and communication with emergency services (on advice from senior site management and dependent on the nature of the material spilled).	Unlikely	Moderate	Tolerable

Ore Treatment and Processing	Fire	Fire resulting in the generation of hydrogen cyanide (HCN) gas.	Appropriate design of storage locations, including limitation of ignition sources and separate storage of flammable materials. Installation of appropriate fire management facilities, including sprinklers, extinguishers and fire hoses in accordance with relevant design standards. MSDS and ChemAlert information retained by Project Site personnel. Operational personnel to have completed relevant training in emergency response and/or HAZMAT. Emergency Management Plan for dealing with spill developed and implemented. The Plan will include the following. Advise emergency services of the spill. – Evacuate the area. – Evacuate (or assist in evacuation) all persons within 1.3 km of the spill.	Rare	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
ANFO						
Transport to the Project Site	Accident	Traffic accident resulting in spillage and possible pollution.	Driver Code of Conduct implemented. Only designated transport route to be followed by driver. UN number and Dangerous Goods Class information for ANFO clearly displayed. Material Safety Data Sheet (MSDS) and other relevant information on ANFO from ChemAlert retained by driver and relevant Project Site personnel. Effective communication between driver and site personnel established. Transport Management Plan implemented. Emergency Management Plan for dealing with ANFO spill developed and implemented. The Plan will include the advising emergency services of the spill.	Unlikely	Moderate	Tolerable

Location / Hazard	Incident	Scenario	Controls	Likelihood	Consequence	Residual Risk
Transport to the Project Site	Fire	Accident resulting in fire	MSDS and ChemAlert information retained by driver and relevant Project Site personnel. UN number and Dangerous Goods Class information for ANFO clearly displayed. Only designated transport route to be followed by driver. Driver to have completed relevant training in emergency response or HAZMAT. Effective communication between driver and site personnel established. Transport Management Plan implemented. Emergency Management Plan for dealing with fire developed and implemented. The Plan will include advising emergency services of the fire.	Rare	Moderate	Tolerable

Note * Residual risk levels assessed as per section 5.1.7

6 Conclusions

The Preliminary Hazard Analysis has found that the main dangerous goods potential hazards associated with the Federation Mine and Federation Plant (Hera Mine Site) were the following:

Federation Plant (Hera Mine Site):

- Sodium Isobutyl Xanthate
- Hydrogen peroxide (50% w/w sol)
- Sodium cyanide (storage and transport)

Federation Mine Site:

- ANFO (storage and transport)

The residual risks associated with these hazards once controls are implemented were rated as Tolerable (i.e. the risk is acceptably low).

The technical and management safeguards required are standard industry practice and readily implemented as part of safety engineering.

The implementation of controls including adherence to technical and management guidelines should be verified in the final detailed design.

It is the conclusion of this Preliminary Hazard Analysis that the proposed development (including Federation Mine and Federation Plant – Hera Mine Site) would be identified as potentially hazardous but the risks associated with both would be considered tolerable, with suitable engineering controls, operational controls and management controls in place.

References

Commonwealth Government, 2020, *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Number 7.7).

Department of Planning NSW, 2011, *Applying SEPP 33* - Hazardous and Offensive Development Application Guidelines.

EMM 2021 Federation Mine Explosive Magazine Storage, Handling, Management and Advice

ERM 2021 *aurelia METALS Pty Federation Project Air Quality and Greenhouse Gas Assessment*

Planning NSW, 2011a *Multi-Level Risk Assessment*, New South Wales Government

Planning NSW, 2011b *Hazard Analysis* – Hazardous Industry Planning Advisory Paper No 6, New South Wales Government

ASIA PACIFIC OFFICES

ADELAIDE
60 Halifax Street
Adelaide SA 5000
Australia
T: +61 431 516 449

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE CBD
Suite 2B, 125 Bull Street
Newcastle West NSW 2302
Australia
T: +61 2 4940 0442

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH
Grd Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 2 4249 1000

AUCKLAND
Level 4, 12 O'Connell Street
Auckland 1010
New Zealand
T: 0800 757 695

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

WELLINGTON
12A Waterloo Quay
Wellington 6011
New Zealand
T: +64 2181 7186

SINGAPORE
39b Craig Road
Singapore 089677
T: +65 6822 2203