Hera Resources Pty Ltd

Federation Project

Environmental Impact Statement

Chapter 5

Rehabilitation Strategy

5. Rehabilitation Strategy

5.1 Introduction

A Rehabilitation Strategy has been prepared for the Project and is included as **Appendix D**. The Rehabilitation Strategy describes proposed closure and final landform, and 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.

These key aspects are summarised in this Chapter.

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 mining operation plan (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.

5.2 SEARs Requirements

The SEARs requirements which relate to rehabilitation are provided in **Table 5-1**.

Table 5-1 Rehabilitation SEARs Requirements

SEARs Requirement	Reference
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	**Section 5.4.2** **Section 5.4.3** **Section 5.5**
Identification and discussion of opportunities to improve rehabilitation and environmental outcomes for existing disturbed areas within the project site, and barriers or limitations to effective rehabilitation	**Section 5.7** **Section 5.8**

5.3 Statutory Context

5.3.1 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 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 a TSF, final landform establishment, geotechnical stabilisation and revegetation works.

The Mining Act requires that a security deposit is provided to the NSW Government which must cover the State's full costs in undertaking rehabilitation in the event of default by the title holder.

5.3.2 Mining Regulation 2016

Under the recently introduced package of rehabilitation reforms which came into effect in July 2021, amending the *Mining Regulation 2016* (Mining Regulation), existing mines are required to convert their existing MOPs into Rehabilitation Management Plans (RMP) by July 2022.

5.3.3 New Standard Rehabilitation Conditions on Mining Leases

The July 2021 amendment to the Mining Regulation set new standards for mine rehabilitation and documentation requirements. The amendments require 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 RMP (which includes the rehabilitation objectives and rehabilitation completion criteria) in the form and way approved by the Secretary;
- Implement the RMP; and
- 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 RMP will include a copy of the rehabilitation outcomes document (as approved or as proposed). The RMP 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 RMP will be published as required by DPIE-RR.

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

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

5.4 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 to be retained by the landholder;
- 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.

5.4.1 Rehabilitation Phases

5.4.1.1 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 of the Rehabilitation Strategy (**Appendix D**). 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.

5.4.1.2 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.

5.4.1.3 Phase 3: Growth Medium Development

The growth medium development phase involves the placement of waste rock and / or 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.

5.4.1.4 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 of the Rehabilitation Strategy (**Appendix D**).

5.4.1.5 Phase 5: Ecosystem and Land Use Sustainability

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

5.4.1.6 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.

5.4.2 Rehabilitation Objectives

The specific rehabilitation objectives and targets for the Project are presented in **Table 5-2** below.

Table 5-2 Rehabilitation Objectives and Targets

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.
	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.

5.4.3 Domain Selection and Objectives

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 5-3** below.

Table 5-3 Domain Rehabilitation Objectives

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 2.4.1.1**. Relates to all rehabilitation other than the TSF, i.e. Infrastructure Areas (except those retained), waste rock stockpiles, backfilled box cut, surface extraction area 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 at Federation.		
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 near the Federation Site where material will be excavated from the top of a knoll that rises above surrounding topography.		

5.5 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 5-1**, and for Hera Mine in **Figure 5-2**. 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;
- Surface extraction area with topography similar to surrounding undisturbed topography;
- 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 in the Services Corridor is shown on **Figures 1-3** and **1-4** 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 5-2**. 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.

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: 18-Jan-2022
Project number: 660.30090.00000

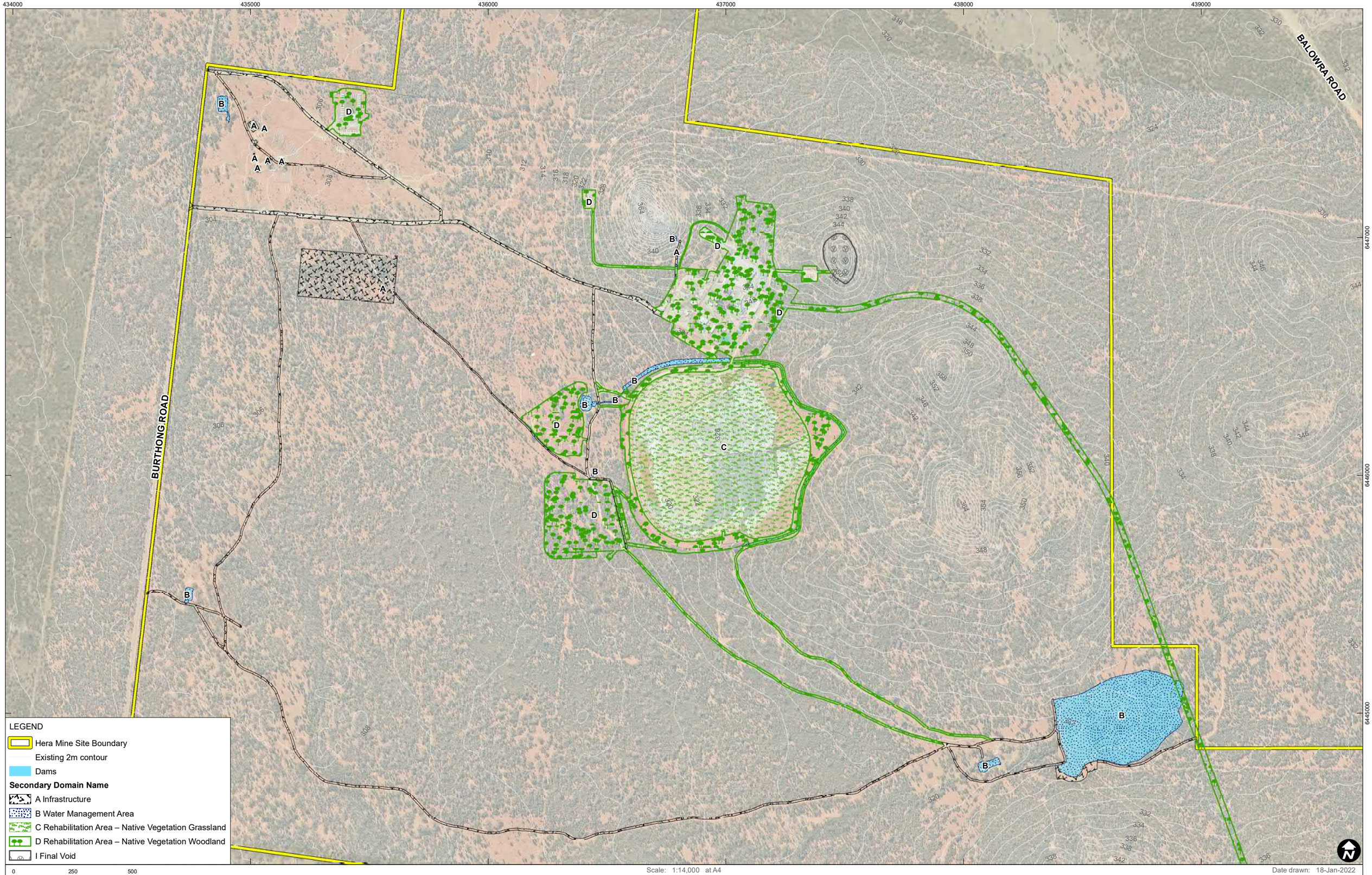
Data Source: Basedata NSW SS, 2019
Aerial imagery supplied by © Department of Customer Service 2020
& Aerometrex Pty Ltd, 2019

SLR

FEDERATION SITE
FINAL LANDFORMS

FIGURE 5-1

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G14_FinalLandform_Federation_003.mxd



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

Date drawn: 18-Jan-2022
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 5-2

H:\Projects-SLR\660-SrvWOL\660-WOL\660.30090.00000 Federation Project Approvals\06 SLR Data\01 CADGIS\GIS\SLR66030090_EIS_G15_FinalLandform_Hera_002.mxd

The anticipated rehabilitation methodology and completion criteria for the Project are provided in **Table 5-4**, noting Domain 4 is not included 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.

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.

Table 5-4 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.		
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.
		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					

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.	Post shaping survey	Aerial 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 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					
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	The final closure strategy for the	Inspection and testing report,	During placement of

		and have an appropriate store and release function for management of rainfall infiltration.	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 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.	including photographs, prepared by a suitably qualified person. Relinquishment inspection and report, including photographs.	capping and cover layers with final monitoring to be undertaken upon establishment of final landform.
		Landform suitable for growth media establishment.	All downstream embankment slopes <18º or 1:3 (V:H) or	As constructed survey plans.	Following completion.

			suitable slope angle demonstrated through LEM and engineering design.		
		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.
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.
			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					
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.	Post shaping survey	Aerial 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 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					
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.
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					
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					
Domain 5 – Box Cut					
Domain 6 – Surface Extraction Area					
Self-sustaining vegetation with similar species composition to the existing	Maintain vegetation communities, including management	Successful establishment of native grasses, shrub and tree species.	Surveys confirm consistency between disturbed areas and undisturbed	Monitoring of revegetation success will involve a combination of	Analogue sites- in accordance with existing biodiversity monitoring.

vegetation communities, e.g. PCT103 and PCT174	of weed and over abundant fauna species and reseeding as required.		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.	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.	Rehabilitated sites – Quarterly visual inspections by site personnel. Annual inspections and monitoring report preparation by a suitably experienced person post closure.

5.5.1 Materials Balance

In order to achieve the final landform as provided in **Figure 5-1** and **Figure 5-2,** 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 320,000m^3 of material available for rehabilitation. This excludes the predicted surplus of soils resources at Federation Site (refer to **Section 5.6.2**) and at Hera Mine, as identified through the MOP.

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 0.6m and 0.8m 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; and
- 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 at Hera Mine which is partially constructed and is currently used for water supply;
- Proposed box cut and surface extraction area at Federation Site, as described in this EIS; and
- Material to 0.3m depth from existing and proposed disturbance areas at Hera Mine and Federation Site.

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

Table 5-5 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**	

5.6 Rehabilitation Implementation

This section provides a summary of rehabilitation implementation for the Project. Further details are provided in Section 4 of **Appendix D.**

5.6.1 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.

5.6.2 Soil Management

Recommended soil stripping depths were provided in the Land and Soil Capability Assessment as included in **Appendix E** and are provided in **Table 5-6.**

Table 5-6 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

Based on the recommended stripping depths as provided above in **Table 5-6**, the anticipated volume of topsoil available is provided below in **Table 5-7**. It is estimated that approximately 120,000 m^3 of soil is required in rehabilitation, indicating that there are adequate soil resources available.

Table 5-7 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

Stripped soils will be stockpiled in designated areas. Stockpiles will be seeded and fertilised as soon as possible. An annual cover crop species that produces 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.

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 will be lightly contour ripped (after soil spreading) to create a "key" between the soil and the subsoil / capping materials. Ripping will 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 will be scarified prior to, or during seeding, to reduce run-off and increase infiltration.

5.6.3 Revegetation

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.

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.

5.6.4 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.

5.6.5 Weed and Pest 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.

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

5.6.6 Erosion and Sediment Control

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.

5.7 Post Closure Monitoring and Maintenance

Following the closure of the Mine and implementation of the rehabilitation methodology provided in **Section 5.6,** a rehabilitation monitoring program is proposed within the Strategy to:

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

Proposed rehabilitation monitoring methodologies will be included in the Project's RMP. 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 RMP.

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.

5.8 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 waste rock pads for backfilling underground, 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.

Table 5-8 below presents an overview of potential barriers or limitations to rehabilitation, triggers for remedial action and potential measures that may be implemented to manage those issues.

Table 5-8 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 areas.	Monitoring of rehabilitated areas and analogue sites indicates that rehabilitated areas are not achieving or moving towards completion criteria. Visible gullies or rills that are greater than 0.3m 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.	▪ 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.

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. 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.