Hera Resources Pty Ltd

Federation Project

Environmental Impact Statement

Chapter 4

Project Description

4. Project Description

4.1 Federation Project Overview

The Project comprises:

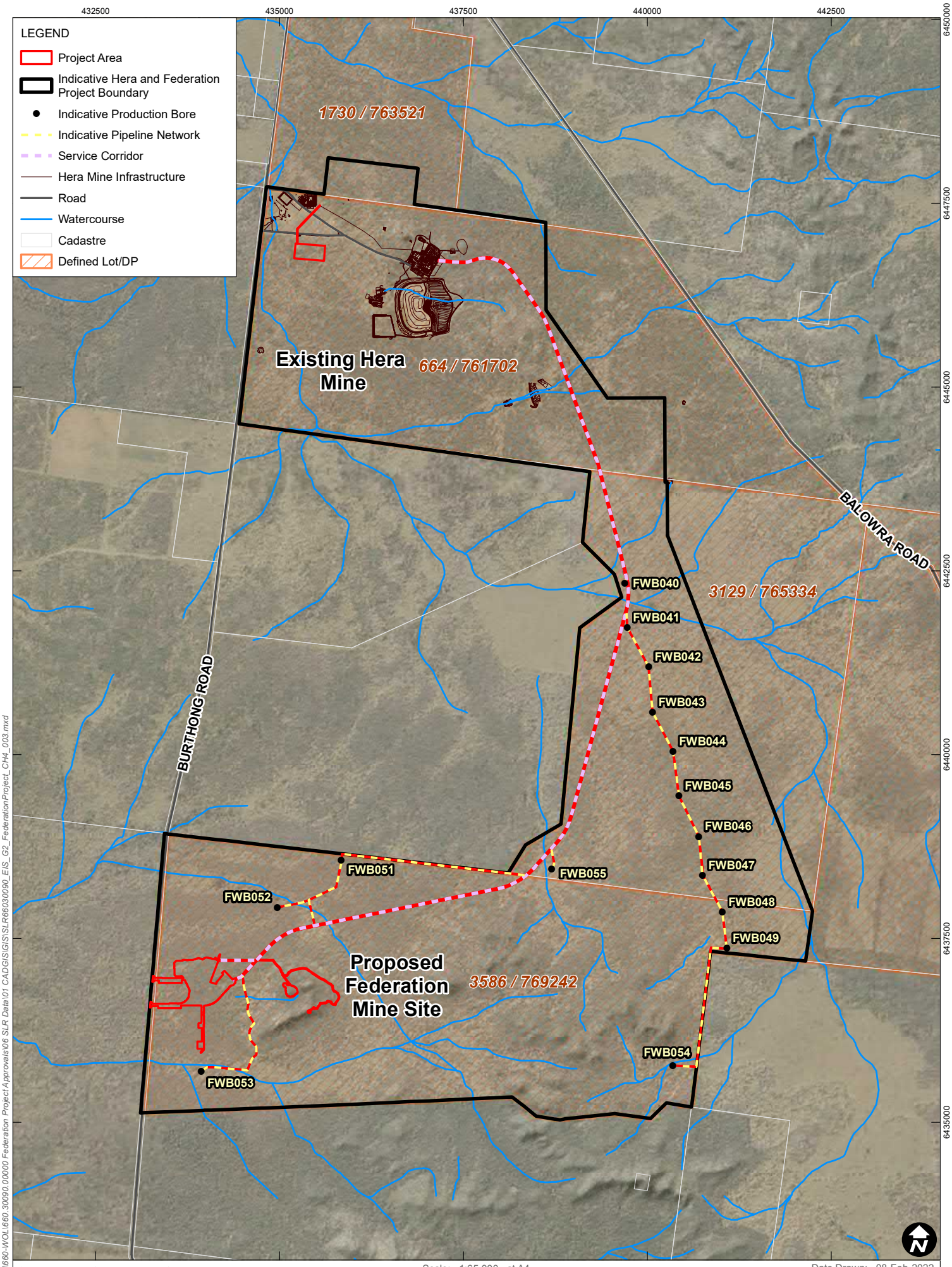
- The establishment and operation of underground gold and metalliferous mining activities, with supporting surface infrastructure, mining approximately 6.95 Mt of ore over a period of 12 to 14 years, referred to as the Federation Site, as shown in **Figure 4-1** and **Figure 4-2;**
- Amendments at Hera Mine to facilitate mining and processing of Federation ore, with works including a new process plant, disposal of tailings in the approved Hera Mine TSF and a new solar farm, as shown in **Figure 4-3**; and
- Services Corridor between the Federation Site and Hera Mine, including powerline, water pipeline, access track and a potential tailings pipeline, as shown in **Figure 4-1**.

Table 4-1 provides a summary of the key elements of the Project.

Table 4-1 Key Federation Project Elements

Project Element	Summary of the Project
Mining Method	Underground mining via longitudinal retreat longhole stoping method
Mineralisation	Federation deposit has a total mineralisation of approximately 6.95Mt to be mined.
Project Area	Total footprint area of 92.52 ha (which includes a 35.69 ha of disturbance associated with the Exploration Decline Program approved by DPIE-RR).
Life of Mine	12-14 years.
Annual Production	Processing of ore at a maximum rate of 750 ktpa at a new process plant at Hera Mine (to be constructed within existing disturbance footprints)
Management of Waste Rock	During operations, waste rock will be stored on designated pads or utilised for backfilling underground stopes. Post mining, potentially acid forming (PAF) waste rock will be returned underground, and non-acid forming (NAF) waste rock will be returned underground, used for backfilling the box cut or in rehabilitation of other areas.
Management of Tailings	Tailings will be either placed into the approved TSF at Hera Mine or returned to Federation Site for placement underground as paste backfill.
General Infrastructure	Internal roads, ablutions block, administration buildings, workshop and stores, sewage treatment and treated effluent irrigation, diesel storage tanks, potable water treatment, waste rock storage, underground vents, sub station, paste plant, laydown area, topsoil stockpiles, ROM pad, box cut, magazines, haul roads, telecommunications tower, surface extraction area and access roads.

Project Element	Summary of the Project
Transport	Ore will be transported from Federation Site to Hera Mine via Burthong Road. Tailings will be transported from Hera Mine to Federation Site via Burthong Road. At the peak of mine ore and tailings transport it is estimated there will be an average of 124 vehicle trips per day. Trips are defined as a one-way movement. Concentrate will be transported via road from Hera Mine to Hermidale Siding with an average of 17 vehicle trips per day at the peak of concentrate transport.
Water Management	The processing plant will generate the majority of water demanded for the Project. Water will primarily be sourced from underground workings and pumped to the surface. A network of production bores will also be established which will supplement the existing production bores. The maximum groundwater extraction forecast by the site water balance model is 530 ML/year, which is within the existing licenced volume of 543 ML/year. A water management system will be implemented at the Federation Site. Key elements include the diversion of clean water runoff around the site, and the collection of water from disturbed areas and the underground. Dirty (sediment) water will be captured in catch drains and collected in the stormwater retention pond. Runoff from the PAF pads will drain to lined leach ponds. Runoff from the box cut would report down the decline and be dewatered as part of the underground dewatering system to the dewater pond. Water contained in the lined leach ponds, stormwater retention pond and dewater pond would be recirculated for reuse within the Hera Mine water management system via the proposed water pipeline between Federation Site and Hera Mine.
Services Corridor	Infrastructure in the 23 m wide Services Corridor includes: ▪ Electricity transmission line; ▪ Water pipeline; ▪ Access track for construction and maintenance; and ▪ Tailings pipeline and return water line (potentially).
Operational Workforce	Approximately 200 – 250 (inclusive of the transition of approximately 150 workforce positions from Hera Mine operations).
Capital Investment	Approximately $200M.
Approval Consolidation	It is intended that the current development consent held by Hera Resources (PA10_0191) will be surrendered in accordance with section 4.63 of the EP&A Act and replaced with the planning consent for the Project. Operations at Hera Mine which are to continue as part of the Project will be authorised by the issued SSD consent. The Project will also require additional approvals to allow for the lawful operation of the Project, which are outlined in **Section 6**.



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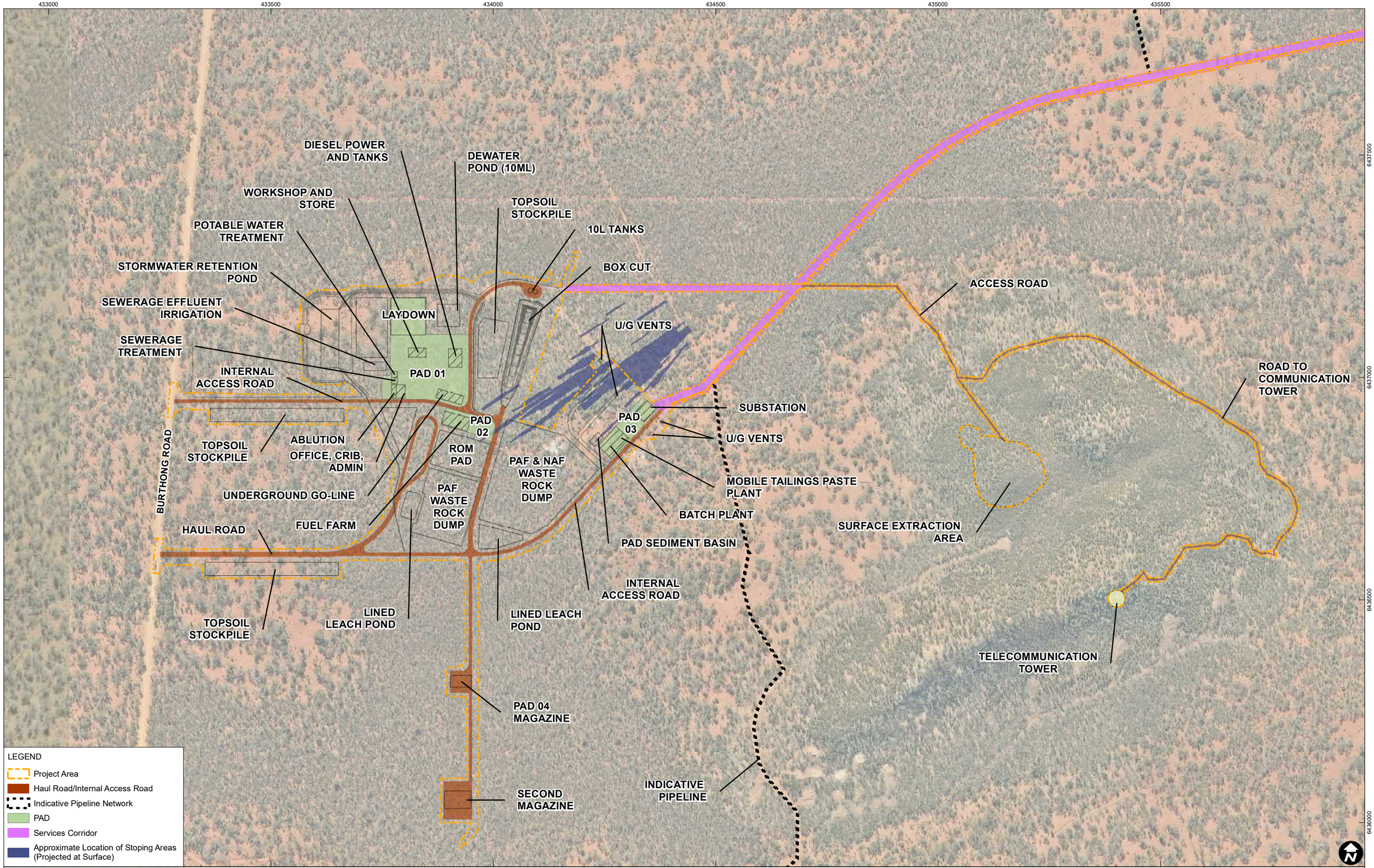
PROJECT BOUNDARY

FIGURE 4-1



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

Date drawn: 08-Feb-2022
Project number: 660.30090.00000

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

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FEDERATION SITE PLAN

FIGURE 4-2

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435000
436000
437000
438000
6447000
6446000

EXISTING AND EXPANDED ACCOMODATION VILLAGE

PROPOSED OVERHEAD TRANSMISSION LINE

EXISTING OVERHEAD TRANSMISSION LINE

NEW PROCESS PLANT

QUARRY LOCATION (MOD 6)

EXISTING PROCESS PLANT

SERVICES CORRIDOR

BURTHONG ROAD

PROPOSED SOLAR FARM

APPROVED MINE SITE INFRASTRUCTURE

RELOCATED MAGAZINE

TO FEDERATION MINE

TSF

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: 08-Feb-2022
Project number: 660.30090

Data Source: Basedata NSW SS, 2019
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HERA MINE SITE PLAN

FIGURE 4-3

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4.2 Phases of the Project and Existing Activities

The Project involves a number of overlapping phases with Hera Mine operations, the Exploration Decline Program and regional exploration activities, as shown in **Figure 4-4**. Hera Mine operations will be ongoing following Project approval and during construction activities for the Project. Exploration Decline Program activities will be undertaken prior to Project approval and during the transition to full scale mining following Project approval. It is anticipated that Project activities will commence in early 2023 and will continue for the life of mine which is estimated at 12 – 14 years. Some elements of Project construction and operations may overlap as the new process plant is constructed whilst mining occurs, and ore is either processed at the existing Hera Mine process plant or at PGM. Regional exploration activities will also continue throughout this period. The timing of the Project is contingent on receiving all necessary approvals.

Project Phase	July 21 - Dec 21	Jan 22 - Jun 22	July 22 - Dec 22	Jan 23 - June 23	July 23 - Dec 23	Jan 24 - June 24
Hera Mine Operations						
Exploration Decline Activities						
Exploration Dregional Activities						
Federation Construction						
Federation Operations						

Figure 4-4 - Indicative Project Phases

4.3 Project Area and Definitions

The following terminology has been used in this EIS:

- The 'Project area' is all areas where activities and infrastructure for mining will occur (i.e. 92.52 ha). This term is synonymous with 'Project footprint'. The Project area includes the 'exploration decline program disturbance area';
- The 'Project disturbance area' is all areas that require clearing for the Project (i.e. 56.83ha). The 'Project disturbance area' includes 55.78 ha of native vegetation and 1.05ha of pre-cleared vegetation;
- The 'exploration decline program disturbance area' is all areas already approved for clearing under the DPIE-RR activity approval for the Exploration Decline Program (i.e. 35.69ha);
- The 'study area' is the Project area and the broader area surrounding the Project area assessed through field surveys and desktop analysis, with information from the study area used to assess potential direct and indirect Project impacts. The study area varies depending on the specialist study being undertaken; and
- The Project boundary is the nominal extent of the State planning approval and associated mining lease (ML) boundaries, noting that ML applications have yet to be made for the Project. This term is synonymous with 'subject land'.

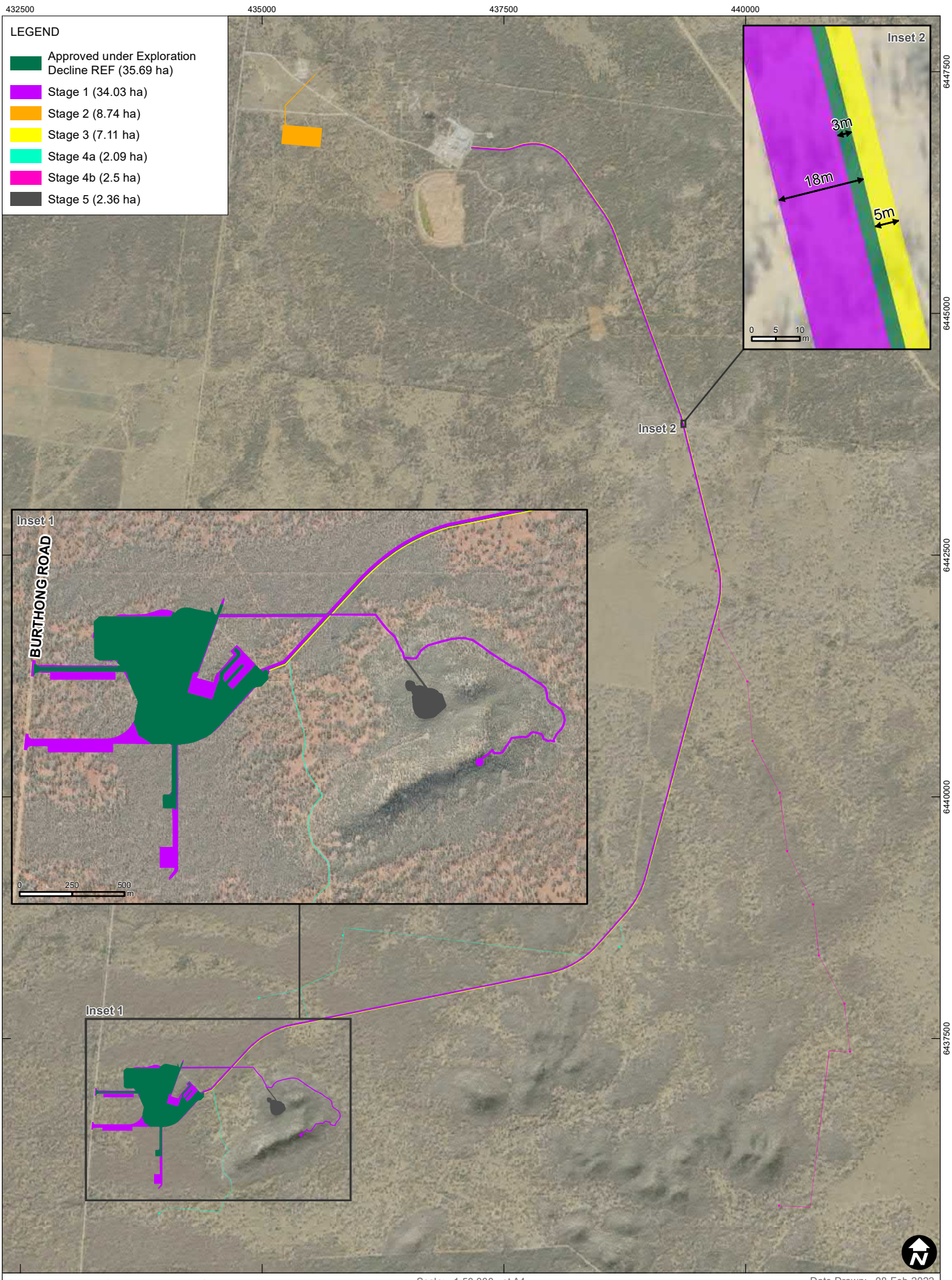
As noted in **Section 2.3.2**, the Project is located on land zoned RU1 – Primary Production and has been previously used for sheep grazing and is predominantly covered with woodland. The Project will involve the removal of some native vegetation to enable the establishment of the Services Corridor, as well as infrastructure at the Federation Site and Hera Mine.

- The majority of the Project disturbance area of 56.83ha will be caused through clearing for the following Project components:
- Services Corridor;
- Access tracks to the surface extraction area[1] and communications tower;
- An additional haul road at the Federation Site;
- Stockpile areas at the Federation Site;
- Solar farm and transmission lines at Hera Mine; and
- Additional magazine at the Federation Site.

The Project includes a number of separate components that will be staged under the *Biodiversity Conservation Act 2016* (BC Act). For the purposes of State offsetting requirements under the BC Act, these components are referred to as stages. Hera Resources has elected to separate the Project into components (or stages) as some components may occur in later years of mine life or may not occur at all, and therefore staging allows for State offsets to be provided as and when a disturbance is scheduled to occur. By including all potential components in the assessment, Hera Resources has adopted a conservative approach in estimating the Project disturbance area (i.e. overestimating the potential Project disturbance area).

The Project area and staging for each component is provided in **Figure 4-5**, which also shows the exploration decline program disturbance area.

[1] Any reference to a quarry in supporting specialists studies refers to the surface extraction area which is an ancillary mining activity.



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Coordinate System: GDA 1994 MGA Zone 55

Date Drawn: 08-Feb-2022
Project Number: 660.30090.00000

Data Source: Basedata NSW SS, 2019
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PROPOSED COMPONENTS STAGING

FIGURE 4-5

4.4 Federation Site

Provided in **Section 4.5** to **Section 4.12** is an overview of key aspects of the mine design and operation proposed for the Federation Site.

4.5 Federation Mine

4.5.1 Federation Deposit

The Federation deposit is located on the eastern margin of the Palaeozoic Cobar Basin. The Cobar Basin is the richest polymetallic basin within the Lachlan Orogen, hosting a significant number of precious and base metal deposits related to different tectonostratigraphic units from Late Silurian to the Early Devonian.

Minor exploration drilling was undertaken in 2013. A larger exploration program was undertaken in 2019, 2020 and 2021 to define the Federation deposit. The June 2021 Australian Stock Exchange (ASX) Federation Mineral Resource Estimate (MRE), reports that the Federation deposit has an estimated combined Indicated and Inferred MRE totalling 5.1Mt at 5.5% Pb (lead), 9.3% Zn (zinc), 0.9g/t Au (gold), 7g/t Ag (silver) and 0.3% Cu (copper). The MRE has been supported by approximately 70,000 m of drilling.

There is an additional 1.9 Mt of unclassified material, bringing the total potential mineralisation to 7 Mt. Ongoing infill drilling is highlighting that the deposit hosts a number of very high-grade, short strike-length gold lenses, and strong upside potential remains for additional discoveries as drilling continues.

4.5.2 Federation Production

Total ore production from the Federation Site is approximately 6.95 Mt over the life of the mine. Maximum annual production is planned at 750 ktpa, which will occur during years six to nine of mine operations. Ore production will ramp up over the initial years and ramp down over the final years of operations as detailed in **Figure 4-6**. The majority of ore produced (6.2 Mt or approximately 90%) will be sent to Hera Mine for processing. Up to 200 ktpa will be transported to PGM in the initial 4 years of ore processing (a total of 0.75 Mt or approximately 10%), whilst the new processing plant at Hera Mine is being commissioned and ramped up.

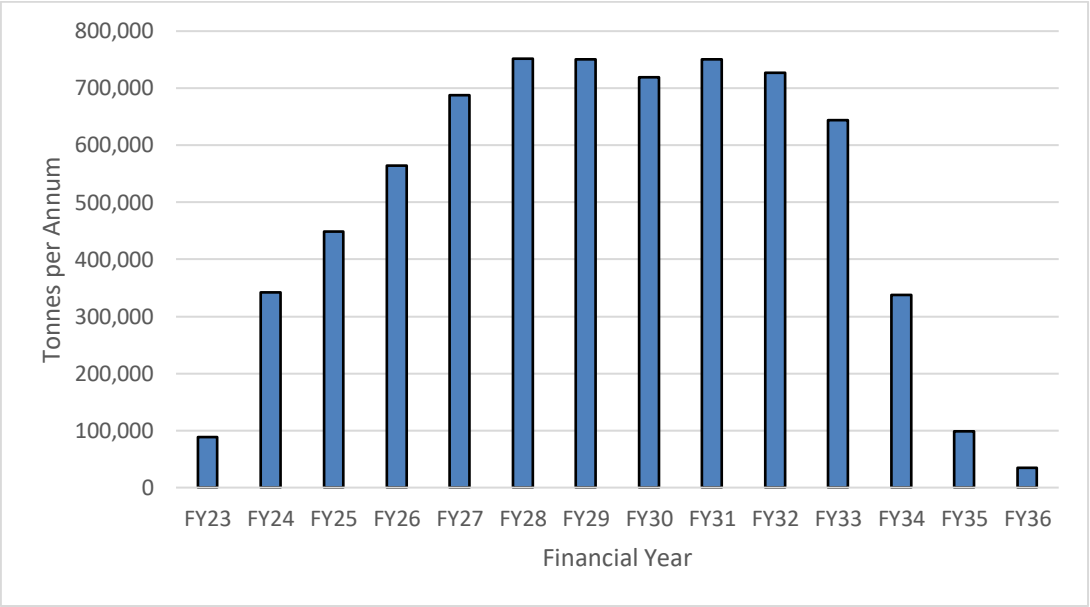

Figure 4-6 - Production Rate

4.5.3 Box Cut and Portal

Access to the underground mine will be via a portal developed through the base of a box cut located northwest of the proposed Federation deposit stoping footprint (refer **Figure 4-7**). The location of the box cut was selected to avoid impacts to items of Aboriginal heritage and to achieve suitable ground conditions. The box cut is designed so that the portal exit faces south, so as to avoid direct sunlight when exiting the underground.

The approximate box cut dimensions are:

- 68,000 m^3 excavation with 80% (54,400 m^3) assumed to be drilled and blasted;
- 22 m depth to base of box cut;
- 250 m long and 60m wide;
- 1:10 down ramp gradient in box cut;
- Upper slope 40°;
- Lower slope 60°;
- Portal face 70°;
- Ground support will be required on lower wall consisting of:
  - 75 mm shotcrete; and
  - Alternate rows of 6m long cable bolts and 2.4 m long grouted rock bolts installed on a 2.5 m x 2.5 m pattern.

4.5.4 Main Decline

The main decline will be developed to gain access to all production levels. The decline is proposed to be developed over a period of 42 months to a depth of approximately 530 m below surface. The decline will be commenced under the approval for the Exploration Decline Program, to source a bulk sample of less than 20,000 t for additional test work. The decline commences with a 35 m long straight and 1:10 downward gradient. This aligns with the gradient of the box cut ramp to allow for installation of steel sets.

The decline has been positioned where mineralisation is minimal. It is expected that the decline will cross areas of economically viable mineralisation, more regularly to the north of the deposit. This was a key reason for placing the decline predominantly on the southern side of the deposit. Placing the decline on the southern side of the deposit also provides proximity to the higher-grade portion of the deposit. The dimensions of the main decline are:

- Length 3,345 m;
- Height 5.8 m;
- Width 5.0 m;
- 1:6.5 down gradient; and
- 22.5m radius turns (centreline).

The main decline and stopes are shown in **Figure 4-7**

4.5.5 Lateral Development

Lateral development, including level access and other waste development, is required to access the mine production areas. Level accesses are preferred to be gently inclined so that water drains towards the decline. Sumps are located in level accesses to capture water run-off from the production areas before it reaches the decline.

A stockpile is included in each level access to allow storage of material during remote bogging operations, and to generally facilitate the transfer of material from boggers to trucks.

Figure 4-7 - Conceptual Federation Mine Design

4.5.6 Vertical Development and Ventilation

As part of the Exploration Decline Program, 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). Ventilation modelling for the design has assumed a ventilation system is required to provide 390m^3/s of airflow for operations. The fresh air raise will be approximately 3m diameter and the emergency egress approximately 1.5m diameter. Vertical development will be completed by raise-boring.

4.5.7 Mining Method

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 or rooms will be excavated via drilling and blasting. The stopes are approximately 25m high from one stope floor to the next and located along approximately 100m vertical panels.

The stopes will typically be excavated from the deepest stope upwards. The loosened ore from the stopes is then brought to the surface via underground truck and placed on the Federation Site ROM ore stockpile near the boxcut. Ore will then be transported by surface trucks to the Hera Mine ROM stockpile at the process plant.

To maintain the structural integrity of the stopes they will be backfilled using tailings paste fill (using tailings from the processing plant at Hera Mine) and/or rockfill from waste rock excavated during decline or lateral development.

4.5.8 Mining Equipment

The proposed underground mining fleet is presented in **Table 4-2**, which is considered typical for this scale of operation.

Table 4-2 Mining Fleet

Equipment Type	Use	Initial Fleet Size	Maximum Fleet Size
Twin boom jumbo	U/G drill rig	1	2
Production drill rig	U/G drill rig	-	2
50t trucks	Ore, tailings and concentrate transport	1	4
17t loaders	U/G ore loaders	1	4
Shotcrete sprayer	Application of shotcrete	1	1
Shotcrete agitator	Mixing of shotcrete	1	2
Explosives charging unit	U/G blasting	1	1
Integrated tool carrier (IT)	General	1	3
Service truck	Service vehicles	-	1
Grader	Surface grading	-	1

Equipment Type	Use	Initial Fleet Size	Maximum Fleet Size
Water truck	Water suppression	-	1
Truck and Loader	General use	-	1

4.6 Power and Communications

The Federation Site will be powered via diesel generation for initial operations whilst construction of the power supply within the Services Corridor is undertaken. Once established, the Federation Site will be powered by a gas plant located at Hera Mine with power supplied via an overhead powerline to Federation Site. The gas will be delivered to Hera Mine via road. Power supply is proposed to be supplemented by a new solar farm at Hera Mine, which will reduce the volume of gas required for power supply.

The current communications link to Hera Mine is provided by Telstra from Cobar to Nymagee, via Mount Boppy. This communication link is at capacity and there has been no commitment from Telstra to increase this bandwidth. The proposed communications to Federation Site (and Hera Mine) includes a private point to point wireless link from Telstra's fibre line at PGM near Cobar to Nymagee, via Mount Boppy. This will involve the installation of communications equipment on radio towers. The Hera Mine to Federation Site link will require installation of an 8 m communications tower at each site. A fibre link may also be installed along the Services Corridor.

At the Federation Site an allowance for an underground communications network has been included, providing high quality communications infrastructure which will allow:

- Remote and autonomous operation of mine equipment;
- Remote operation of ventilation infrastructure; and
- Real time monitoring of mining mobile equipment.

4.7 Site Access

The light vehicle access road between Burthong Road and the Federation Site will consist of a 750m long, 8 m wide unsealed gravel pavement. A boom gate will be constructed across the light vehicle access, approximately 450 m from Burthong Road. Security fencing will be constructed from the boom gates along the edge of the administration building, hardstand and store yard to deter unauthorised site entry.

A heavy vehicle access will be constructed approximately 250m south of the light vehicle access. This will be used by the vehicle fleet transporting ore to the Hera Mine or returning tailings for processing at the paste plant.

4.8 Tailings Paste Plant and Batch Plant

The preferred backfill method is cemented paste fill using tailings. The tailings paste plant will be located adjacent to the stoping footprint to allow gravity reticulation of tailings paste fill down dedicated boreholes and laterally through an underground paste distribution system. The paste plant would require capacity to produce 40m^3/hr (nominally 900m^3/day).

The shotcrete batch plant will be co-located with the tailings paste fill plant. This plant will provide an ongoing supply of shotcrete for ground support requirements underground and concrete for miscellaneous construction works.

4.9 Waste Rock Management

Geochemical testing of waste rock was undertaken by Terrenus and is described in **Appendix B**.

Of a potential 1.5 Mt of waste rock to be mined, about 60% will report to the surface during the first seven years (approximately) of operations, with the remainder disposed underground as backfill. Waste rock brought to the surface will be placed in one or more waste rock stockpile areas, depending upon the environmental geochemical classification (to segregate NAF from PAF waste rock as much as practical). Run-off and seepage from the waste rock stockpile areas will be captured in lined leach ponds, and treated if/as appropriate before use in the mine water management system.

Weathered waste rock generated from the box-cut is expected to be NAF possessing a very low potential to generate acid and metalliferous drainage (AMD) and low potential to generate salinity and neutral mine drainage (NMD). Waste rock form the box-cut will be stockpiled separately to fresh rock, as much as practical, and potentially used to backfill the box-cut, for other rehabilitation and construction activities or transported to Hera Mine and disposed underground.

Fresh waste rock is expected to be PAF, posing a high potential to generate low to moderate-level AMD (as a bulk material). Fresh rock from the underground will report to the waste rock stockpiles, where run-off and seepage (leachate) will be captured in lined leach ponds and treated if/as appropriate before use in the mine water management system. PAF waste rock that is brought to surface will either be transported back underground (during or post mining operations) for use as backfill or transported to Hera Mine and disposed underground. No PAF waste rock is proposed to remain at the surface at closure. PAF waste rock used as underground backfill would be placed below the final groundwater level (approximately 60 to 80m below natural surface) where oxidation within the saturated zone would be very low. As such, backfilled waste rock would pose a very low environmental risk with respect to AMD and/or NMD, as discussed in **Section 8.2**.

4.10 Water Management

4.10.1 Water Demand

The primary water demand for the Project will be the process plant at Hera Mine. Water will be required at the Federation Site to support the underground workings, for dust suppression, ablutions and vehicle washdowns.

4.10.2 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. The indicative locations of production bores and pipelines are provided in **Section 8.5**. These locations may alter once further investigations are complete.

Alternative water sources have been investigated including pumping water from the former Nymagee mine, trucking of water sourced from local sources and reuse of treated effluent from the Hera Mine accommodation village.

There are existing water supply bores supplying water to Hera Mine, which will continue to operate. Aurelia Metals holds WAL 43173, which permits the extraction of 543 ML of water annually. There is no planned increase to this limit as part of the Project.

4.11 Water Management Infrastructure

The Project will have an integrated water management system between 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. The conceptual design of water management infrastructure to be constructed at the Federation Site includes:

- Mine dewatering dam (also referred to as the dewater pond) 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/NAF waste rock pads and ROM pad. Water from the leachate ponds will be pumped to the mine water dam;
- Stormwater retention pond (also referred to as the sediment 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; and
- 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.

4.11.1 Mine Dewatering

Based on groundwater modelling undertaken for the Federation Site, groundwater inflow rates from mining the Federation deposit have been estimated at predicted at 338 m^3/day in year 2028 which equates to the peak year of mine operations. A series of pumps will be installed to transfer water from

the underground workings to the surface mine dewatering dam via a decline water pipeline. The capacity of this dam is approximately 10ML, which has been benchmarked against the process water dam located at Hera Mine.

Two 10,000L header tanks located on surface will supply water to the underground workings from above the portal. Water will be gravity fed through a polyethylene pipe suspended from the decline backs.

Raw water/fire fighting water will be stored in a 50 kL tank.

4.11.2 Stormwater Retention Pond

The stormwater retention pond has been sized to collect a 1:100-year 72-hour rainfall event (nominally 151 millimetres (mm) rainfall depth) from a catchment of approximately 25 ha. The stormwater retention pond has an indicative capacity of 28 ML, subject to further engineering.

4.11.3 Lined Leachate Ponds

Lined leachate ponds will be constructed to collect any contaminated runoff from the PAF waste rock dumps and ROM pad. The water will be collected and pumped to the mine water dam. The general design of the leachate ponds would be:

Sized to collect a 1:100-year 72-hour rainfall event, with a capacity of approximately 2.5ML; and

Lined with clay or other low permeability material which provides flow of $<1x10^{-9}$m/s through the lining.

4.11.4 Drainages

A series of site drainage structures will be developed to divert clean water away from site and direct water from disturbed areas into the stormwater retention pond. Included in the drainage designs are earthworks and culverts to manage water underneath the proposed site roads.

4.11.5 Potable Water

Initially potable water will be required to be delivered to site via road, whilst the bore field is established. It is planned that once the bores have been developed and a treatment plant installed, bore water will be piped to site and treated. A packaged potable water treatment plant, suitable to provide water for drinking, change house and cribbing requirements for approximately 50 people, will be located adjacent to the raw water/fire water tank. A 20 kL potable water storage tank will be located adjacent to the potable water treatment plant.

4.11.6 Sewage Treatment Plant

A sewage treatment plant will be installed at the Federation Site designed for the appropriate treatment volume required which has been estimated at 50 people. The plant will be provided by a third party specialist and will be designed in accordance with the predicted demand and also consider the constraints around water availability. Treated effluent will be irrigated to an area within the

Federation Site. The fully modular plant would be transported to site and assembled by third parties. The system would be regularly maintained by experienced contractors to ensure efficient operation.

4.12 Site Infrastructure

Onsite infrastructure at the Federation Site that will be established to support site operations is summarised in **Table 4-3**

Table 4-3 Federation Site Infrastructure

Item	Description
Site roads, laydown and access control	Internal access roads will be constructed for heavy and light vehicle access to the various operational areas. Hardstand areas will be developed for laydown areas, the administration building, maintenance workshop, diesel storage, explosive magazines, temporary diesel power, permanent power infrastructure, batch plant and tailings paste plant. Security fencing will be constructed from the boom gates along the edge of the administration building, hardstand and store yard to deter unauthorised site entry. Security fencing will also be installed at the magazines.
Mobile equipment maintenance workshop and warehouse	A dedicated workshop and warehouse will be provided for maintenance of mining vehicles. The workshop and warehouse will have an area of approximately 800 m^2.
Hydrocarbon storage	Self-bunded diesel tanks with combined 160,000 L capacity will be provided for refuelling of underground mining vehicles and the ore haulage fleet. No additional bunding of the tanks is required; the tanks will be a dual-lined system.
Washdown facilities	The heavy and light vehicle washdown will be a drive-through facility for cleaning mine haul trucks, graders, dozers, other underground vehicles, road trucks, buses and light vehicles.
Administration building	The mining administration building will have an area of approximately 400m^2. The building will accommodate 25-30 people.
Change house and laundry	A change house building(s) will be required for showers and changing facilities for all personnel working underground due to the presence of lead mineralisation. The change house and laundry will have an area of approximately 200m^2.
Soil Stockpiles	A number of soil stockpile locations are located around the Federation Site. Soil will be stored on site until it is required for use in rehabilitation.
Surface extraction area	A surface extraction area will be established to the east of the Federation Site. Material which is extracted from the surface extraction area will be used as required around the site for various earthworks or in rehabilitation.

Magazines	Two magazines will be located to the south of the main infrastructure areas at the required separation distance. The magazines will store ANFO for use in blasting during operations. They will be fenced with only authorised access permitted.
Substation	A substation is located at the termination of the Services Corridor, which will reduce the incoming voltage for use at Federation Site.

4.13 Services Corridor

A Services Corridor is proposed to link Hera Mine with the Federation Site, as shown in **Figure 4-1**, inclusive of:

- Powerline;
- Water pipeline;
- Access track; and
- Tailings pipeline and return water line (potentially).

The nominated width of the Services Corridor is 23 m with an approximate length of 14.3 km. Clearing of vegetation will be required for the installation of the proposed services infrastructure. The access track will be used for maintenance and inspection requirements and will not be used for haulage of ore or tailings.

Whilst the preferred method for transport of tailings from Hera Mine to the Federation Site is via road (see **Section 8.13**) there is potential that tailings will be pumped through a dedicated pipeline between the process plant at Hera Mine and the tailings paste plant at the Federation Site. A return water line would also potentially be installed to return water removed from the tailings to the process plant. The width required to accommodate the tailings pipeline and return water line is 5 m which has been included within the 23 m width of the Services Corridor.

4.14 Surface Extraction Area

A surface extraction area will be established to the east of the Federation Site. Material which is extracted from this area will be used as required around the site for various earthworks or in rehabilitation. Material will be removed from a small knoll with suitable material that rises above surrounding topography, using an excavator. The final, rehabilitated landform for the surface extraction area will be similar to surrounding topography and rehabilitated to a native ecosystem with limited grazing.

4.15 Hera Mine Site

Hera Mine infrastructure is proposed to be modified to facilitate the Project (refer **Figure 4-3**), including:

- New processing plant;
- Solar farm and connecting power lines; and

- Other minor infrastructure changes.

The approved Hera Mine accommodation village has capacity to accommodate the Project construction and operational workforce.

4.16 New Processing Plant

A new 750 ktpa process plant is proposed to be commissioned at Hera Mine. The existing processing plant will continue to operate at Hera Mine until the completion of the new plant. The new plant will be within the existing approved footprint of Hera Mine (refer **Figure 1-2**). It is anticipated that the new processing plant will be commissioned in early to mid-2024.

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; and
- Tailings thickening and filtration, and disposal by both underground paste backfill at Federation Site and surface storage in the approved Hera Mine TSF.

A conceptual diagram of the new processing plant is provided below in **Figure 4-8**. 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. The production of separate zinc, lead and copper concentrates is anticipated to result in better resource recovery and more closely meet customer demand for such products compared with the blend concentrate currently produced.

Cyanide will be used in the new processing plant, similar to that currently undertaken at Hera. Cyanide is received and stored as a dry solid. The dry solid is mixed with water to make up a solution which is pumped to an intensive leachate reactor (ILR). The ILR is used to leach the gold from the solids into a pregnant solution. The pregnant solution reports to the gold room, where electrowinning recovers the gold. The barren solution and wash solutions containing cyanide are recycled where possible and any excess or “bleed” solutions will be treated.

Sodium metabisulphite (SMBS) and copper sulphate will be used in the new process plant. These chemicals are used with air in the treatment process. It is anticipated that a weak acid dissociable (WAD) cyanide of less than 0.5ppm is achievable using this process.

4.17 Production Rates

As stated in **Section 4.5.2** approximately 6.95 Mt of ore will be produced over the life of the mine from the Federation Site, with a maximum production rate of 750 ktpa. Total annual maximum copper, lead and zinc concentrate produced from processed ore is summarised in the **Table 4-4**.

Table 4-4 Hera Annual Maximum Concentrate Production

Concentrate	Total Dry Metric Tonne (dmt)
Copper	6,000
Lead	51,000
Zinc	98,000

A volume of 5,500 dmt of zinc/lead concentrate will also be produced as a result of ore processed at the existing Hera processing plant. A maximum annual production of 14,500dmt of lead concentrate and 24,000 dmt zinc concentrate will also be produced at PGM in the initial four years of processing operations. **Figure 4-9** identifies the anticipated annual lead, zinc and copper concentrate production from Federation ore at the Hera Mine processing plant and PGM processing plant.

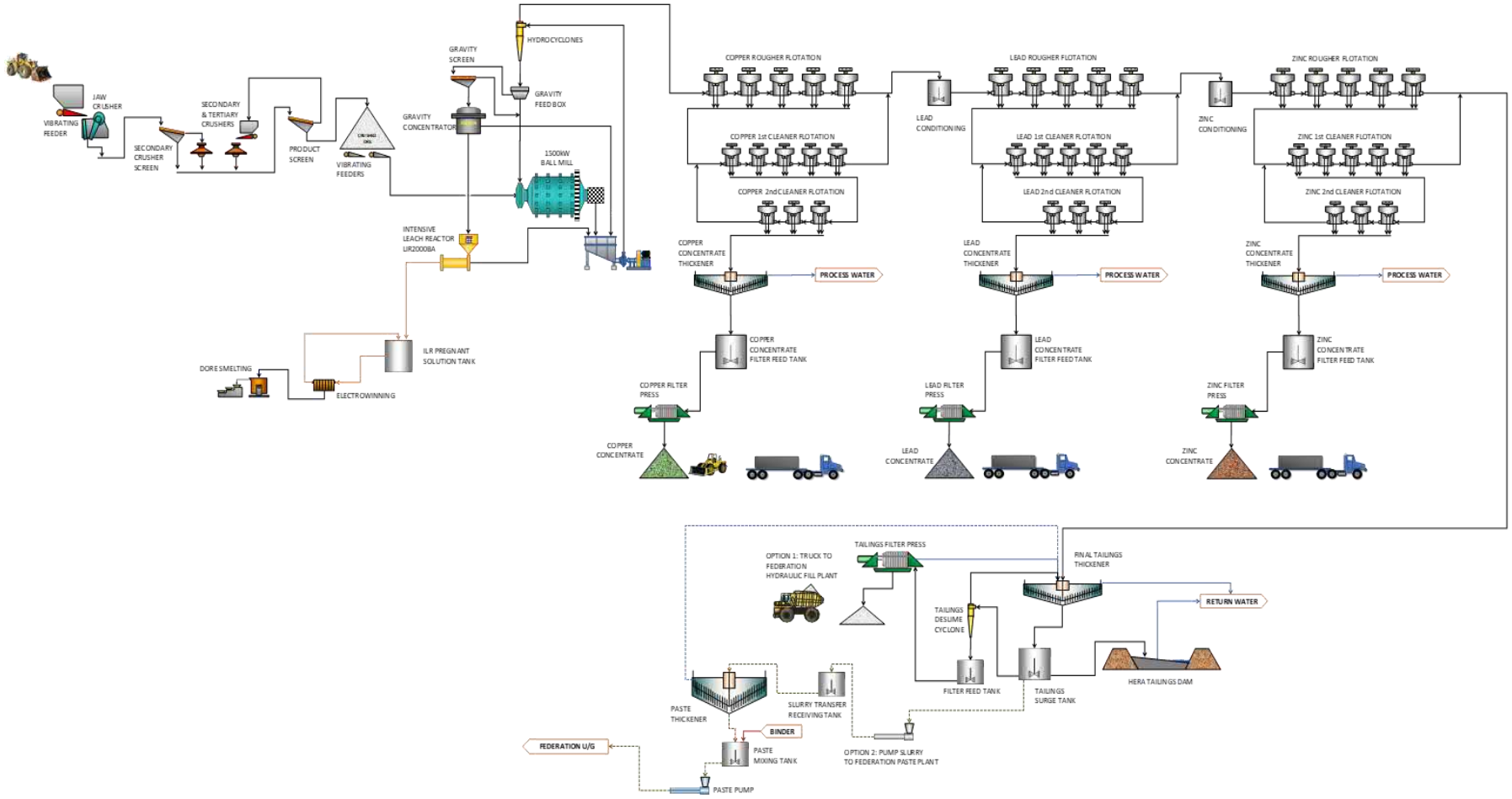

Figure 4-8 - New Process Plant

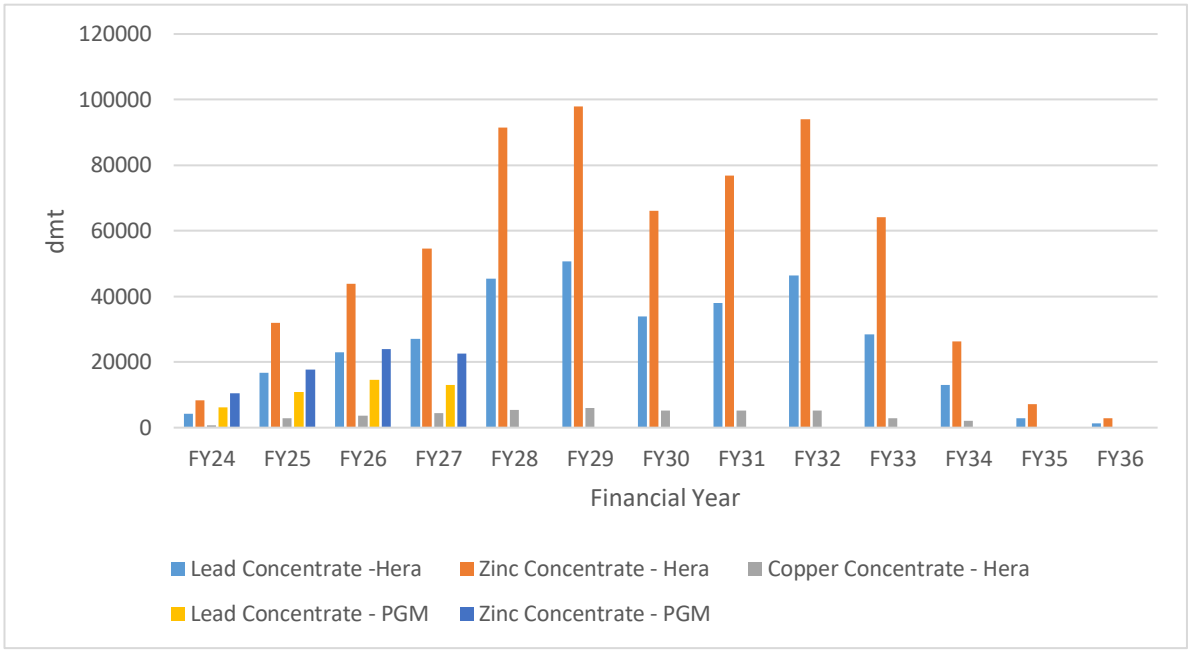

Figure 4-9 - Annual Concentrate Production

A total of 115,000 ounces of gold doré and 985,000 ounces of silver doré will also be produced. **Figure 4-10** below identifies the anticipated annual gold and silver production from Federation ore at Hera Mine (PGM is not proposed for production of gold and silver).

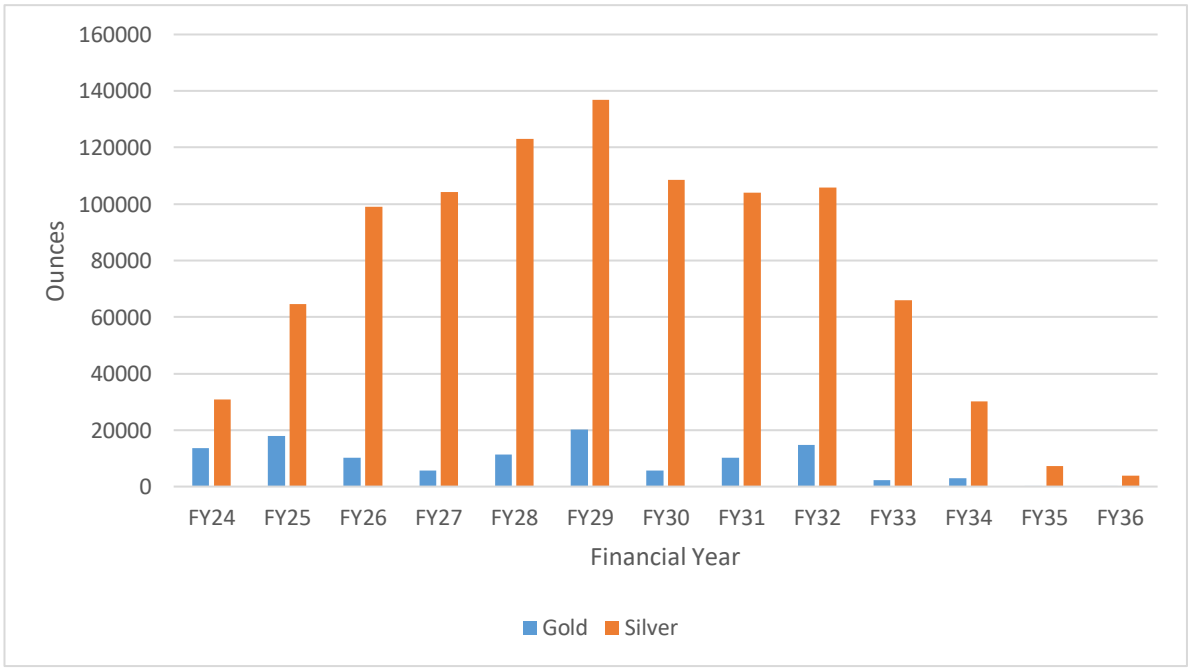

Figure 4-10 - Gold and Silver Production – Hera Mine

4.18 Tailings Production

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 to be used as backfill, with tailings for backfilling sourced from Hera Mine rather than PGM due to the proximity of Hera Mine. Provided in **Figure 4-11** is the annual tailings production, which is the highest in financial year 2031.

Geochemical characterisation of the tailings was undertaken by Terrenus and is included in **Appendix B**. Testing of a master composite of tailings concluded that the material was likely to generate a moderate to high AMD hazard (unmitigated) with respect to generation of acidity and sulfate. However, under the proposed management strategies whereby tailings will either be disposed into the approved TSF (where oxidation will be limited by rapid and subsequent burial by fresh tailings), or tailings will be returned underground at Federation Mine, as a paste fill below final groundwater level, the risk to the environment was considered low. Management of the TSF is outlined in **Section 4.19**.

Cyanide in tailings is predicted to be <1ppm WAD. Cyanide in process water is detrimental to the flotation process as it interferes with the extraction of zinc, therefore it is desirable to keep the WAD as low as possible.

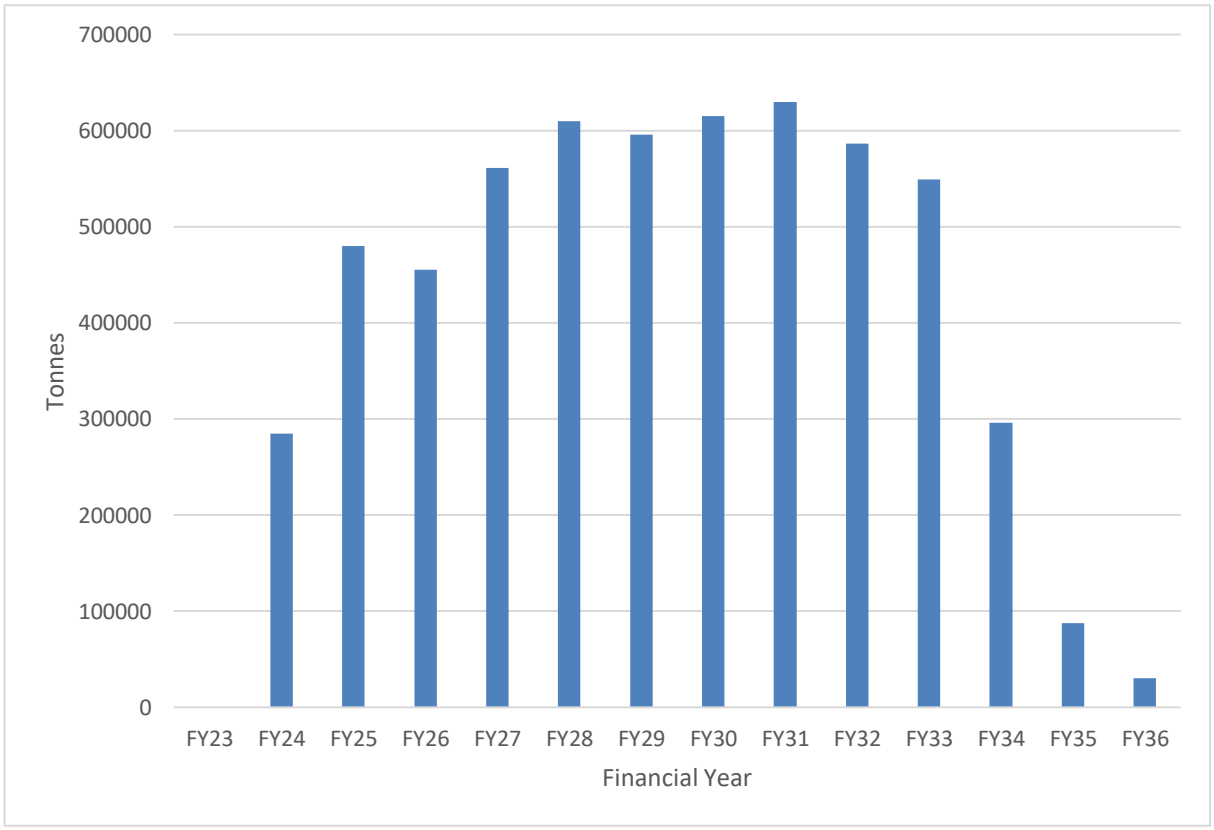

Figure 4-11 - Annual Tailings Production

4.19 Tailings Storage Facility (TFS)

4.19.1 TSF Capacity

The approved Hera Mine TSF (refer **Chapter 3**) 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.

The Hera Mine TSF has an approved area of approximately 50 ha and an approved western embankment elevation of 329m AHD, based on the environmental assessment prepared for Hera Mine's planning consent. The existing, constructed western embankment elevation is approximately 324.7 m AHD. At September 2020, the existing TSF had available capacity of 0.7Mt. Raising the embankment height through staged wall lifts to 329 m AHD (i.e. up to the currently approved TSF capacity) would increase the available capacity of the TSF by 2.4 Mt to 3.1 Mt.

Hera Mine would generate approximately 1.2Mt of tailings over its remaining life after September 2020. Tailings from Federation ore would generate a further 1.7 Mt, resulting in a total capacity requirement of 2.9 Mt of tailings at the Hera TSF. This is less than the maximum approved capacity of 3.1 Mt with wall raises to an elevation of 329 m AHD. Therefore, there is not expected to be a requirement for any TSF wall raises above the approved capacity. The Project assessment includes an assessment of capacity of the TSF based on the predicted tailings reporting to the TSF.

4.19.2 TSF Management

The TSF is constructed as a geo-technically stable landform with all water draining internally or from the embankments via water management structures towards diversion drainage that diverts water upslope of the TSF around the facility. The embankments of the TSF are profiled so that slopes are 1:3 (V:H) downstream and 1:2 (V:H) upstream. The TSF includes a central thickened discharge system. Tailings deposition occurs via single point discharge/risers located within the TSF area. The TSF has minimal ponding areas as the water from these ponds is automatically pumped to the existing process water dam.

Hera Resources have documented procedures for the management of the TSF which will continue to be implemented and reviewed as required for the Project. These include procedures for monitoring, inspections and maintenance checks on tanks, bunds, machines, instruments, metering pumps and the TSF.

The tailings pipeline infrastructure connecting the processing plant and the TSF has been bunded to contain spills from potential line ruptures.

Existing monitoring and management measures relevant to the TSF, which will continue for the Project, include the following:

- Construction of the TSF to achieve a permeability of no less than 1 x 10^{-8}m/s to a depth of at least 600mm of clay (or equivalent);

- Construction of lined tailings seepage pond to achieve a permeability of no less than 1 x 10^{-9}m/s;
- Construction of clean water diversion structures around the TSF that have been designed for a probable maximum flood event;
- Use of a cyanide destruction process using hydrogen peroxide prior to tailings disposal to the TSF;
- Thickening tailings to reduce ponding in the TSF;
- Maintaining concentration of WAD cyanide in tailings discharged from the discharge point to the TSF between 10 mg/L (10 ppm) and 50 mg/L (50 ppm);
- Maintaining concentration of WAD cyanide at the discharge point to the process water dam not greater than 20 mg/L (90^{th} percentile) or 30 mg/L (maximum); and
- Monitoring of cyanide levels for both surface and ground water.

4.20 Solar Farm

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. The solar farm will offset greenhouse gas emissions that would otherwise have been generated if all power was supplied by the gas fired power plant.

4.21 Minor Infrastructure Changes

Minor infrastructure changes within the current Hera Mine disturbance area are anticipated as part of the proposed modifications. These may include:

- Relocation of the gas power plant;
- Office, change house and / or crib room upgrades;
- Minor electrical modifications;
- Plumbing modifications;
- Parking;
- Internal roadways; and
- Fencing and security.

4.22 Peak Gold Mine

Up to 200 ktpa of ore will be transported from the Federation Site for processing at PGM, with a maximum of 750 kt over the Federation deposit life. The current processing plant at PGM has approval to process 800 ktpa, providing sufficient capacity to process ore from the Federation Site. The existing

TSF at PGM has capacity for the approximate 630kt of tailings generated from Federation ore. An application to increase the capacity of the PGM TSF was approved by Cobar Shire Council (CSC) in July 2021. The increase will provide surplus capacity above what is currently proposed in PGM's life of mine plans. No changes to the approved PGM processing plant or TSF (following approval for the capacity increase from CSC) will be required as a result of processing ore from Federation.

4.23 Transport

Ore from the Federation deposit, that will be processed at Hera Mine, is proposed to be transported approximately 10 km along Burthong Rd. Ore proposed for processing at Peak Mine will be transported along Burthong Rd, Priory Tank Rd and Kidman Way (the same as the currently approved alternate concentrate haulage route). The Traffic Impact Assessment prepared by TTPP (refer **Appendix C**) has been based on transport of materials for the Project using similar vehicles to those currently used at Hera Mine (i.e. Type 1 A-double road trains and modular B-triple road trains with an approximate 50 t capacity). Should the use of higher capacity vehicles be feasible (e.g. A-triple road trains with an approximate 80 t capacity), the number of trips required to achieve the various transport tasks would be reduced. The Traffic Impact Assessment predicts that at peak production haulage (ore and tailings) vehicle trips along Burthong Road (between Hera Mine and Federation Site) will be an average of 124 trips per day.

Approximately 60% of the total tailings from Hera processing plant will be used for paste backfill of the stope voids at the Federation Site. Tailings will be transported to the Federation Site via Burthong Road from Hera Mine, with the potential for use of the same truck fleet transporting ore to Hera Mine. However, the Traffic Impact Assessment has adopted a conservative approach and assessed separate ore and tailings fleets. Tailings from processing ore at Peak Mine will be deposited within the existing Peak Mine TSF, which has sufficient capacity.

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 Peak Mine will be transported to Hermidale or Dubbo rail sidings, as per the current concentrate transport methods and truck sizing. The Traffic Impact Assessment predicts at peak production heavy vehicle trips from Hera Mine to Hermidale Siding will be an average of 17 per day.

4.24 Workforce

4.24.1 Construction

Construction of Project infrastructure will occur over a period of 6 – 12 months. It is estimated that approximately 100 construction personnel would be engaged as contractors and would be accommodated at the Hera Mine accommodation village.

4.24.2 Operational

Similar operational workforce numbers will transition from Hera Mine to the Project once operational. It is estimated that the Project operational workforce will be approximately 200 - 250 personnel,

compared to the approximate 150 workers at Hera Mine. Throughout the life of the Project, regional exploration drilling will continue which would employee approximately 25 personnel.

A workforce histogram, describing the period prior to Project approval, construction period and operational period, is provided in **Figure 4-12** below. This demonstrates that workforce numbers remain relatively consistent in the transition from mining at Hera Mine to mining at the Federation Site; other than a spike in numbers associated with the construction workforce.

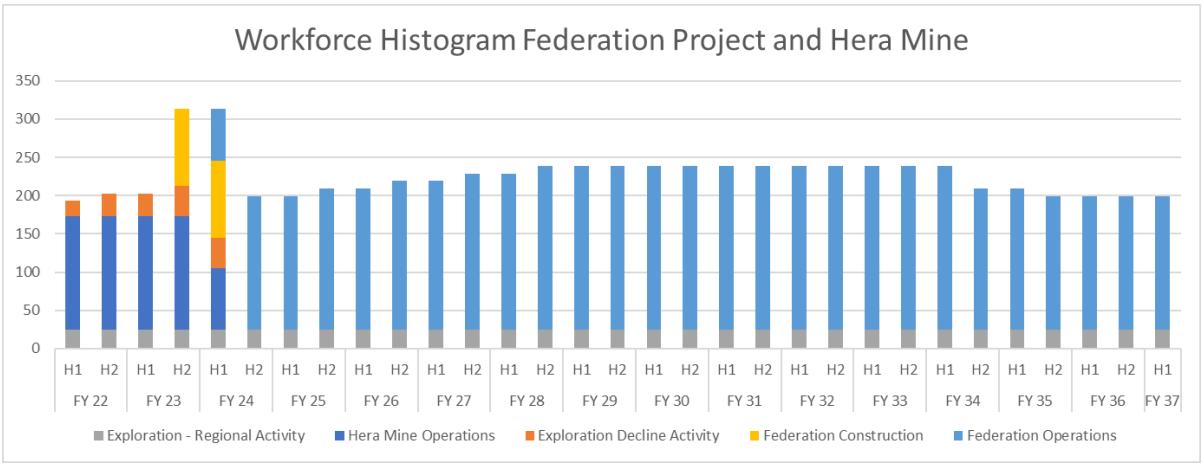

Figure 4-12 - Project Workforce Histogram

4.25 Hazardous Materials and Dangerous Goods

4.25.1 Process Plant

Hazardous chemicals are used in the processes for the extraction of gold, and lead, copper and zinc concentrates as described in **Section 4.16**. A Preliminary Hazard Analysis (PHA) was undertaken based on the materials that will be transported and stored at Federation Site and Hera Mine for the Project.

Safe storage, handling, transportation and use of hazardous materials will be coordinated through standardized operating procedures, and the application of all legislation and Material Safety Data Sheets (MSDS) related to the hazardous material. A summary of processing chemicals is below in **Table 4-5.**

Table 4-5 Processing Chemicals

Chemical	Storage and Handling
Sodium Hydroxide	Sodium hydroxide will be delivered to site as liquid in IBC containers. This container will be connected to a smaller changeover tank which feeds the dosing pumps.

Chemical	Storage and Handling
Copper Sulphate Pentahydrate	The solid copper sulphate will be delivered to the site in 1,000 kg bulk bags. The bags are mixed in a mixing tank and pumped to a holding tank. The solution will be available for use in the Rougher and Cleaner flotation cells and also at the detoxification tank.
Hydrogen Peroxide weight per weight (w/w)	Hydrogen peroxide will be delivered to site as liquid at 50%w/w in IBC containers. These containers will be used as the holding tank and a small changeover tank will allow for containers to be changed out without affecting the continuous delivery required.
Methyl Isobutyl Carbinol (MIBC)	MIBC is used as a flotation frother. It is stored on site in IBC as a yellow liquid. Estimated maximum storage on site at any one time is 4.2 t.
Sodium Isobutyl Xanthate	Estimated maximum amount stored on site is 4.9t. It is delivered to site in approximate 2.3 t loads. It is used as a collector in the floatation process.
Sodium Cyanide	Sodium cyanide is stored on site in IBC, with an estimated maximum storage on site being 7.5t and is delivered in approximate 7.5t loads. Used as a gold complexing agent.
Nitric Acid	Used in the process plant as a concentrate filter cleaner. Is delivered to site in approximate 1,000L loads with an estimated 2,000L stored on site at any one time.

4.25.2 Fuel Storage

Self-bunded diesel tanks with combined 160,000 L capacity will be provided for refuelling of underground mining vehicles and the ore and tailings haulage fleets. No additional bunding of the tanks is required; the tanks will be a dual-lined system.

The refuelling points for mining equipment and haulage vehicles will be on opposite sides of the tanks to ensure separation of mine and highway vehicles. The refuelling areas will be covered to reduce the risk of spills.

4.25.3 Explosives

Two magazine areas will be established at the Federation Site for the storage of explosives. Explosives will be used throughout the life of the Project to break up material underground. The primary explosives material will be ANFO. ANFO is a mixture of ammonium nitrate and fuel oil and is classed as a "Class 1.5" in accordance with the *Australian Code for the Transport of Dangerous Good by Road and Rail (Edition 7.7).*

Explosive material will be stored at the Hera magazine in self-contained storage units separated by earth bunds, as per AS 2187.2-1993 Explosives Storage, Transport and Use, Part 2: Use of Explosives

requirements. The ANFO will be stored in 500kg bags with an estimated maximum of 40t stored at any one time. The magazines have been located so that they are the prescribed distance from other mining activities and infrastructure.

The magazine area will be fenced and locked. Access to the magazine will only be accessible by permitted employees and contractors. Explosives are strictly regulated and only qualified and certified employees/contractors will be allowed to handle the explosives.

4.25.4 Cyanide

Cyanide will be used at the Hera Mine as sodium cyanide during the process of gold recovery from ore. Management of sodium cyanide will be consistent with the principles of the *International Cyanide Management Code for the Manufacture, Transport and use of Cyanide in the Production of Gold* (Code). Cyanide is only purchased from Code certified companies that supply and transport cyanide.

Hera Resources operate an engineered approved automated cyanide transfer system designed to extract solution from isotainer, coupled mini-sparge systems used by Code certified transporters of cyanide. This system eliminates the potential for spills and manual handling of the product. This transfer will be undertaken within a designated bunded area within the processing plant. Storage containers and associated transfer pipes will be located within bunded areas.

The management of cyanide at the process plant is detailed in **Section 4.18.**