FEDERATION PROJECT

Rehabilitation Strategy

Prepared for:

Hera Resources
The Peak
Burthong Road

SLR Ref: 660.30090.0050-R01
Version No: -v1.0
November 2021

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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.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
660.30090.0050-R01-v1.0	5 November 2021	Rod Masters	Renae Gifford	
660.30090.0050-R01-v0.1	12 October 2021	Rod Masters	Renae Gifford	

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1 Introduction

1.1 Project Background

The Federation Project (the Project) is a proposed underground metalliferous mine development located in central-western NSW, approximately 15km south of the Nymagee township and 10km south of Hera Resources Pty Limited's (Hera Resources') Hera Mine. 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.

SLR Consulting (SLR) have been engaged by Hera Resources to prepare a Rehabilitation Strategy in accordance with the Project's SEARs (refer **Section 1.3.2**).

1.2 Project Description

The Project 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); and
- Services Corridor between the Federation Site and Hera Mine, including powerline, water pipeline and access track.

Total ore production from the Federation Site is approximately 6.95 Mt over the life of the mine. 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 4 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 box cut. Ore will then be transported by surface trucks via Burthong Road to the Hera Mine ROM stockpile at the Hera Mine process plant.

A surface extraction area will be established to the east of the Federation Site. Material will be extracted from the top of the existing knoll, back to a level landform (i.e there will be no void required to be backfilled at the end of mining). Material won from the surface extraction area may be used in the final rehabilitation of the Project (refer **Table 5**).

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. 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 or 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.

Hera Mine currently operates under an approved Mine Operation Plan (MOP). Rehabilitation at Hera Mine will continue in accordance with the MOP until the Project is granted planning consent and Hera Mine's planning consent is incorporated into a planning consent for the Project and Hera Mine. Infrastructure at Hera Mine will continue to service the Project. Rehabilitation at Hera Mine will therefore occur at the end of the Project life, with rehabilitation requirements incorporated into the Rehabilitation Management Plan for the Project. The Rehabilitation Management Plan will also account for the continued use of the TSF, the new solar farm and process plant.

This Rehabilitation Strategy covers all disturbance areas requiring rehabilitation and closure relating to the Federation Site and Services Corridor. It also describes the rehabilitation strategy for infrastructure at Hera Mine which is proposed to facilitate the Project, namely the new process plant, approved TSF, and solar farm. The rehabilitation strategy for other infrastructure at Hera Mine will continue to be in accordance with the existing MOP, and hence is not specifically addressed in this Rehabilitation Strategy. The conceptual final landform maps included in this Rehabilitation Strategy include Federation Site and Hera Mine as if the Project is approved, and is based on the current MOP for Hera Mine.

1.2.1 Exploration Decline Program

In February 2021, Hera Resources applied to DPIE-Resource Regulator (DPIE-RR) for the development of an exploration decline at Federation (referred to as the Exploration Decline Program) under Part 5 of the *Environmental Planning & Assessment Act 1979* (EP&A Act). The application was approved in August 2021 with construction due to commence in late 2021 / early 2022.

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;
- Provide further samples for metallurgical, geotechnical and associated test work; and
- Allow for extraction of one or more bulk samples (totalling no more than 20,000t).

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. Waste rock from the box cut will be stored within the surface infrastructure area for future use in rehabilitation. All other waste rock will be stored within the surface infrastructure area and transferred to Hera Mine via Burthong Road or returned underground via the decline;
- Establishment and use of an approximately 14.8km surface pipeline to transfer water from the exploration decline to Hera Mine. The pipeline will be installed on the surface, except where it crosses ephemeral watercourses where it will be buried. The pipeline would be installed within an approximately 3m wide cleared corridor, with the cleared corridor increasing to 7m wide 40m either side of any watercourse crossings;
- Exploration drilling from the exploration decline; and
- Extraction of one or more bulk samples together totalling no more than 20,000t and transportation of that material to Hera Mine via Burthong Road.

Upon approval of the Project, rehabilitation requirements associated with the Exploration Decline Program will be managed through the Rehabilitation Management Plan developed for the Project. In the event that mining does not occur, rehabilitation of the Exploration Decline will be undertaken in accordance with the Exploration Decline approval requirements.

1.3 Regulatory Framework

The key legislation for rehabilitation and closure requirements are the *Mining Act 1992* (Mining Act), the EP&A Act and the *Protection of the Environment Operations Act 1997* (POEO Act).

1.3.1 Mining Act 1992

An authorisation must be granted for prospecting, exploration or mining under the Mining Act before these activities can be undertaken; rehabilitation and environmental performance conditions are attached to all mining leases under the Mining Act and have been considered in the preparation of this Rehabilitation Strategy.

Rehabilitation activities cover a broad range of components requiring to be addressed in order to establish a safe and stable environment following the closure of a mining operation. The scope of rehabilitation activities may include demolition of surface infrastructure, remediation of contaminated land, capping of the TSF, final landform establishment, geotechnical stabilisation and revegetation works.

The Mining Act also provides for a security deposit to be provided to the NSW government which must cover the government's full costs in undertaking rehabilitation in the event of default by the title holder. The title holder is required to provide a rehabilitation cost estimate (RCE). The Department of Planning, Industry and Environment - Resource Regulator (DPIE-RR) will consider this estimate when determining the amount of the security deposit required for a title, or group of titles.

1.3.2 Mining Regulation 2016

Recently DPIE-RR introduced a package of rehabilitation reforms which came into effect in July 2021, amending the *Mining Regulation 2016* (Mining Regulation). The purpose of the reforms was to introduce improved compliance and reporting relating to mine rehabilitation. These reforms apply to all new mining leases from July 2021. Existing mines are required to convert their existing MOPs into rehabilitation management plans by July 2022.

Upon granting of a mining lease for the Project, a Rehabilitation Outcomes Document and associated RCE will be submitted to DPIE-RR for approval. This process is further outlined in **Section 1.5**.

1.3.3 Environment Planning and Assessment Act 1979

Prior to a mining lease being granted, development consent must be obtained under the EP&A Act.

Additionally, the EP&A Act allows for making of environmental planning instruments including State Environmental Planning Policies (SEPPs). Given that the Project is expected to exceed the capital investment threshold outlined in the State and Regional Development SEPP, the Project has been identified as State Significant Development (SSD) and is required to be informed by and environmental impact statement (EIS) addressing the Secretary's Environmental Assessment Requirements (SEARs) issued by the DPIE.

The SEARs for the Federation Project require that the EIS must address the following specific issues with respect to **Closure, Rehabilitation and Final Landform** – including a Rehabilitation Strategy providing:

- A detailed overview of the final land-use and final landform, rehabilitation objectives and closure criteria for the development, including the conceptual final landform design; and
- Identification and discussion of opportunities to improve rehabilitation and environmental outcomes for existing disturbed areas within the Project site, and barriers and limitations to effective rehabilitation.

1.4 Closure Planning Guidelines

The following section includes a summary of key industry guidelines and closure planning framework documents that have been considered during the preparation of this Rehabilitation Strategy.

1.4.1 Integrated Mine Closure – Good Practice Guide (ICMM 2019)

The International Council on Mining and Metals (ICMM) has developed the Integrated Mine Closure – Good Practice Guide to support mining operations in achieving a post-closure status that leaves behind an enduring positive legacy in the community.

The guide recommends three basic steps to develop an effective closure plan:

- Development of a conceptual plan including identification of target closure outcomes and goals;
- Ongoing development and implementation of a detailed closure plan, which increases the understanding and detail of specific goals and milestones as well as the actions and outcomes of activities to meet these; and
- Development of a decommissioning and post-closure plan.

1.4.2 Strategic Framework for Mine Closure (ANZMEC 2000)

The *Strategic Framework for Mine Closure* has evolved as a cooperative development between the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Australian Minerals Industry (represented by the Minerals Council of Australia (MCA)). It is designed to provide a broadly consistent framework for mine closure across the various jurisdictions. The objective of the Strategic Framework is to encourage the development of comprehensive Closure Plans that return all mine sites to viable, and wherever practicable, self-sustaining ecosystems, and that these plans are adequately financed, implemented and monitored within all jurisdictions.

The Strategic Framework is designed to cover a broad range of mining and mining related activities. Planning and selected strategies and the methods for implementation are outlined in this Rehabilitation Strategy .

1.5 New Standard Rehabilitation Conditions on Mining Leases

As stated in **Section 1.3.2** amendments were made to the Mining Regulation in July 2021, which set new standards for mine rehabilitation and documentation requirements. The amendment requires new mining lease conditions which specify that documents must be prepared and (where relevant) given to the Secretary in a 'form' and 'way' approved by the Secretary (clause 9 in Schedule 8A). Lease holders of large mines are required to:

- Prepare rehabilitation objectives and rehabilitation completion criteria in the form and way approved by the Secretary;
- Submit the rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation plan to the Secretary for approval (collectively referred to as the "rehabilitation outcome documents");
- Prepare a rehabilitation management plan (which includes the rehabilitation objectives and rehabilitation completion criteria) in the form and way approved by the Secretary;
- Implement the rehabilitation management plan;
- Achieve the final land use as stated in the approved rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation Plan (large mines only).

Prior to the development of the rehabilitation outcomes document, a comprehensive risk assessment will be undertaken. A rehabilitation risk assessment will be undertaken that:

- identifies, assesses and evaluates the potential risks to achieving the rehabilitation objectives, rehabilitation completion criteria and (for large mines) the final land use as spatially depicted in the final landform and rehabilitation plan;
- identifies the specific risk control measures that need to be implemented to eliminate, minimise or mitigate the risks; and
- identifies how the effectiveness of the risk control measures will be assessed.

The Rehabilitation Management Plan will include a copy of the Rehabilitation Outcomes Document (as approved or as proposed). The Rehabilitation Management Plan will also include a statement of the performance outcomes for the matters addressed by the rehabilitation outcomes documents and the ways in which those outcomes are to be measured and monitored. The Rehabilitation Management Plan will be published as required by DPIE-RR.

A forward program will also be developed that will provide a schedule of mining actvities and the spatial progression of rehabilitation activities over a period of three years.

An annual report on rehabilitation activities will be prepared annually along with an updated RCE. The annual report along with corresponding spatial data will be submitted via the online portal. The portal provides DPIE-RR to accurately record and track areas of disturbance and rehabilitation of individual sites across NSW.

2 Existing Environment

2.1 Soils and Land Capability

Hera Resources engaged Sustainable Soils Management Pty Ltd (SSM) to conduct a Land and Soil Capability (LSC) Assessment for the proposed Federation Project. The resulting report is hereafter referred to as SSM (2021).

SSM's assessment was based on profile descriptions in 26 pits, laboratory tests and used surface observations and published data to divide the land into 5 soil mapping units. The key differences between Soil Mapping Units (which cover any area inclusive of, but larger than, the Project disturbance area) were the depth to more than 50% gravel and the profile of cation ratios as described in **Table 1**.

Table 1 Soil Properties that Differentiate Soil Mapping Units

Soil Mapping Unit	Key Properties	LSC Class	Area (ha)
Dermosol	• >1 m to more than 50% gravel. • Desirable cation ratios through profile.	4	61
Non-calcic Dermosol	• Average 75 cm to more than 50% gravel. • Cation ratios desirable in 0 to 5 cm layer, elevated calcium in 5 to 60 cm layer, elevated sodium in 60 to 90 cm layer.	5	76
Rudosol	• Average 20 cm to more than 50% gravel. • Desirable cation ratios through profile.	6	85
Acidic Rudosol	• Average 25 cm to more than 50% gravel. • Elevated aluminium through profile.	6	26
Tenosol	• Minimal soil.	7	16
Source: Sustainable Soils Management (2021)			

In summary, soils in the Soil Study Area were assessed as being suitable for stripping and use in rehabilitation to return the land to existing land capability. SSM (2021) concluded that there would be no net change in LSC Class from pre to post mining.

2.2 Surface Water

The Project is located within the catchment area of Sandy Creek. The main creek systems in the vicinity of the Project are westerly flowing ephemeral streams that ultimately drain to the Darling River include Box Creek to the north, and Sandy Creek to the south. The Services Corridor route crosses six mapped watercourses.

Surface water flows within the Project area generally feature sheet wash and overland flows (R.W Corkery, 2021).

2.3 Vegetation

Hera Resources engaged AREA Environmental Consultants & Communication Pty Ltd (AREA) to complete a Biodiversity Development Assessment Report for Project. The resulting report is hereafter referred to as AREA (2021).

The assessment identified the following Plant Community Types (PCTs) within the Project area:

- PCT174 – Mallee – Gum Coolabah woodland on red earth flats of the eastern Cobar Peneplain Bioregion;
- PCT104 – Gum Coolabah woodland on sedimentary substrates mainly in the Cobar Peneplain Bioregion;
- PCT103 – Poplar Box – Gum Coolabah – White Cypress Pine – shrubby woodland mainly in the Cobar Peneplain Bioregion;
- PCT184 – Dwyer's Red Gum - White Cypress Pine – Currawang low shrub-grass woodland of the Cobar Peneplain Bioregion;
- PCT258 Gum Coolabah - Mugga Ironbark - White Cypress Pine woodland on granite low hills in the eastern Cobar Peneplain Bioregion and central NSW South Western Slopes Bioregion; and
- PCT180 Grey Mallee - White Cypress Pine woodland on rocky hills of the eastern Cobar Peneplain Bioregion

2.4 Land Use

Existing land uses, as defined by the NSW Land Use and Management database within and adjacent to the Federation Project area include the following:

- Grazing native vegetation – predominately sheep and goat grazing with no pasture modification and widely spaced rural residences / homesteads;
- Other minimal use – areas of land that are largely unused, likely as a result of steep slopes or dense vegetation; and
- Nature conservation and forestry – associated with the Balowra State Conservation Area.

3 Rehabilitation Management Strategy

The Rehabilitation Strategy specifically includes the following key aspects relating to rehabilitation of the Project:

- identification of the rehabilitation objectives and completion criteria;
- proposed rehabilitation methods for the disturbed areas;
- the management of soil resources (including topsoil and subsoil) for use in rehabilitation of the site;
- description of the planned revegetation of areas across the mine site;
- the integration with on-going and future rehabilitation activities across Hera Mine; and
- specific rehabilitation monitoring and maintenance requirements which will apply.

3.1 Outline of the General Principles of the Rehabilitation Strategy

To achieve the objectives outlined above, the rehabilitation of disturbed land within the Project area will be conducted so that:

- all infrastructure is removed, with the exception of infrastructure required by the landholder to be retained;
- a soil profile is established capable of sustaining the specified land uses which are consistent with pre-mining land use;
- suitable species of vegetation are sown / planted and established to achieve the nominated post-mine land uses which are commensurate with the surrounding vegetation;
- the potential for water and wind induced erosion is minimised, including the likelihood of environmental impacts being caused by the release of dust;
- the quality of surface water released from the site (if any) is such that releases of contaminants are not likely to cause environmental harm; and
- the final landform is stable and not subject to slumping or erosion which will result in the agreed post mining landform not being achieved and does not present a risk of environmental harm or a safety risk the public and / or domestic stock / native fauna.

3.1 Rehabilitation Phases

Phase 1: Decommissioning

Decommissioning will include the disconnection of remaining services, demolition and removal of infrastructure from the Project area as defined in Section **1.2**. This phase will also include capping of boreholes (where not retained for future water supply for landholders) and sealing of ventilation shafts. Remediation of any contamination will also be undertaken during this phase.

Phase 2: Landform Establishment

The landform establishment phase involves the earthworks required to construct and/or profile all or part of each domain to the approved final landform. The constructed landform will be suitable for the proposed final land use and blend, as far as practicable with the adjacent topography. This stage also includes the construction of any drainage structures needed for the final landform.

Phase 3: Growth Medium Development

The growth medium development phase involves the placement of waste rock, soil resources and preparation of the surface for revegetation. Soil preparation may include ameliorant application (e.g. gypsum) and ripping or scarifying the surface. Organic material may be used in preference to fertilisers during rehabilitation.

Phase 4: Ecosystem and Land Use Establishment

The ecosystem and land use establishment phase involves the establishment and maintenance of vegetation on the completed landform. Initial activities for ecosystem and land use establishment of land that will have a final use of native vegetation conservation will focus on establishing a cover of suitable native groundcover (grasses). Revegetation will then comprise seeding / planting of suitable vegetation and / or natural regeneration from seed within the growth medium. Following completion and during mining activities these areas will be returned to native vegetation occurring within existing PCTs as described in **Section 2.3**.

Phase 5: Ecosystem and Land Use Sustainability

The ecosystem and land use sustainability phase occurs once monitoring illustrates the achievement of relevant performance indicators with respect to ecosystem development. Areas of the landform may remain within this phase for extended periods whilst progress is made towards achieving completion criteria.

Phase 6: Land Relinquishment

On achievement of the nominated closure criteria, the land will be relinquished and the rehabilitation security held by the Resources Regulator released.

3.2 Proposed Post Mining Land Use

The post mining land use goal is to provide a low maintenance, geotechnically stable and safe landform that is commensurate with the land use of the surrounding area.

Rehabilitation planning will attempt to maximise opportunities for diverse post-mining landscapes and land uses that not only provide a stable landform but also provide the best opportunity to minimize net losses of natural habitats, biodiversity and landscape function. Conceptually, this plan proposes that the predominant final post-mining land use for the site will include returning the site to a combination of agriculture (limited pastoral activities) and native vegetation made up of predominantly endemic species (comprising trees, shrubs and grasses). The land uses are consistent with land uses permissible without development consent under the *Cobar Local Environmental Plan 2011*. As the Project is Zoned RU1 under the LEP, land uses permissible without development consent include nature conservation and extensive agriculture.

Where existing landholders have proposed retention of infrastructure, and where documented in existing or future agreements, mining infrastructure will be retained for post mining use. Buildings, access roads, hardstands and other infrastructure will be made safe with mitigation of mining related legacies appropriate to the post mining land use where relevant. Redundant mining related infrastructure will be demolished and removed.

3.3 Specific Rehabilitation Objectives

Specific rehabilitation objectives and completion criteria are presented in **Table 2.** Further details regarding rehabilitation objectives and completion criteria are provided in **Table 6**.

Table 2 Rehabilitation Objectives and Completion Criteria

Phase	Objective	Completion Criteria
Decommissioning	Decommission and remove all surface infrastructure	All surface infrastructure removed (unless required for a lawful post mining land use).
	Assess and remove any potentially acid forming (PAF) material from the waste rock pads and transfer underground at the Federation Site or at Hera Mine. Non-acid forming (NAF) material to be used as backfill for the box cut, in rehabilitation of other areas or shaped into a stable landform if a beneficial use for the box cut is identified.	All contamination removed or treated and PAF material placed underground. NAF material to be used for the box cut rehabilitation, in rehabilitation of other areas or shaped into a stable landform if a beneficial use for the box cut is identified.
Landform Establishment	Provide a low maintenance, geotechnically stable and safe landform that is suitable for the proposed final land use.	Geotechnical assessments indicate that the embankment on the TSF and the faces of the box cut (if not backfilled) are stable. Landform evolution modelling used to support assessment of long-term stability of TSF cover layer.
	Provide a non-polluting landform.	Surface water and groundwater quality monitoring results indicate that the landform is non-polluting. Pollution will be considered against the definition provided by Section 120 of the POEO Act.
	Construct, to the extent that is practicable, the final landform to integrate with the surrounding landscape.	Profile the landform so that it is consistent with the final land use.
	Minimise visual impact of final landforms as far as is reasonable and feasible.	Profile the landform so that it is consistent with the surrounding landscape.
Growth Medium Development	Where available, provide a cover of soil over landforms that will enable the establishment of, and sustain, the nominated vegetation.	Soil depth and chemistry is to be consistent with comparable analogue sites.
Ecosystem and Land Use Development	Revegetated areas provide a vegetation community with maintenance requirements no greater than adjoining vegetation / analogue sites not disturbed by mining activities.	Rehabilitation monitoring confirms that the established vegetation communities are self-sustaining.

Phase	Objective	Completion Criteria
	Revegetated areas contain species consistent with surrounding vegetation communities.	Rehabilitation monitoring confirms the non-native and non-target species (weeds) occur at similar abundance to surrounding vegetation / analogue sites not disturbed by mining activities.
Ecosystem and Land Use Sustainability	Provide native vegetation communities suitable for land use strategies.	Rehabilitated landform is self-sustaining and suitable for the proposed final land use.
	Final land use compatible with surrounding land uses.	Rehabilitation monitoring confirms that the final land use is compatible with surrounding land use.
Land Relinquishment	Allow for the relinquishment of the mining tenements and the return of the security lodged over the mining lease(s) within a reasonable time after the end of the mine life.	Within 10 years of final rehabilitation.

3.4 Domain Selection

Mining domains for the Project have been defined on the basis of existing land management units within the Project area which have similar operational purposes and therefore similar geophysical characteristics. Final land use domains have been defined as land management units characterised by similar post mining land use objectives. The nominated mining and final land use domains for the Project are included in **Table 3**. This Rehabilitation Strategy is based on the box cut being backfilled and subsequently returned to a native vegetation woodland. However, should a potential beneficial use for the box cut be identified, such as a water storage for a landholder, then future rehabilitation strategies or management plans may be updated to reflect this outcome.

Table 3 Mining and Final Land Use Domains

Code	Mining Domains	Code	Final Land Use Domains
1	**Infrastructure Areas** - Includes all proposed built infrastructure and facilities. Includes linear infrastructure, new processing plant, workshops and amenities, roads, hardstand areas and car park, water management structures, ventilation shafts and associated infrastructure.	A	**Infrastructure –** Includes all infrastructure that will remain on the site at mine closure including, potentially, access tracks and roads, water management structures, communications tower, solar farm, boreholes, selected sheds and transportable buildings that could reasonably be required for agricultural and/or nature conservation purposes.
2	**Tailings Storage Facility** - This domain is the Hera Mine TSF including all embankments (given that tailings produced from Federation ore will be delivered to the Hera TSF).	B	**Rehabilitation Area – Native Vegetation Grassland** – Grassland rehabilitation comprising a cover crop which includes native grassland species. Relates to the TSF. (Note that there is future potential for woodland vegetation on the TSF subject to further assessment)
3	**Waste Rock Stockpile Area** – Temporary, separated stockpiles of PAF and NAF materials.	C	**Rehabilitation Area – Native Vegetation Woodland** – Native woodland vegetation (refer **Section 2.3**). Relates to all rehabilitation other than the TSF, i.e. Infrastructure Areas (except those retained), waste rock stockpiles, backfilled box cut and the Services Corridor.
4	**Soil Stockpiles** - Areas used for stockpiling of soil resources (excludes stockpiled waste rock).		
5	**Box Cut** - Box cut providing entrance to the underground mine workings.		

Code	Mining Domains	Code	Final Land Use Domains
6	**Services Corridor** – Between Federation Site and Hera Mine, including powerline, water pipeline and access track.		
7	**Surface Extraction Area –** This domain is the surface extraction area where material will be excavated from the top of a knoll that rises above surrounding topography.		

3.5 Domain Rehabilitation Objectives

Rehabilitation objectives for each of the Mining and Final Land Use domains are provided in **Table 4**. These objectives have been used to develop the performance indicators and completion/relinquishment criteria presented in **Section 3.8**.

Table 4 Domain Rehabilitation Objectives

Mining Domain	Final Land Use Domain	Rehabilitation Objectives
1 –Infrastructure Area at Federation Site	A – Infrastructure	All roads, hardstand areas and linear infrastructure to be retained for a lawful final land use reduced in width or size to that suitable for final land use. Domain safe and free from hazardous materials and contaminants. Free draining, stable and permanent landform established.
	C – Native Vegetation Woodland	All infrastructure and services not suitable for a lawful final land use to be removed. Domain safe and free from hazardous materials and contaminants. Free draining, stable and permanent landform established. Establish a soil profile capable of sustaining the specified end land use. Establish vegetation with a similar species composition to existing PCTs.
2 – Tailings Storage Facility	B – Native Vegetation Grassland	Infrastructure removed and domain made safe. Free draining, stable and permanent landform established. Limit opportunities for pollution of the surrounding landscape. Establish a soil profile capable of sustaining the specified end land use. Establish predominantly native grass cover. Grassland ecosystem is established with maintenance needs no greater than those of surrounding, undisturbed land. Vegetation dominated by shallow rooted native grassland species.
3 – Waste Rock Stockpile Area	C – Native Vegetation Woodland	Domain safe and free from hazardous materials and contaminants. PAF waste rock is removed from domain. NAF waste rock will be rehabilitated within the stockpile area should NAF waste rock not be used to backfill the box cut, or for other rehabilitation purposes. Free draining, stable and permanent landform established. Establish a soil profile capable of sustaining the specified end land use. Establish vegetation with a similar species composition to existing PCTs.

Mining Domain	Final Land Use Domain	Rehabilitation Objectives
4 – Soil Stockpiles	C – Native Vegetation Woodland	Domain safe and free from hazardous materials and contaminants. Soil stockpiles will be used for rehabilitation of disturbed areas. Free draining, stable and permanent landform established. Establish vegetation with a similar species composition to existing PCTs.
5 – Box Cut and Portal	C – Native Vegetation Woodland	Domain safe and free from hazardous materials and contaminants. Sealed portal. Free draining, stable and permanent landform established for a backfilled box cut Establish vegetation with a similar species composition to existing PCTs.
6 - Surface Extraction Area	C – Native Vegetation Woodland	Domain safe and free from hazardous materials and contaminants. Free draining, stable and permanent landform established Establish a soil profile capable of sustaining the specified end land use. Establish vegetation with a similar species composition to existing PCTs.

3.6 Management of Waste – Geochemical Properties

3.6.1 Waste Rock

Two waste rock stockpiles will be located at the Federation Site to store waste rock generated from the development of the box cut, decline and the lateral and vertical development. One stockpile will be for the storage of non-acid forming (NAF) and potential acid forming (PAF) materials, and the other for PAF materials. 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 from 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.

3.6.2 Tailings

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. There is not expected to be a requirement for any TSF wall raises above the approved capacity to accommodate tailings produced from the Project.

The Hera Mine TSF has an approved area of approximately 50ha and an approved western embankment elevation of 329m AHD, based on the environmental assessment prepared for Hera Mine's planning consent.

Whilst the preferred method for transport of tailings from Hera Mine to the Federation Site is via road, there is potential that tailings will be pumped through a dedicated pipeline in the Services Corridor between the process plant at Hera Mine and the tailings paste plant at the Federation Site.

3.7 Landform Design and Planning

Rehabilitation planning will ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden run-off. Re-contouring of the disturbed area will be undertaken so it is commensurate with the surrounding natural landforms wherever possible. The rehabilitation will generally be designed to achieve a stable final landform compatible with the surrounding environment.

The conceptual final landform design for Federation Site is shown in **Figure 1**, and for Hera Mine in **Figure 2**. The Federation Site final landform will comprise the following:

- Box cut to be backfilled with NAF waste rock, with the existing topography largely re-established;
- Infrastructure areas with the existing topography largely re-established;
- Sealed ventilation rises capped in accordance with the relevant guidelines; and
- Retained infrastructure including the powerline, water pipeline, access track, communications tower etc (Note that infrastructure is the Services Corridor is shown on **Figure 1** and **Figure 2** as being woodland final landform; however it is expected that opportunities for beneficial future use of some or all of this infrastructure will be identified during Project life). All retained tracks will be suitable for ongoing agriculture and land maintenance use.

The conceptual landform for Hera Mine is provided in **Figure 2**. This is a reproduction of the approved *Hera Mine 2020 -2022 Mining Operations Plan (Amendment A)*, with the exception of the solar farm, additional power lines and Services Corridor. The solar farm will be retained as infrastructure for future use.

It is presently proposed that the final land-uses of the rehabilitated Project area will include returning the majority of the Project area to native vegetation made up of predominantly endemic species (composing trees, shrubs and grasses). It is recognised, however, that in order to achieve a long-term stable landform, the use of some introduced species (mainly grass and understorey) may be necessary. **Section 3.11** discusses the proposed species composition to be used in the rehabilitation program in more detail.

The anticipated rehabilitation methodology and completion criteria for the Project are provided in **Table 6**. Domain 4 is not included in **Table 5** given that stockpiles in this domain will be removed and used as growth media during rehabilitation works. The rehabilitation strategy for *Domain 3 – Waste Rock Stockpile Area* is based

on utilising NAF waste rock to back fill the box cut (noting that PAF waste rock will be returned underground as described in **Section 3.7.1**). However, should a potential beneficial use for the box cut be identified, such as a water storage for a landholder, then future rehabilitation strategies or management plans may be updated to reflect this outcome.

Domain 2 – Tailings Storage Facility is the Hera Mine TSF and has been included as a domain for the Project given that tailings produced from mining and processing ore will be deposited in the Hera TSF. Hera Resources proposes to manage the TSF's potential risk to the receiving environment by capping the TSF at final closure with a store and release cover that will mimic a natural soil profile. The purpose of the cover is to:

- Limit rainfall infiltration into the tailings to prevent seepage, and mobilisation of oxidation products from the PAF tailings that may form Acid Rock Drainage (ARD);
- Provide an environment favourable to the growth of vegetation in the cover; and
- Stop capillary rise of constituents from ARD migrating upwards from the tailings into the cover and potentially leaking onto the natural environment.

It is proposed that the TSF closure landform will be informed through the use of landform evolution modelling (LEM). LEMs are used to estimate potential surface water runoff for a proposed soils type and vegetation cover and predict resulting erosion and deposition processes on a landform scale. When applied to mining landforms, LEM erosion predictions can be used to inform closure planning and to predict post-closure performance. Performance indicators and completion criteria for the Hera TSF are included Tables 18 to 22 in the approved *Hera Mine 2020 -2022 Mining Operations Plan (Amendment A)*, and have been reproduced in **Table 6**.

3.7.1 Material Balance

In order to achieve the final landform as provided in **Figures 1** and **Figure 2** material from various sources will be required for backfilling and surface contouring. Based on the approved sources of material available for the Project and the anticipated demand, there is predicted to be an excess of 320,000 m^3 of material available for rehabilitation. This excludes the predicted surplus of soils resources (refer to Section 4.1.2).

The estimate of material demanded has been based on the following:

- Material is required for a capping layer and capillary break layer for the TSF. The combined depth has been conservatively estimated at 0.9m (0.6m + 0.3m); noting that data and trials for Hera TSF cover material, as presented in the MOP, show that a combined depth of between 0.6 m and 0.8 m is optimal.
- Material is required to construct TSF embankment raises up to the current approved embankment height.
- Information on Hera Mine's materials balance is presented in Modification 6 (MOD 6) to Hera Mine's planning approval (approved in June 2021) and is utilised to inform the materials demand.
- As Federation mine stopes will primarily be filled with tailings paste, there is not predicted to be a demand for additional materials, above what is available from PAF waste rock, for backfill purposes, and hence this is excluded from the materials balance.

The estimate of material supply has been based on the following:

- Approved sources of material supply from:
    - The surface extraction area at Hera Mine (approved as part of MOD 6)

  - Peak Mine (approved as part of MOD 6)
  - the Exploration Decline Program (approved as part of the activity approval for the Exploration Decline Program)
  - Back dam east which is constructed but not currently used for water supply.
- Proposed box cut and surface extraction area at Federation Site, as described in this EIS.
- Material to 0.3m depth from existing and proposed disturbance areas at Hera Mine and Federation Site.

Table 5 provides a summary of the source and demand of the material and approximate quantities.

Table 5 Materials Balance

Requirement	Volume (m^3)	Source / Assumptions
Hera TSF capping layer	294,000	Assume 0.6m capping over entire TSF footprint including embankments
Hera TSF capillary break	126,000	Assume 0.3m capping over TSF surface only
Hera Mine backfill to 2023	269,000	As per requirement in Hera Mine Modification 6
Backfill Federation box cut	70,000	As per Federation Project EIS
TSF wall lifts	285,000	As per engineering TSF Capacity Design report prepared by GHD in 2019
Total	*1,044,000*	
Supply		
Federation PAF waste rock to Hera for backfill	243,000	As per activity approval for Exploration Decline Program
Federation box cut	70,000	As per Federation Project EIS
Surface extraction area - Hera magazine hill	307,000	As per approval for Hera Mine Modification 6
Back dam east	292,000	As per approval for Hera Mine Modification 6
Peak Mine (approved)	171,000	As per approval for Hera Mine Modification 6
Surface extraction area - Federation	104,000	As per final landform design at the Federation surface extraction area
Hera infrastructure area	72,000	As per approval for Hera Mine Modification 6– site disturbance to depth of 0.3m
Federation infrastructure areas	105,000	As per Federation EIS – site disturbance to depth of 0.3m
Total	*1,364,000*	
Surplus	**320,000**	

433000 433500 434000 434500 435000 435500

6437500 6437000 6436500 6436000

ACCESS ROAD

ROAD TO COMMUNICATION TOWER

TELECOMMUNICATION TOWER

HAUL ROAD

BURTHONG ROAD

A B D

LEGEND

Existing 2m contour

Dams

Secondary Domain Name

A Infrastructure

B Water Management Area

D Rehabilitation Area – Native Vegetation Woodland

0 250 500 m

Scale: 1:7,500 at A4

Coordinate system: GDA 1994 MGA Zone 55

Date drawn: 22-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

FEDERATION MINE SITE FINAL LANDFORMS

FIGURE 1

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_RS_G1_FinalLandform_Federation_001.mxd

434000 435000 436000 437000 438000 439000

6447000 6446000 6445000

BURTHONG ROAD

BALOWRA ROAD

LEGEND

- Hera Mine Site Boundary
- Existing 2m contour
- Dams

Secondary Domain Name

- A Infrastructure
- B Water Management Area
- C Rehabilitation Area – Native Vegetation Grassland
- D Rehabilitation Area – Native Vegetation Woodland
- I Final Void

0 250 500 m

Scale: 1:14,000 at A4
Coordinate system: GDA 1994 MGA Zone 55

Date drawn: 22-Dec-2021
Project number: 660.30076

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

SLR

HERA MINE SITE
FINAL LANDFORMS

FIGURE 2

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_RS_G2_FinalLandform_Hera_001.mxd

Table 6 Rehabilitation Methodology and Completion Criteria

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Phase 1 – Decommissioning					
Domain 1 – Infrastructure Area					
All infrastructure and services not suitable for a lawful final land use will be removed	Scrape all sheeting material from roads and hardstand areas to be rehabilitated	Roads and hardstand areas not required for final land use are removed.	Roads removed unless permitted for agricultural or other approved activity.	Relinquishment inspection and report, including photographs.	Single occurrence following decommissioning (unless follow up actions identified)
	Remove infrastructure and transport off site.	Infrastructure not required for final land use removed	Relevant infrastructure removed.		
	Design, manufacture and install appropriate caps.	Ventilation rises capped.	Ventilation rises capped (in consultation with Resources Regulator).	Relinquishment inspection and report, including photographs.	Following completion
All roads, hardstand areas, powerline, water pipeline, boreholes, dams and communications tower to be retained for lawful final land use at the landholder's request reduced in width/size to that suitable for final land use.	Infrastructure retained.	Remaining roads reduced in width to that suitable for final legal land use.	Required width identified and roads reduced to comply.	Relinquishment inspection and report, including photographs	Single occurrence following decommissioning (unless follow up actions identified).
	Infrastructure retained.	Hardstand areas reduced in size to that suitable for final legal land use.	Required infrastructure areas identified and remainder removed.		

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Domain safe and free from hazardous materials and contaminants	Undertake a contaminated lands assessment and implement the recommendation of the assessment to remove any contaminated material	Contaminated land identified and remediated.	Contaminated land assessment confirms no contaminated materials remain on site.		
	Undertake a hazardous materials assessment and implement the recommendation of the assessment to remove any contaminated material.	All hazardous materials removed.	Hazardous materials assessment confirms no hazardous materials remains on site.		
Domain 2 - TSF					
Infrastructure removed and domain made safe	Identification of infrastructure to be removed.	Pipework, decant and associated ancillary infrastructure removed.	Pipework, decant and associated ancillary infrastructure removed.	Relinquishment inspection and report, including photographs.	Single occurrence following decommissioning (unless follow up actions identified).
		TSF structurally sound.	Technical report confirms that TSF is structurally sound, report is accepted by Dam Safety Committee of NSW, and notification of successful decommissioning received.	Independent engineers report to Dam Safety Committee of NSW. Correspondence with Dam Safety Committee of NSW.	Ongoing and following decommissioning.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
		TSF non-polluting.	Surface water and groundwater monitoring indicates that surface flow/leachate complies with trigger values noted in the Water Management Plan.	Water quality testing as per the approved Water Management Plan.	Monthly during and immediately following operations, with frequency to be reduced progressively post-closure, based on performance.
Domain 5 – Box Cut					
Domain safe and free from hazardous materials and contaminants	Undertake a contaminated lands assessment and implement the recommendation of the assessment to remove any contaminated material.	Contaminated land identified and remediated.	Contaminated land assessment confirms no contaminated materials remain on site.	Relinquishment inspection and report, including photographs.	Single occurrence following decommissioning (unless follow up actions identified).
Domain 6 – Surface Extraction Area					
Any infrastructure removed and domain made safe	Identification of infrastructure to be removed	Infrastructure not required for final land use removed	Relevant infrastructure removed.	Relinquishment inspection and report, including photographs.	Single occurrence following decommissioning (unless follow up actions identified).
Phase 2 – Landform Establishment					
Domain 1 – Infrastructure Area					
			Post shaping survey	Aerial survey or similar	Following completion.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Free draining, stable and permanent landform established.	Shape final landform to mimic current landform to the extent practicable.	Shaped landform matches current landform. Presence of erosion/sedimentation, landform design and monitored water quality.	Water quality complies with the relevant trigger values.	Water quality testing in accordance with the *Water Management Plan*. Monitoring reported annually through the Annual Review which is a mining lease requirement.	Following rainfall events that generate surface water runoff, with frequency to be reduced progressively post-closure, based on performance.
			The number of visible gullies or rills that are greater than 0.3 m in width or depth is limited or improving.	Visual inspection and monitoring reports, including photographs.	Quarterly during operations with frequency to be reduced progressively post-closure, based on performance.
			All slopes in final landform <18º or 1:3 (V:H) or suitable slope angle demonstrated through LEM and engineering design	LIDAR survey or similar	Following completion.
			Longitudinal grade of contour drains 2% (or suitable grade for soil type)		
Domain 2 - TSF					

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Free draining, stable and permanent landform established	Shape to final contours as per the final design	Tailings fully settled	Monitoring indicates that tailings settling / dewatering is complete/reduced to an acceptable level.	Visual surveys of tailings surface by site personnel.	Six monthly following decommissioning.

		Tailings are appropriately capped and have an appropriate store and release function for management of rainfall infiltration.	The final closure strategy for the TSF will be subject to results of rehabilitation trials on the appropriate capping depth and compositions. LEM will be utilised to assess the long term performance of the TSF cover layer. Until such time, an interim approach to rehabilitation has been developed based on the cover depth assessment completed by EMM (2016) and SGM (2018): • Embankments will be stabilised with NAF waste rock, where necessary. • A 0.8m covering of NAF waste rock or other suitable	Inspection and testing report, including photographs, prepared by a suitably qualified person. Relinquishment inspection and report, including photographs.	During placement of capping and cover layers with final monitoring to be undertaken upon establishment of final landform.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
			material will be applied to the surface to provide a store-release cover for management of rainfall infiltration. The final landform in this domain will be constructed to be free draining.		
		Landform suitable for growth media establishment.	All downstream embankment slopes <18º or 1:3 (V:H) or suitable slope angle demonstrated through LEM and engineering design.	As constructed survey plans.	Following completion.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
		Facility profiled to be free draining.	Mapping confirms that the landform is free draining. Embankment height of 9m above original surface. Slope of outer embankment 1:3 (V:H) or suitable slope angle demonstrated through LEM and engineering design. No pooling of water on upper surface of the facility is observed.	As constructed survey plans. Relinquishment inspection and report, including photographs.	Following completion.
		Suitable drop structures (if required) installed and capable of transferring water from the facility without eroding.	Drop structures constructed (if required) as per Landcom (2004) or other suitable engineering design standards. The number of visible gullies or rills that are greater than 0.3m in width or depth is limited or improving.	As constructed survey plans. Visual inspection and monitoring reports, including photographs.	Following completion and 6 monthly.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Limit opportunities for pollution of the surrounding landscape.		Leachate (if present) of acceptable quality.	Water quality complies with the relevant trigger values identified in the Water Management Plan.	Water quality testing in accordance with the Water Management Plan. Monitoring reported annually through the Annual Review.	Monthly during and immediately following operations, and then less frequently following completion of the Mine.
		Suitable surface water controls installed and operating effectively.	Water quality complies with the relevant trigger values identified in the Water Management Plan. The number of visible gullies or rills that are greater than 0.3m in width or depth is limited or improving.	Water quality testing in accordance with the Water Management Plan. Visual inspection and monitoring reports, including photographs.	Following rainfall events that generate surface water runoff, with frequency to be reduced progressively post-closure, based on performance.
Domain 5 – Box Cut					
Free draining, stable and permanent landform established	Back fill box cut with stockpiled NAF waste rock and shape the final landform to mimic current landform to the extent practicable	Shaped landform matches current landform. Presence of erosion/sedimentation, landform and monitored water quality.	Post shaping survey	LIDAR survey or similar	Following completion
			Water quality complies with the relevant trigger values	Water quality testing in accordance with the *Water Management Plan*. Monitoring reported annually through the Annual Review	Following rainfall events that generate surface water runoff, with frequency to be reduced progressively post-closure based on performance.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
			The number of visible gullies or rills that are greater than 0.3 m in width or depth is limited or improving.	Visual inspection and monitoring reports, including photographs.	Quarterly during operations with frequency to be reduced progressively post-closure, based on performance.
			All slopes in final landform <18º or 1:3 (V:H) or suitable slope angle demonstrated through LEM and engineering design	LIDAR Survey or similar	Following completion
			Longitudinal grade of contour drains 2% (or suitable grade for soil type)		
		Sealed portal	Portal sealed with suitable material (e.g. NAF waste rock)	Relinquishment inspection and report, including photographs, prepared by a qualified person.	Following completion.
Domain 6 – Surface Extraction Area					
			Post shaping survey	Aerial survey or similar	Following completion.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Free draining, stable and permanent landform established.	Shape final landform to mimic surrounding landform to the extent practicable.	Shaped landform matches surrounding landform. Presence of erosion/sedimentation, landform design and monitored water quality.	Water quality complies with the relevant trigger values.	Water quality testing in accordance with the *Water Management Plan*. Monitoring reported annually through the Annual Review which is a mining lease requirement.	Following rainfall events that generate surface water runoff, with frequency to be reduced progressively post-closure, based on performance.
			The number of visible gullies or rills that are greater than 0.3 m in width or depth is limited or improving.	Visual inspection and monitoring reports, including photographs.	Quarterly during operations with frequency to be reduced progressively post-closure, based on performance.
			All slopes in final landform <18º or 1:3 (V:H) or suitable slope angle demonstrated through LEM and engineering design	LIDAR survey or similar	Following completion.
			Longitudinal grade of contour drains 2% (or suitable grade for soil type)		
Phase 3 – Growth Medium Development					
Domain 1 – Infrastructure Area					

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Domain 2 - TSF					
Domain 5 – Box Cut (NAF waste rock used to back fill the box cut)					
Domain 6 – Surface Extraction Area					
Establish a soil profile capable of sustaining the specified end land use of nature conservation and occasional grazing. Establish a soil profile capable of sustaining the specified end land use of nature conservation and occasional grazing.	Place stockpiled soil on the shaped landform.	Growth medium spread on final landform.	Indicative soils resource depth of 15 cm to 50 cm depending on original soil depths.	Relinquishment inspection and report, including photographs, prepared by a qualified person.	Following spreading of soil.
		Key soil characteristics generally within the range of soil characteristics identified at analogue sites.	Analysis of representative soil samples record parameters within 10% of analogue sites.	Soil analysis within rehabilitation monitoring report. Parameters to be assessed include the following • pH • Conductivity • Organic matter • Phosphorus • Nitrate • Cation exchange capacity • Exchangeable sodium percentage • Nutrient levels	Following growth medium spreading and annually until site relinquishment.

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Phase 4 – Ecosystem and Land Use Establishment					
Domain 1 – Infrastructure Area					
Domain 2 – TSF					
Domain 5 – Box Cut (NAF waste rock used to back fill the box cut)					
Domain 6 – Surface Extraction Area					

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Establish vegetation with similar species composition to the existing vegetation communities, e.g. PCT103 and PCT174	Spread locally sourced seed of species consistent with the required vegetation communities. Permit natural revegetation of disturbed areas.	Successful establishment of native grasses, shrub and tree species.	Comparison with undisturbed analogue areas confirm: • >70% total number of species established are in accordance with the applied species mix and represent 75% of the total projected foliage cover; • Species diversity >65% of analogue site; • Species density comparable with analogues site.	Monitoring of revegetation success will involve a combination of visual and technical assessments of groundcover, biomass and Landscape Function Analysis. A minimum of six monitoring points will be established. A monitoring report will be prepared by a suitably qualified and experienced person. The report will include a summary of performance of the treatment area(s) against representative analogue monitoring points and photographs.	Analogue sites – in accordance with existing biodiversity monitoring. Rehabilitated sites – Quarterly visual inspections by site personnel. Annual inspections and monitoring report preparation b a suitably experienced, person post closure.
Phase 5 – Ecosystem and Land Use Sustainability					
Domain 1 – Infrastructure Area					
Domain 2 – TSF					

Objective	Rehabilitation Methodology	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency
Domain 5 – Box Cut					
Domain 6 – Surface Extraction Area					
Self-sustaining vegetation with similar species composition to the existing vegetation communities, e.g. PCT103 and PCT174	Maintain vegetation communities, including management of weed and over abundant fauna species and reseeding as required.	Successful establishment of native grasses, shrub and tree species.	Surveys confirm consistency between disturbed areas and undisturbed analogue sites in relation to the following: • Percentage of plants affected by negative health indicators (nutrient deficiency, shallow root development) • Ground cover % • Canopy Cover % • Number of native flora species recorded • Percentage cover of environmental weeds. • Pest species and abundance.	Monitoring of revegetation success will involve a combination of visual and technical assessment of groundcover, biomass and Landscape Function Analysis. A minimum of three monitoring points will be established. A monitoring report will be prepared by a suitably qualified and experience person. The report will include a summary of performance of the treatment area(s) against representative analogue monitoring points and photographs.	Analogue sites-in accordance with existing biodiversity monitoring. Rehabilitated sites – Quarterly visual inspections by site personnel. Annual inspections and monitoring report preparation by a suitably experienced person post closure.

4 Rehabilitation Implementation

4.1.1 Vegetation Clearing

Construction activities will be limited to the designated construction areas. The total area cleared will be restricted to the minimum area required.

A preclearing inspection will be undertaken by a qualified ecologist prior to the removal of vegetation. An ecologist or spotter/catcher should be present for the removal of hollow-bearing trees, logs or stags which could contain native fauna. Prior to clearing, the boundary of the area authorised for clearing will be identified and clearly marked to ensure earthmoving equipment does not impact on adjacent undisturbed areas. Regular inspections of the boundary will be undertaken to ensure it remains intact for the clearing. Prior to clearing, a clearing pattern will be determined to allow fauna adequate opportunity for dispersal into adjacent habitat. Cleared vegetation will be pushed into a series of windrows within the disturbed areas and generally mulched for reuse to stabilise disturbed areas where possible. Vegetation identified as potentially valuable habitat e.g. hollow logs, may be stockpiled for use in erosion and sediment control works or for site rehabilitation.

4.1.2 Soil Management

The proponent recognizes the importance of appropriate soil identification, stripping and management practices for successful mine rehabilitation and the achievement of the desired post-mining land use. To achieve these outcomes the proponent will implement measures to effectively manage soil resources through the mining and rehabilitation process.

A detailed description of the identification of appropriate soil resources within the Project area and their management is included in a Land and Soil Capability (LSC) Assessment (SSM, 2021). The report provides information on the following key areas related to the management of the soil resources through the mining and rehabilitation process, including management of soil stripping, storage and use as a topdressing material for rehabilitation and monitoring methodology for rehabilitated areas to be implemented on the site.

4.1.2.1 Soil Stripping Assessment

The SSM (2021) LSC Assessment provides recommended stripping depths for each soil unit, together with the dominant limitations and soil erodibility rating for each soil unit (refer **Table 7**).

Table 7 Recommended Stripping Depths

Soil Mapping Unit	Average Stripping Depth (cm)	Stripping Depth Range (cm)	Dominant Limitation	Surface Soil Erodibility of tested sites
Dermosol	75	35 to 135	Coarse fragments in gravel layers	Highly erodible
NonCalcic Dermosol	60	35 to 140	Coarse fragments of weathered rock	Moderately erodible
Rudosol	15	10 to 50	Coarse fragments of weathered rock	Highly erodible
Acidic Rudosol	30	15 to 50	Coarse fragments of weathered rock	50% moderately erodible, 50% highly erodible
Tenosol	Zero		Coarse fragments of weathered rock	Not assessed
Source: SSM (2021)				

4.1.2.2 Soil Volume

Based on the recommended stripping depths as provided in **Table 7**, the anticipated volume of topsoil available is provided in **Table 8**. SSM (2021) estimate that approximately 120,000 m^3 of soil is required in rehabilitation, indicating that there are adequate soil resources available.

Table 8 Soil stripping depths and volume

Soil Mapping Unit	Area in Federation Site to be disturbed (ha)	Maximum Stripping Depth (cm)	Volume available (m^3)
		Topsoil	Topsoil
Dermosol	10	75	72,000
NonCalcic Dermosol	13	60	75,000
Rudosol	12	15	18,000
Acidic Rudosol	5	30	14,000
Total			179,000

4.1.2.3 Soil Stripping and Handling

Where soil resources stripping and transportation is required, the following proposed soil handling techniques will be adopted to prevent excessive soil deterioration:

- Soil will be maintained in a slightly moist condition during stripping. Material will not be stripped in either an excessively dry or wet condition;

- The surface of soil stockpiles will be left in as coarsely textured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming;
- Where practicable, a maximum stockpile height of 3m will be maintained. Clayey soils will be stored in lower stockpiles for shorter periods of time compared to sandier soils;
- Stockpiles will be seeded and fertilised as soon as possible. An annual cover crop species that produce sterile florets or seeds will be sown. A rapid growing and healthy annual pasture sward provides sufficient competition to minimise the emergence of undesirable weed species. The annual pasture species will not persist in the rehabilitation areas but will provide sufficient competition for emerging weed species and enhance the desirable micro-organism activity in the soil;
- Prior to re-spreading stockpiled soil onto disturbed areas, an assessment of weed infestation on stockpiles will be undertaken to determine if individual stockpiles require herbicide application and / or "scalping" of weed species prior to soil spreading; and
- An inventory of available soil will be maintained to ensure adequate soil materials are available for planned rehabilitation activities.

4.1.2.4 Soil Re-Spreading and Seedbed Properties

The spreading of soil, addition of soil ameliorants and application of seed should be carried out in consecutive operations to reduce the potential for soil loss to wind and water erosion.

Application of purchase seed mix for the region, or thorough seedbed preparation will be undertaken to ensure optimum establishment and growth of vegetation. All re-soiled areas should be lightly contour ripped (after soil spreading) to create a "key" between the soil and the subsoil / capping materials. Ripping should be undertaken on the contour and the tynes lifted for approximately 2m every 200m to reduce the potential for channelized erosion. Ripping to be undertaken when soil is moist and immediately prior to sowing. The re-spread soil surface should be scarified prior to, or during seeding, to reduce run-off and increase infiltration.

4.1.3 Revegetation

4.1.3.1 Implementation of an Effective Revegetation Program

An effective revegetation strategy is proposed for the Project area that seeks to complement desirable post-mining land-use objectives whilst maintaining effective erosion and weed controls in the longer term.

Revegetation activities will be planned to occur after the completion of reshaping, re-soiling and construction of drainage structures. Where possible, the timing of the soiling and drainage works will be scheduled to enable immediate sowing of grasses and tree seed after preliminary ground preparation works are completed in order to minimise the potential for soil erosion and weed invasion.

Cover crops will be used in revegetation, where necessary, to provide for an effective groundcover until the specific native and pasture grasses are established. This will minimise the likelihood for erosion during the initial establishment phase of the rehabilitation.

All areas will be shallow ripped/scarified prior to sowing to provide a suitable environment that encourages water infiltration in the soil. Large rocks will be removed from the ripped/scarified soil surface prior to sowing. The seeding will be undertaken as soon as possible after ripping / scarifying in order to limit surface crusting and sealing to occur. This will enhance the likelihood of successful seed germination and vegetation establishment.

4.1.4 Species Selection

Soil resources will contain the initial seed source for the revegetation program. Revegetation will be enhanced by application of seed sourced by a reliable local supplier.

Six discrete PCTs were identified by AREA (2021) during the Biodiversity Development Assessment of the Project area. Where not sourced from a local supplier, seed will be collected for as many species as possible within the PCTs for use in revegetation works but particularly from PCT103 (Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland) and PCT174 (Mallee – Gum Coolabah woodland), the dominant PCTs within the Project area.

Trees will be established from either direct seeding or tube stock planting, however, the general strategy will involve direct seeding given the greater likelihood of success and production of more natural assemblage. Where appropriate, seed will be treated, (e.g. inoculated and scarified prior to sowing to improve the chance of early and successful germination).

All revegetated areas will be monitored to ensure long-term resilience and natural regeneration. In areas assigned to native vegetation, success will be based on the establishment and subsequent development of ground cover, mid-storey and canopy species. Revegetation techniques will be continually developed and refined over the life of mine through an ongoing process of monitoring and relevant industry experience elsewhere.

4.1.5 Rehabilitation Maintenance

Rehabilitated areas will be monitored on a regular basis to ensure that original objectives are achieved. Rehabilitation monitoring will include regular inspections for the following key aspects:

- soil erosion;
- revegetation success;
- weed infestation (primarily noxious weeds, although where rehabilitation areas are dominated by other weeds it will also be monitored and managed); and
- integrity of diversion drains, waterways and sediment control structures.

Maintenance works will be undertaken to address any deficiencies or areas of concern identified from monitoring. This may include the re-application of soil, re-seeding, re-planting, weed control, additional fertiliser applications, de-silting or repair of drainage works and sedimentation dams and infill and re-grading of eroded areas.

4.1.6 Weed Management

The presence of weed species has the potential to have a major impact on revegetation and regeneration outcomes. In addition to this, the presence of weed species within the surrounding land has the potential to significantly impact on the biodiversity value of the rehabilitated areas. Weed management will be a critical component of mine rehabilitation activities and will be achieved through a series of control measures, including:

- Hosing down equipment in an approved wash down area before entry to site;
- Herbicide spraying or scalping weeds off soil stockpiles prior to re-spreading soil;
- Rehabilitation inspection to identify potential weed infestations; and

- Identifying and spraying existing weed populations on-site together with ongoing weed spraying over the life of the mine.

The spread of weeds will be prevented by using the measures above. The monitoring and control weed populations using herbicides within the site, particularly in the areas to be stripped and on soil stockpiles, will assist.

Weed control, if required, will be undertaken in a manner that will minimise soil disturbance. Any use of herbicides will be carried out in accordance with appropriate requirements. Records will be maintained of weed infestations and control programs will be implemented according to best management practice for the weed species concerned.

Pests such as rabbits, pigs and feral goats have the potential to disturb vegetation as it becomes established and the ongoing maintenance. Regular pest control will be undertaken to protect the vegetation during the establishment of rehabilitation through targeted control methods.

4.1.7 Erosion and Sediment Control

4.1.7.1 Objectives

The principle objectives of erosion and sediment control (ESC) for the Project are set out below:

- To minimise erosion and sedimentation from all active and rehabilitated areas, thereby minimising sediment ingress into surrounding surface waters;
- To ensure the segregation of ‘dirty’ water from ‘clean’ water, and maximise the retention time of ‘dirty’ water such that any discharge meets the relevant water-quality limits. ‘Dirty’ water is defined as surface runoff from disturbed catchments (e.g. active areas of disturbance, stockpiles and rehabilitated areas (until stabilised). ‘Clean’ water is defined as surface runoff from catchments that are undisturbed or relatively undisturbed by Project-related activities and rehabilitated catchments;
- To minimise the volume of water discharged (should the discharge of water prove necessary), ensure sufficient settlement time is provided prior to discharge such that suspended sediment within the water meets the objectives identified in the point above;
- To ensure sustainable long-term surface water features are established following rehabilitation works, including implementation of an effective revegetation and maintenance program; and
- To monitor the effectiveness of surface water and sediment controls and to ensure all relevant surface-water quality criteria are met.

The principle design aspect will be the prevention of ‘clean’ water in ephemeral drainage channels entering the active disturbance area. This will be achieved through the use of cut-off drains, dams and piped diversions, as well as the containment of ‘dirty’ water in sediment control structures to eliminate and uncontrolled runoff.

4.1.7.2 Erosion and Sediment Control Plan Principles

A detailed site ESC Plan (ESCP) will be prepared prior to the commencement of construction activities. The primary principles for the site ESCP will be to minimise erosion and then to capture sediment in drainage from disturbed areas. These principles will apply to the planning, design, construction and operation of the Project. They can be summarised as follows:

- Plan for erosion and sediment control during and before any earthworks begin, including assessment of site constraints;
- Minimise the area of soil disturbed and exposed to erosion;
- Conserve soil resources for later site rehabilitation or regeneration (in a stabilised stockpile);
- Control water flow by diverting up-slope 'clean' water away from disturbed areas and ensuring that concentrated flows are below erosive levels and sediment is retained from disturbed areas;
- Rehabilitate disturbed lands quickly; and
- Maintain erosion and control measures appropriately.

Effective erosion and sediment control for the site will require appropriate activities to be carried out over the life of the Project including:

- Operations; and
- Rehabilitation and closure.

The effectiveness of erosion and sediment controls during the operational and rehabilitation / closure stages will be optimised through effective mine planning and design. Suitable strategies will include:

- Designing and operating drainage systems for the life of Project activities, including rehabilitation and closure, so that they do not cause erosion. This will involve scour protection of open drains and energy dissipaters located at drain outlets;
- Diverting runoff where possible, to minimise external runoff flowing to operational areas;
- Separating sediment-contaminated stormwater from other sources of polluted water such as mine water or runoff from stockpiles. The streams should be either separated to optimise their treatment prior to discharge or combined as part of an integrated water-management strategy; and
- Stormwater reuse as part of the overall water-management strategy for the site to avoid or reduce discharge of polluted water. A range of non-potable water uses will be available on the mine site such as dust suppression and irrigation of tree plantings.

5 Post Closure Maintenance and Rehabilitation Monitoring Program

5.1 Rehabilitation Monitoring Program

A rehabilitation monitoring program will be undertaken in accordance with best practice standards. The objectives of the program will be to:

- Assess the long term stability and functioning of re-established ecosystems on affected land; and
- Assess rehabilitation performance against the closure criteria.

In order to verify rehabilitation procedures and outcomes the monitoring program is required to assess rehabilitation progress towards meeting the completion criteria using appropriate indicators.

The proposed rehabilitation monitoring program will be implemented to describe the processes and activities required to determine the biophysical state of each domain. It describes a standardised and repeatable approach to the measurement of certain biophysical attributes and processes that can be compared against the completion criteria for the site and domains. The program has been designed track performance towards completion criteria and to ensure collection and storage of data is undertaken in a robust and statistically valid manner.

The monitoring program will be continued within rehabilitated areas as well as non-mined areas (analogue sites) until it can be demonstrated that rehabilitation has satisfied the closure criteria. Information from this monitoring program will also be used to refine closure criteria as required.

Proposed rehabilitation monitoring methodologies will be included in the proposed Project Rehabilitation Management Plan (formerly Mine Operations Plan (MOP)). Where rehabilitation outcomes are not trending toward the nominated completion criteria, Hera Resources will instigate early intervention and adaptive management to minimise the potential for rehabilitation failure. Where there is a significant threat to rehabilitation, Hera Resources will respond in accordance with a rehabilitation Trigger Action Response Plan (TARP) to be included in the proposed Project Rehabilitation Management Plan.

Rehabilitation areas will be subject to regular inspections, during which the following will be noted:

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover;
- Success of initial cover crop or grass cover establishment;
- Success of tree and shrub plantings;
- Natural regeneration of native species;
- Adequacy of drainage controls; and
- General stability of the rehabilitated areas.

5.2 Rehabilitation Quality Assurance Process

A rehabilitation quality assurance process (RQAP) will be developed in the Rehabilitation Management Plan. This will include details of inspections, monitoring and record keeping which will be required to ensure that:

- Rehabilitation is being implemented in accordance with the nominated methodologies; and
- Identified risks to rehabilitation are being adequately addressed at each phase of rehabilitation.

Hera Resources will implement the RQAP through every phase of rehabilitation. The RQAP will also include an inspection protocol to ensure that each phase of decommissioning and rehabilitation has been completed in accordance with the Rehabilitation Management Plan completion criteria. Conceptually, the RQAP will include:

Phase 1 - Active

- Documentation of pre-clearance surveys;
- Maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources;
- Regular inspections of temporary and permanent erosion and sediment controls;
- Regular inspections to identify potential weed infestations; and
- Documentation of all weed management and eradication programs and follow-up inspections.

Phase 2 - Decommissioning

- Inspections and demolition reports to confirm infrastructure has been removed; and
- Validation testing to ensure any contamination has been appropriately remediated and/or removed.

Phase 3 – Landform Establishment

- Survey and preparation of as constructed drawings of final constructed slopes, landforms and water drainage structures.

Phase 4 – Growth Medium Establishment

- Site records of re-spread topsoil, ameliorants, fertiliser etc; and
- Soil testing results to confirm appropriate soil geochemical parameters for plant establishment.

Phase 5 – Ecosystem and Land Use Establishment

- Documentation of reseeding or planting activities undertaken including:
- date of planting;
- weather conditions;
- seeding rate (kg/ha) and/or planting rate (tubestock/ha); and
- fertiliser rate (kg/ha); and
- Regular site inspections of rehabilitated areas to allow early identification of any emerging threats to rehabilitation; and

Phase 6 – Relinquishment

- DPIE-RR signoff on completion of rehabilitation.

6 Barriers or Limitations to Rehabilitation

Rehabilitation will be unlikely to be constrained by the following:

- PAF material – all such material will be removed from the Infrastructure Area and a contamination assessment will be conducted to ensure that no contaminated materials remain on site; and
- Slopes greater than 18° or geotechnical instability – the box cut will be backfilled to reflect the existing landform and the ventilation rises will be collared and capped. Suitable slope angles will be demonstrated through LEM and engineering design. As a result, there will be no slopes greater than 18° or areas with long term risks of landform instability, or areas subject to geotechnical instability following completion of rehabilitation operations.

Where rehabilitation performance is not trending to the nominated completion criteria this may indicate that there is a threat to long term rehabilitation success. Notwithstanding this, a range of factors have the potential to adversely impact on rehabilitation success. **Table 9** presents an overview of those matters, triggers for remedial action and potential measures that may be implemented to manage those issues.

Where the RQAP or monitoring indicates that there is a significant threat to rehabilitation, adaptive management will be undertaken in accordance with a Rehabilitation Trigger Action Response Plan (TARP) which will be developed for the Rehabilitation Management Plan.

Table 9 Potential Barriers or Limitations to Rehabilitation

Potential Barrier or Limitation	Potential Adverse Outcome	Trigger for Remedial Action	Potential Remedial Action
Erosion of the final landform and loss of growth medium.	Failure of vegetation to become established. Deposition of sediment in undisturbed sections of the Federation area.	Monitoring of rehabilitated areas and analogue sites indicates that rehabilitated areas are not achieving or moving towards completion criteria identified in **Table 5.** Visible gullies or rills that are greater than 0.3 m in width or depth.	• Reshaping and stabilisation of soil within areas experiencing unacceptable erosion • Use of stabilising agents such as molasses on the shaped landform until such time and vegetation becomes established. • Amelioration of soils to reduce their dispersibility, including through the use of gypsum or similar.
Below average rainfall or drought conditions.	Failure of vegetation to become established or failure of established vegetation to become self-sustaining	Monitoring of rehabilitated areas and analogue sites indicates that rehabilitated areas are not achieving or moving towards completion criteria identified in **Table 5**.	• Delay revegetation operations until appropriate weather conditions are predicted, namely winter or spring or when the long-term rainfall forecast indicated average or above average rainfall. • Revegetate areas where prior revegetation has failed. • Seek expert advice and implement the associated recommendations.

Potential Barrier or Limitation	Potential Adverse Outcome	Trigger for Remedial Action	Potential Remedial Action
Excessive grazing by feral or over abundant fauna species.	Failure of vegetation to become established or failure of established vegetation to become self-sustaining	Monitoring or rehabilitated areas and analogue sites indicates that rehabilitated areas are not achieving or moving towards completion criteria identified in **Table 5.** Monitoring of pest species indicates that such species are present in abundances that are limiting rehabilitation.	• Undertake, in consultation with surrounding landholders, pest control programs as required. • Where practicable, erect temporary fencing around areas of rehabilitation until such time as the vegetation becomes established and monitoring indicates compliance with the completion criteria identified in **Table 5.**

7 References

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