

Environment  
Effects  
Statement

VHM Limited  
Goschen Rare Earths and Mineral  
Sands Project

# Chapter 23 Conclusion

November 2023



# Table of Contents

23.	Conclusion	23-1
23.1	Introduction	23-1
23.2	Project evaluation objectives	23-1
23.2.1	Resource development	23-1
23.2.2	Biodiversity and habitat	23-2
23.2.3	Water, catchment values and hydrology	23-5
23.2.4	Amenity and environmental quality	23-7
23.2.5	Social, land use and infrastructure	23-9
23.2.6	Cultural heritage	23-13
23.2.7	Landscape and Visual	23-13
23.3	Environmental Management Framework	23-14
23.4	Rehabilitation and Closure	23-14





# 23. Conclusion

## 23.1 Introduction

This chapter concludes the Environment Effects Statement (EES) for the Goschen Rare Earths and Mineral Sands Project (the Project). This chapter provides an overview of how the assessment has responded to the evaluation objectives as listed in the scoping requirements issued by the Minister for Planning and the next steps in the EES process.

VHM Limited (VHM) is proposing to develop the Project in the Loddon Mallee Region of Victoria, approximately 35 km south of Swan Hill in the Gannawarra Shire. The Project would involve the mining and processing of heavy mineral sands and rare earth minerals.

In response to the EES evaluation objectives described in the EES scoping requirements, impacts of the Project on environmental assets have been assessed. The EES has assessed the potential environmental effects of the design, construction, operation and decommissioning of the Project across 17 specialist technical investigations. This informed the development of an Environmental Management Framework (EMF) that includes measures to avoid, minimise and mitigate potential impacts. These environmental commitments would be implemented by VHM and its contractors, through relevant management plans and their integration into relevant statutory approvals and consents.

## 23.2 Project evaluation objectives

The scoping requirements include seven evaluation objectives for the EES. The evaluation objectives have guided the preparation of the EES and informed the assessment of potential impacts and development of mitigation measures to avoid, reduce and manage potential project impacts on environmental, social and cultural values. A summary of the key findings of the EES relevant to each evaluation objective is provided below.

### 23.2.1 Resource development

Resource development – *To achieve the best use of available mineral sands resources, in an economic and environmentally sustainable way, including while maintaining viability of other local industries.*

EES documents relevant to this evaluation objective include:

- Chapter 2 Project rationale.
- Chapter 18 Socio-economics.

#### *Achieving the best use of available mineral sands resources in an economic way*

The Murray Basin in south eastern Australia is proving to be a major mineral sand province that some consider likely to replace Australia's east and west coasts in production of rutile, zircon, and ilmenite. Victorian government policy encourages the sustainable exploitation of such resources and this project offers a significant opportunity to further enhance the mineral sands industry in Victoria, and to grow the Swan Hill and Kerang regional economies by creating significant new opportunities for employment and procurement.

The Project's rare earth and zircon deposit is unique as the mineralisation occurs in the form of fully liberated sands near the surface. This is unlike other deposits in Australia which are hosted within hard rock. This translates to cost benefits in both the mining and processing operations when compared to other rare earth mineral projects which require handling and processing large quantities of material through crushing and grinding circuits.

Across Victoria, the Project is expected to result in a net uplift of approximately \$1.3 billion (in present-value terms, discounted at 7%), in additional Gross State Product (GSP), compared to the base case, where it is assumed the Project never enters development. This equates to an average annual economic impact of \$126 million (undiscounted) in additional GSP to the State. Qualitative benefits also include the upgrade of roads, power lines, and water pipelines in the Project area.

The Project would also generate notable benefits for the Region, in the form of employment creation and wealth generation and the extraction and utilisation of a productive resource which is in demand. Furthermore, the employment created by the Project would assist in attracting and retaining young adults to the region and in doing so, contribute to the viability of community services such as schools and childcare, and inject energy and enthusiasm into activities such as community sports, the arts and alike.

#### Achieving the best use of available mineral sands resources in an environmentally sustainable way

The Project has been designed and will be operated in accordance with regulatory requirements, and in so doing would deliver long-term benefits to the community, local, state and federal governments.

VHM aims to progressively rehabilitate the Project site to enable the continuation of agricultural activities consistent with the previous use, or as agreed with the future landholder, following mining; as well as rehabilitate areas of native vegetation, leaving a positive mining legacy for local landowners and the surrounding community.

The Project is the culmination of an iterative design process that aimed to develop the resource in the most economically viable manner and at the same time avoid or limit (minimise) potentially significant environmental and social impacts. Alternatives were considered including options for alternative mine scales, sites, mining and minerals processing methods, tailings management, mine infrastructure, water sources, transport methods and routes, and a 'no project' scenario. The basis for selecting the preferred option (the Project) included economic, social and environmental considerations.

Detailed specialist studies were prepared as part of the EES process on aspects of the physical and biological environment as well as cultural heritage and socio-economic aspects. The outcomes of these studies supported the further development of the project and are the basis for the preparation of the EMF. The framework would be implemented to manage the environmental and social impacts of all stages of the project including construction, operations and closure (decommissioning, rehabilitation and post-closure). Land would be restored to its previous use following cessation of mining. To measure the success of rehabilitation, objectives and completion criteria have been developed (refer to draft Rehabilitation Plan). The proposed closure criteria includes, but is not limited to, the completion of contamination assessments following decommissioning, completion of topographic surveys to confirm final landform levels are within design parameters and soil testing to ensure that soil chemistry and fertility is comparable with pre-existing soils and suitable for future agricultural land use.

With consideration to the objectives of rehabilitation, the proposed methodology and the closure criteria, a post-mining land use suitable for agriculture is considered readily achievable.

#### Maintaining viability of other local industries

The Project is expected to create both positive and negative spillover on the local economy. The economic impact on adjacent sectors such as construction, wholesale trade and dwellings, reflects the additional economic activity associated with the Project, including increases in real incomes and associated rises in consumption of local services.

Negative spillovers (i.e. crowding out) are expected to be most prominent in capital intensive industries that employ specialised labour such as heavy manufacturing, agriculture, and mining industries. Overall however, while crowding out effects are expected, these are small in scale relative to the larger spillover benefits projected for other sectors as a result of the development of the Goschen Project.

The services sector within the area is estimated to experience positive spillovers worth \$61 million in terms of an average annual net increase in sector output. This is followed by wholesale trade, and construction, which experience \$19 million in additional average annual output, respectively. The dwellings sector experiences positive economic spillovers within the area as well, with an estimated additional \$18 million per annum in economic output. There are therefore large economic benefits projected for other sectors as a result of the development of the Project, compared to the base case.

#### 23.2.2 Biodiversity and habitat

Biodiversity and habitat – *To avoid or minimise potential adverse effects on biodiversity values within and near the site including native vegetation, listed threatened species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and commonwealth policies.*

EES documents relevant to this evaluation objective include:

- Chapter 07 Terrestrial and Aquatic Ecology.
- Chapter 20 Matter of National Environmental Significance

- Technical Report A: Native Vegetation.
- Technical Report B: Fauna Ecology.

#### Effects on biodiversity and habitat

The Project, including the 38 km underground water supply pipeline, has been sited to avoid and minimise impacts to native vegetation as much as practicable.



Figure 23-1 Woorinen Mallee (EVC 824) along a farm boundary

Opportunities to avoid and minimise impacts to native vegetation have been undertaken at mine site Area 1 and Area 3. This has resulted in the retention of:

- 23.868 hectares of native vegetation, including 22.445 hectares in patches and 22 scattered trees at mine site Area 1
- 41.375 hectares of native vegetation, including 40.497 hectares in patches and 17 scattered trees at mine site Area 3.

Out of three possible water supply pipeline alignments, the preferred option was chosen due to having significantly less impact to native vegetation and trees. Overall to facilitate the construction of the mine and water supply pipeline, the Project would result in the loss of a total extent of 14.36 ha of native vegetation including 531 large trees in patches and 37 large scattered trees and 14 small scattered trees. Impacts to trees along the proposed water supply pipeline alignment were reduced to 61 trees from 1,844 trees following a preliminary arboricultural impact assessment.

The loss of native vegetation is based on a 'worst-case' scenario within Area 1 and Area 3 (excluding vegetation patches identified for retention), at upgraded transport intersections, and all native understorey vegetation intersecting the 6 m construction corridor along the length of the 38 km water supply pipeline.

Six flora species listed as threatened under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) were recorded within the development footprint of the Project during the native vegetation and flora impact assessment and are considered likely to be impacted by the construction of the Project. These include Fragrant Saltbush (11 individuals), Umbrella Wattle (353 individuals), Yarran (17 individuals), Bush Minuria (18 individuals), Dwarf Myall (one individual) and Frosted Goosefoot (54 individuals).

It is anticipated that the extent of native vegetation removed during construction of the Project would be reduced by engaging an arborist to assist with micro-siting the water supply pipeline and to identify additional measures to avoid adverse impacts to structural root zones and safeguard trees at the mine site and along the pipeline alignment. The provision of no-go fencing may enable protection of some understorey vegetation along the pipeline alignment, within the 6m construction corridor, particularly in areas where native vegetation occurs only on one side of the road reserve.

The offset target for the proposed removal of native vegetation for this Project totals 4.819 general habitat units (GHU), plus 531 large trees in patches and 37 large, scattered trees (mallee trees). Once offsets are secured, the impacts of the Project would be in line with the over-arching objective of the Victorian native vegetation retention controls, namely, there would be 'no net loss' of biodiversity as a consequence of native vegetation removal for the Project.

There would not be any direct loss of conservation significant species from the construction of the Project, however conservation significant species such as Superb Parrot, Black Falcon, Diamond Firetail, Hooded Robin, Samphire Skink, Eastern Bearded Dragon and Eastern Great Egret may utilise fauna habitat in the study area, and the direct removal and fragmentation of native vegetation would result in losses of fauna habitat. The removal of this potential habitat represents 1.3% of native vegetation and fauna habitat mapped as part of the native vegetation and flora impact assessment (541 ha). The removal of 470 large trees in patches, 37 large scattered trees and 14 small scattered trees from Project mine areas and transport intersections represents 1.13% of the total number of trees within the study area, estimated as part of the native vegetation and flora impact assessment (45,911 trees). The impact to roadside vegetation along the pipeline alignment would be confined to a loss of 61 large trees in patches associated with EPBC-listed Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions Community. The understorey, ground cover and woody debris component would remain in-situ. The loss of 61 large trees in patches represents 0.13% of all canopy trees available across the study area according to the native vegetation and flora impact assessment.

As such, it is unlikely that impacts would result in a significant removal of potential habitat or cause any significant change to the network of remnant vegetation along road reserves that allow species, in particular birds, to move across the landscape to larger conservation reserves. The removal of native vegetation during Project construction is not considered to impact habitat critical to the survival of Commonwealth and State listed fauna species.

Nonetheless, minimising impacts to native vegetation, particularly along road reserves during the construction of the underground pipeline, would ensure potential impacts to listed fauna species are minimised. Habitat enhancement strategies where vegetation is to be retained would be implemented and where fauna habitat is to be removed, fauna salvage would be undertaken by suitably qualified specialists.

During operation of the Project, there is not expected to be any direct impacts to flora or fauna. Indirect impacts are considered the most likely threat to fauna and fauna habitat, however measures such as speed restrictions, buffers around the mine operations area, maintaining vehicle exhaust systems and utilising Commonwealth Light Pollution Guidelines (2020) for light installation would reduce the likelihood of indirect impacts.

#### Effects on matters of national environmental significance

Project activities can be managed such that impact to matters of national environmental significance, including Ramsar wetlands and listed threatened species and ecological communities would not be significant.

The Kerang Wetlands Ramsar site is located approximately 30 km east of the Project area. Under the Ramsar Convention, Kangaroo Lake is classified as a "permanent freshwater lake" and its primary contribution to the Ramsar site is its "special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna. The proposed underground water pipeline would connect the Project area with Kangaroo Lake, which forms part of the Kerang Wetlands. With a surface area of approximately 984 hectares and maximum depth of 8.4 metres (m), Kangaroo Lake is one of the largest and deepest permanent freshwater lakes in the Murray-Loddon region of the Murray-Darling Drainage Division. It is located within the Torrumbarry Irrigation Area (TIA) area of the Loddon-Campaspe irrigation region.

Construction of the pump station on the road reserve adjacent to Kangaroo Lake would not result in the removal of critical habitat. In the vicinity of the proposed pump station, fringing vegetation consists of a 2-4 m wide monoculture of Common Reed, which reduces in thickness and density into the No. 4/7 Channel. The small, terrestrial footprint of the pump station is highly disturbed and includes spoil (assumed to be from channel clearing) and is predominantly covered in weed species including exotic grasses, thistles and Patterson's curse (*Echium plantagineum*). While considered a minimal impact to habitat, the direct loss of Common Reed and surrounding vegetation during construction of the pump station would be minimised by designing the pump station and work area to have the smallest footprint possible and by installing sediment fencing and establishing a NGZ to prevent ingress and protect areas of the lake's banks and bed. With implementation of the



recommended mitigation measures, the potential for direct removal of habitat at Kangaroo Lake during construction would be restricted to fringing vegetation consisting of a 2-4 m wide monoculture of Common Reed.



Figure 23-2 Location of proposed pump station (centre of image)

During operation of the Project, water demand would represent a maximum 8% increase to the lake's current average daily demand. As such, the additional water usage as a result of Project operations is likely to have negligible impact to salinity levels and aquatic habitat within Kangaroo Lake, as well as the lake's water height, beyond what is already controlled.

A desktop assessment identified that six EPBC-listed aquatic fauna species either occurred, potentially occurred or had potential habitat within Kangaroo Lake. Of these six species, the Murray Cod, Flathead Galaxias, Silver Perch, Murray Hardyhead and Growling Grass Frog were assessed as being present, likely present or possibly present. The assessment of potential impacts on EPBC-listed aquatic fauna species potentially present at Kangaroo Lake found that the Project is unlikely to result in a significant impact.

No EPBC Act-listed threatened flora species were recorded within 10 km of the Project area during field assessments undertaken as part of EES, however the Plains Mallee Box Woodlands, listed as a threatened ecological community under the EPBC Act, would be impacted by the construction of the Project and underground water pipeline. It has been estimated that prior to the implementation of mitigation measures, approximately 11.347 ha of Plains Mallee Box Woodlands would be lost during the construction of the Project, with nearly half of this extent (4.289 ha) due to the potential removal of 61 large trees in patches along the pipeline route. As discussed, engaging an arborist to assist with micro-siting the underground water supply pipeline and to identify additional measures to avoid adverse impacts to structural root zones and safeguard trees at the mine site and along the pipeline alignment would minimise the extent of vegetation actually removed. The provision of no-go fencing may also enable protection of some understorey vegetation along the pipeline alignment.

An individual Superb Parrot was recorded in proximity to the Project in 2018. Listed EPBC Act fauna species, such as the Superb Parrot, may utilise remnant vegetation surrounding the Project area to move across the landscape.

Minimising impacts to native vegetation, particularly along road reserves during the construction of the underground pipeline, would ensure potential impacts to listed fauna species are minimised.

### 23.2.3 Water, catchment values and hydrology

Water, catchment values and hydrology - *To minimise effects on water resources and on beneficial and licensed uses of surface water, groundwater and related catchment values (including the Kerang Wetlands Ramsar site) over the short and long-term.*

EES documents relevant to this evaluation objective include:

- Chapter 13 Surface Water.

- Chapter 14 Groundwater.
- Technical Report H1: Surface Water.
- Technical Report H2: Mine Site Surface Water.
- Technical Report I: Groundwater.

### Effects catchment values and hydrology

The Project is located within the North Central Catchment Management Authority (CMA) management area and is close in proximity to the Mallee CMA management area.

The selection of the final Project's mine site area (proposed MIN) is such that it is not affected by riverine flooding and there are no major overland flow paths leading directly from the Project area to downstream water environments (including the Murray River, Avoca River and Kerang Wetlands Ramsar site).

Regional catchment inundation modelling determined that Area 1 is located within an overland flow path and has the potential to reduce surface water runoff to depressions to the east. When considering a conservative scenario that the Project would capture all surface water runoff within its boundaries at the same time, the modelled 1% AEP water levels indicated that, following the implementation of mitigation measures, residual surface water impacts would be limited to a minor accumulation of water east of Area 1 and a 12 cm decrease in water depth west of Area 1, where two remnant patches of native vegetation occur.

While the water supply pipeline between Kangaroo Lake and the Project mine site would interact with the Back Creek floodplain, the waterway is ephemeral and only flows during Avoca River flood events. The proposed pump station works are in close proximity to Kangaroo Lake and works would need to ensure no runoff or disturbed water can enter Kangaroo Lake.

No other significant waterways are located in proximity to the Project area, therefore construction and operational activities are not expected to impact riverbeds, riverbanks and existing drainage paths and impacts as a result of erosion and sediment runoff are considered to be unlikely.

A key engineering control is that the Project mine site water storage basins will be designed to capture surface water runoff from 5% AEP events, with any runoff generated above this to be directed to the active mine pit, ensuring that that impacted stormwater runoff could not leave the site and impact downstream water quality and environmental values.

### Effects on water resources and groundwater quality

The primary geological unit and groundwater aquifer underlying the Project is the Loxton Parilla Sands. The inferred groundwater elevation is 64 metres Australian Height Datum (m AHD), or 48 metres below ground level (m bgl) at the proposed mining location and groundwater flows in a north westerly direction with no known surface water connections and/or groundwater dependent ecosystems (GDEs) within 20 km. Groundwater within the Loxton Parilla Sands aquifer is considered saline and no groundwater receptors, such as groundwater users, were identified.

In regards the different phases of the Project:

- All construction activities associated with the Project are above the groundwater table and as such potential impacts, including construction of the underground water pipeline from Kangaroo Lake to mine site, have not been identified.
- During operation and rehabilitation of the Project the key impact is that from the mined pits, which would be above the water table, but are progressively backfilled with tailings.

The principal risk to groundwater is from the seepage coming out of the slurry tailings being deposited back into the mine voids that change the groundwater levels and groundwater quality.

The outcomes of the predictive modelling of tailings deposition show that groundwater mounding will occur and reach a theoretical maximum of over 20 metres immediately beneath the mine at year eight of mining operations, before declining and dissipating following the cessation of mining operations. This impact would be mitigated through the various measures to enhance water recovery of the tailings prior to seepage occurring.

Mounding resulting from tailings deposition would be spatially limited beyond the Project area, with increases to groundwater levels considered negligible.

The water quality of the seepage from the tailings is shown to be of low salinity and non-acidic and includes aluminium, arsenic, cerium, chromium, hexavalent chromium, fluoride, phosphorus, nickel, titanium and vanadium potentially above background concentrations. However, the natural geochemical processes mean any

changes to groundwater quality will be limited to within 2km of the mine site and not impact any sensitive receptors.

Measures to minimise the infiltration of groundwater would be implemented to minimise impacts to the quality and quantity of the groundwater environment. Measures to optimise tailings water recovery (and ultimately reduce infiltration to groundwater) include, thickening during processing, use of flocculants to optimise water separation (coagulation/clumping of clays) and decant on tailings to recover water, solar drying prior to backfill and the inclusion of an embankment underdrain (interception). These measures would be implemented as part of a tailings management plan.

Ongoing groundwater monitoring would be undertaken in accordance with a Groundwater Management Plan (GMP) during operation and rehabilitation of the Project to identify any changes to groundwater chemistry in comparison to pre-existing conditions in the Project area. Where ongoing groundwater monitoring detects any impacts to groundwater quality outside that predicted, a review of the groundwater data and mining practices that have occurred would be undertaken. Further trigger levels and contingency actions would be detailed as part of the Project GMP.

#### 23.2.4 Amenity and environmental quality

*Amenity and environmental quality - To protect the health and wellbeing of residents and local communities, and minimise effects on air quality, noise and the social amenity of the area, having regard to relevant limits, targets or standards.*

EES documents relevant to this evaluation objective include:

- Chapter 11 Noise.
- Chapter 12 Air quality.
- Chapter 17 Radiation.
- Chapter 18 Socio-economics.
- Technical Report F: Noise.
- Technical Report G: Air Quality.
- Technical Report N: Radiation.
- Technical Report O: Social.

##### Effects on amenity and environmental quality from noise

An assessment of noise impacts from the Project has shown that the construction phase of the Project would comply with the requirements of the *Civil construction, building and demolition guide*, (EPA Publication 1834). This is based on construction activities being limited to standard EPA 'normal' day-time hours, with the exception of unavoidable works and low-noise impact works (if required). Predicted construction noise from the main project site is also likely to be below ambient background noise levels at most receptors, with only a single receptor anticipated to receive construction noise at an elevated level. This is, however, unlikely to result in adverse impact.

During the construction of the water pipeline, noise generating activities are likely to be below ambient background noise levels at most receptors, with the exception of two receptors that are predicted to be exposed to noise levels exceeding 75 dBA and nine receptors between 60 dBA and 75 dBA. Since the work is short in duration (anticipated to be only a few days in Mystic Park) and occurs during 'normal' day-time hours, the level of impact is considered reasonable and would be appropriately controlled through the use of appropriate management measures, including prior community consultation and work notifications. Noise from the operational pumping station at Kangaroo Lake is predicted to be below the noise protocol noise limits (EPA Publication 1826) at all receptors, for all time periods.

Construction phase impacts would be managed under a Construction Environment Management Plan (CEMP) and mitigated by limiting the hours of construction to standard daytime hours and ensuring prior community consultation and notification occurs.

During Area 1 mining operations (Year 1 to Year 8) an exceedance (7-10 dBA) of the day-time noise limit was predicted for one receptor. This receptor is not considered a sensitive receptor should the Project proceed as VHM has an agreement in place for the residents to be relocated whilst mine operations impact on the property. Residual impacts are predicted at two sensitive receptors, resulting in moderate exceedances of the night-time noise limit (4-5 dBA). However, the addition of specialist engineered noise suppression kits to haul fleet vehicles, higher levels of noise suppression on the processing plant building, and investigating the restriction of mining activities to below ground pits only during the night will ensure the further reduction of these exceedances.

Area 3 mining operations are anticipated to comply with day, evening and night-time noise limits including low frequency noise.

The operational phase impacts would also be mitigated to eliminate low frequency noise emissions as far as practicable through regular maintenance, engineering controls (high performance silencers and enclosures to power plant building) and administrative controls (limiting certain activities and mining locations to day periods only). This mitigation of noise emissions will be an ongoing duty to prevent the risk of harm to human health and the environment. Under Section 25(1) of the EP Act, the General Environmental Duty (GED) requires that a person or entity who is engaging in an activity that may give rise to risks of harm to human health or the environment, to minimise those risks, so far as reasonably practicable, and this will be a key component to the Project's environmental management framework.

A Noise Management Plan will be developed, which formally documents all of the managerial and engineering measures to be implemented to control noise from the site. The Noise Management Plan ensures that the risk of harm from noise will be minimised so far as reasonably practicable, consistent with the GED, throughout all stages of the project. In developing the Noise Management Plan, consideration shall be given to frequency spectrum as a prescribed factor and specifically the potential risk of problematic low frequency noise.

### Effects on air quality

The air quality impact assessment show that impacts during construction would be predominantly dust generation. The risk of impacts to health and the environment due to dust soiling from construction and closure/rehabilitation of the Project site and the pipeline corridor would be low to negligible. However, it is noted that the existing (non-mining) elevated background concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> result in exceedances of the 24-hour average criteria<sup>1</sup> at all receptors before the Project contribution is considered.

Air quality impacts from the Project would be minimised during construction works for the water pipeline and facilities through dust suppression, restricting vehicle movements and speed on unsealed surfaces and covering loads. Decommissioning activities that generate dust would be managed in a similar manner.

During the operation phase, the proposed mining activities in Area 1 and Area 3 are scheduled to move around the extraction area, mining block by mining block. As such, the extent of potential impacts to air quality beyond the extraction boundary and at nearby sensitive receptors will change as the locations of the emission sources change. Exceedances of the PM<sub>10</sub> and PM<sub>2.5</sub> are predicted at all receptors due to the maximum background concentrations already exceeding the air pollutant assessment criterion before the Project contribution is added. The number of additional exceedances (over and above those of the background concentrations) predicted to be generated by the Project are few (between 0 and 1) depending on receptor and stage of mining.

Wheel generated dust from internal mine haul roads has been identified as one of the primary potential source of dust emissions, therefore preparing and maintaining level and well finished haul road surfaces would be considered a priority. Contingency measures included in the EMF also are reducing the site speed limit for haul trucks during periods of hot and dry weather coupled with increased water truck application.

The power station and Kangaroo Lake water pumping station generator emissions are predicted to result in exceedances of the 1-hour average NO<sub>2</sub> concentration without mitigation beyond the Project boundaries when using diesel fuel. However, with the use of catalytic reductive technology<sup>2</sup> (which is a commitment in the EMF) in the diesel fuel or with the use of LNG, the potential of any unacceptable impacts beyond the Project boundary will be managed.

Irrespective of the fact that risk of harm to sensitive receptors can be managed, best practice dust emission mitigation measures would be employed for all aspects of the Project operations including use of water sprays, misting systems and water trucks and will be an ongoing duty to minimise the risk of harm to human health and the environment. Under Section 25(1) of the EP Act, the GED requires that a person or entity who is engaging in an activity that may give rise to risks of harm to human health or the environment, to minimise those risks, so far as reasonably practicable, and this is a key component to mitigation measures outlined in the Project's environmental management framework (EMF) with regards air quality.

### Effects from radiation

The existing radiological environment was assessed by monitoring that commenced in 2018. The radiological environment is consistent with general Australian and world radiological characteristics in terms of gamma dose rates.

---

<sup>1</sup> Refer to EPA Publication 1961 for definition

<sup>2</sup> Designed to reduce NO<sub>x</sub> emissions



The radiation impacts as a result of the Project were assessed as follows:

- The conservative maximum dose to humans as a result of the Project is 0.19 mSv/y which is below the member of the public dose limit of 1 mSv/y.
- The radiological impact to flora and fauna, as assessed using the ERICA Tool is below the screening level of 10 µGy/h with the highest being 0.044 µGy/h for lichens and bryophytes.
- The radiological impact to grain crops is assessed to be minimal as the project originated soil radionuclide increments are within the error bands for existing soil radionuclide levels, and the calculated project increment radionuclide activity concentration is one to two orders of magnitude less than current calculated crop radionuclide activity concentrations.
- The radiological impact to groundwater is assessed to be low due to the inert nature of the tailings and also because the radionuclide concentration of tailings would be less than that of the ore.
- The conservative maximum dose to members of the public as a result of the interim storage of product material at the Ultima intermodal facility is 0.80 mSv/y for Phase 1 of production, reducing to a maximum of 0.12 mSv/y for Phases 1a and 2 of production. The conservative maximum dose to members of the public during the transportation of product material by train is 0.006 mSv/y. All doses are below the member of the public dose limit of 1 mSv/y.

The assessment has shown that the construction, operation and decommissioning phases of the Project can be managed such that the objective of minimising adverse effects resulting from radiation can be met.

The residual potential radiological effects due to the Project will be further avoided or minimised and managed to required standards through the Radiation Management Plans and by routine monitoring to identify any exceedances with procedures to minimise impact.

The assessment methods are based on the internationally and Australian recognised recommendations and standards:

- International Atomic Energy Agency (IAEA).
- International Commission on Radiological Protection (ICRP).
- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

### 23.2.5 Social, land use and infrastructure

Social, land use and infrastructure – *To minimise potential adverse social and land use effects, including on agriculture and transport infrastructure.*

EES documents relevant to this evaluation objective include:

Chapter 10 Traffic and transport.

Chapter 15 Land use and Planning.

Chapter 16 Agriculture and soils.

Chapter 18 Socio-economics.

Technical Report E: Traffic and transport.

Technical Report K: Land use Planning.

Technical Report L: Agriculture Impact Assessment.

Technical Report O: Social.

#### Effects from traffic

The local land use is predominantly agricultural and the area surrounding the Project consists of highways, such as the Murray Valley Highway and Calder Highway, sealed main roads such as Donald-Swan Hill Road and local gravel roads, such as Shepherd Road. Given the rural setting of the Project, existing traffic volumes are relatively low on local roads.

The principal component of the Project designed to avoid and minimise impacts on traffic is the transport of product to the Port of Melbourne via rail from the nearby rail intermodal at Ultima. The transport of product to Ultima from the site would be limited during daytime hours only. The impacts to both public safety and transport infrastructure have been considered on this basis, with full road transport of product to Port of Melbourne considered as an alternative if the rail line is non-operational for any reason(s).

Construction activities would generate additional light and heavy traffic, requiring routes to be assessed for their safety and suitability, upgrades to the local road network and the short- and long-term closure of traffic lanes and roads. It was determined that the additional traffic generated during construction would be well within the existing capacity of the local road network, causing negligible impacts. The traffic routes assessed for light and heavy vehicles during construction would be appropriate, however no roads along the route are over-dimensional approved and as such, approval would be required to operate this vehicle class.

Subject to detailed design and stakeholder input, upgrades have been proposed where Donald-Swan Hill Road intersects Bennett Road and Mystic Park-Meatian Road, as well as at a number of local access roads. The proposed upgrades would ensure that these roads and intersections can safely accommodate heavy and light construction vehicles.

It is proposed (as outlined in the EMF) that ongoing stakeholder engagement, developing and implementing a Traffic Management Plan (TMP) and site access strategy and undertaking heavy transport route assessments would ensure that residual impacts to public safety and transport infrastructure are negligible. These measures would also ensure potential impacts are minimised during the anticipated road closures at Bennett Road and Thompson Road. Bennett Road and Thompson Road would be closed during Project construction and operation, with segments proposed to be closed for up to approximately 21 years prior to reinstatement.

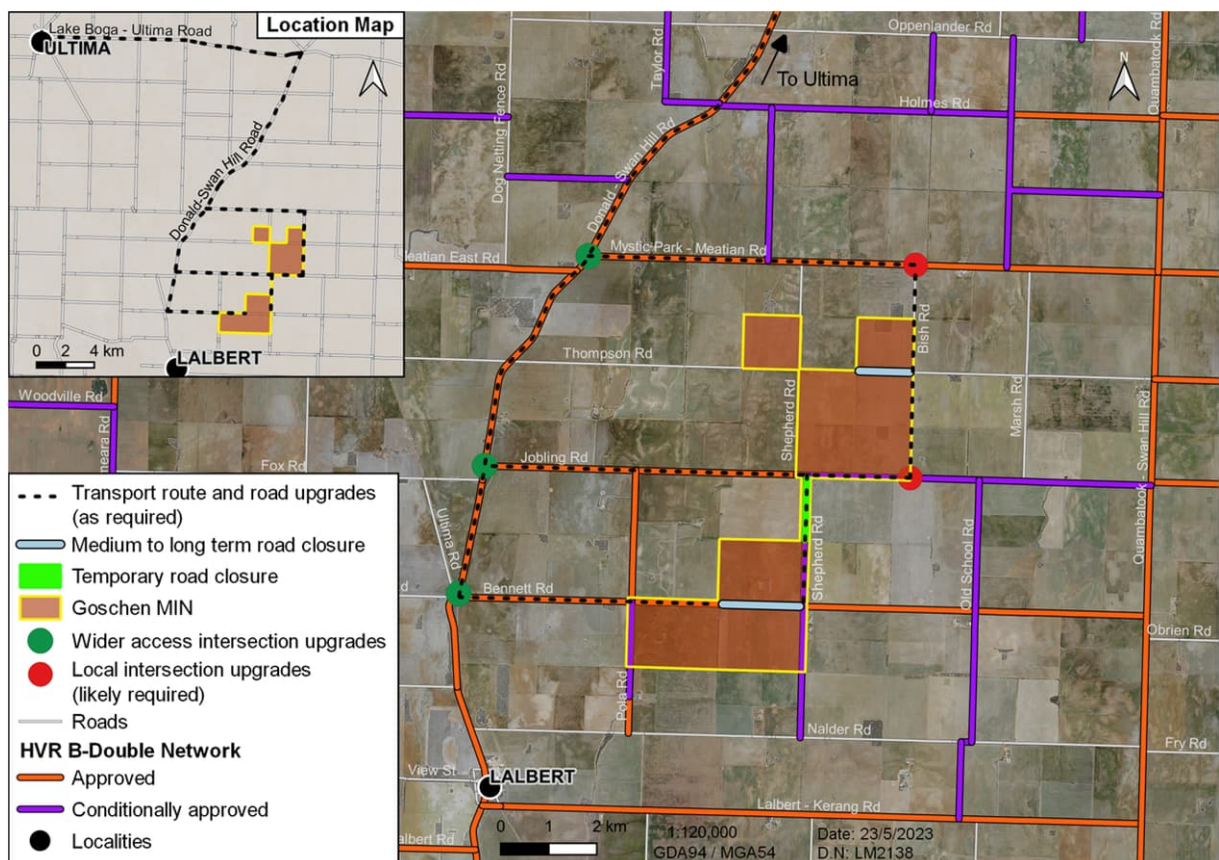


Figure 23-3 Proposed project road closures and intersection upgrades

Similar to the construction phase of the Project, there would be negligible impact to the existing road capacity and public safety during its operation. Traffic routes and upgrades to the local road network would also be similar during operations, however this phase of the Project would need to consider the transport of product between the Project and the Ultima intermodal rail terminal, 47 km from the Project. Any residual impacts associated with operational traffic routes would be limited to minor delays experienced by local road users due to potential lowered speed limits. This would last for the duration of operation. The use of A-double vehicles, proposed to transport product from site to the Ultima terminal, would require approval from Department of Transport (DoT) to travel along its proposed route. Necessary upgrades to local access roads would also be undertaken so that they are safe and suitable for A-double transportation. This would be managed through mitigation measures, ensuring impacts to public safety, transport infrastructure and operations are low.

### Effects on land use

Land use refers to the economic and cultural activities (for example, agricultural, residential, industrial, mining and recreational uses) that are undertaken at a given place. The Project and associated study areas (Mining

Study Area, Water Pipeline Study Area and Traffic Study Area) extend across the municipality boundaries of the Gannawarra Shire Council and Swan Hill Rural City Council. The features of the landscape provide a strong foundation for farming, nature-based tourism and emerging industries such as mining. Land use immediately surrounding the Project typically comprises broadacre farming, consisting of dryland cropping and the production of wheat, barley, pulses, legumes, sheep and lambs. Closer towards Kangaroo Lake, land is situated within the Goulburn Murray Irrigation District. Kangaroo Lake itself is one of the largest and deepest permanent freshwater lakes supplied by the Torrumbarry Irrigation system.

During construction, land would be temporarily used in a manner that may interfere to some degree with established land management, land use practices and planning policies that apply to land within the Mining Study Area, Water Pipeline Study Area and Transport Study Area.

Proposed construction activities would result in:

- Temporary land use change that is inconsistent with land use policy and/or conflict with established land uses.
- The permanent loss of native vegetation within road reserves, contrary to established land use policies.
- Temporary impacts to land access and access routes of surrounding land uses as a result of increased construction traffic on surrounding roads and temporary road closures to facilitate road infrastructure upgrades.

It is also recognised that temporary amenity impacts may conflict with existing and reasonably foreseeable land use and policy within the Mining Study Area, Water Pipeline Study Area and Traffic Study Area.

During operation, potential land use impacts include:

- A cumulative loss of agricultural land in the region.
- Impacts to landscape dominated by agricultural and farming land uses and more broadly, internationally recognised Ramsar wetlands and associated high-value natural features.
- Access issues resulting from increased traffic impacting the condition of the local road network and creating congestion and delays.
- Changes to flood patterns as a result of pump station infrastructure displacing surface water during episodes of flooding.
- An increased risk of fire associated with operation of the mine and pump station infrastructure.
- Amenity impacts that are inconsistent with existing or reasonably foreseeable land use and policy.

During decommissioning and rehabilitation, aspects of the Project that have been identified as potential land use impacts include:

- Amenity impacts including visual, noise, social, dust and vibration, that have impacts to surrounding agricultural operations and sensitive receptors.

Land use impacts will be addressed by requirements of the EMF, which would implement a variety of regulatory documents and management plans including (but not limited to) a Work Plan, Construction Environment Management Plan, Transport Management Plan, Bushfire Management Plan, and Rehabilitation Environment Management Plan. It is expected that any risks to land use impacts would be further managed through the provisions set out in the Planning scheme Amendment documentation.

### Effects on agriculture

The Project will temporarily replace a relatively small portion of existing agricultural use for up to 25 years and the majority for less than 5 years with progressive rehabilitation. The Project also has the potential to reduce the local employment pool which may impact agricultural productivity in the community. However, the Project is estimated to sustain net employment gains of around 480 full time equivalent employees per annum.

Regarding agricultural revenue, the existing potential gross margin from growing winter cereal crops in the study area was calculated at up to \$340,170 per annum (or \$481,651 with a 25% assumed yield increase for the Cannie Ridge) and with a variable cost of \$624,138. The potential revenue represents 0.12% of the \$264 million that regional agricultural production contributes to the Shire. Given the Project area has the potential to generate 0.12% of the agricultural production value within the Shire and comprises 0.4% of the total land area, thus it is concluded impact of the Project to agricultural production within the Shire would be minimal. Additionally, it is estimated that the Project would generate \$2 billion in additional gross regional product for the Loddon-Mallee region, which equates to an average output of \$206 million per annum.

To allow mining in Area 1 and 3 parts of Bennett Road would require road diversions and Thompson Road is expected to be closed for up to 12 years during construction and operation of the Project, having some impact on

local agricultural activity. As part of the Project, a traffic management plan (TMP) would be prepared and implemented to ensure impacts on the local road network are minimised and managed. As a result, residual impacts on agricultural productivity from road closures and increased vehicle movements are expected to be minor.

Once the water supply pipeline is constructed, water would be sourced from Goulburn Murray Water via the open water market with no constraints put on existing or future agricultural availability. The Project would purchase or lease water licences for the maximum required 4.5 gigalitres per annum, which would represent less than 1% of available surface water licences in the Goulburn Murray Water system. The construction of the water supply pipeline would not be expected to impact agricultural productivity in the area and may provide the local area with opportunities to source irrigation water once the Project ceases operation.

### Effects on soils

To allow the construction of processing plant area and extraction of ore from within Area 1 and 3 soil and sub-soil stripping would occur as part of site establishment and progressively during Project operation. Stripping and stockpiling activities have the potential to impact soil and thus ultimately impact the agricultural productivity of the land post rehabilitation.

To mitigate impacts to soils, the following would be implemented. Prior to stripping disturbance areas, the soil surface would have 5 to 10 tonnes per hectare of natural gypsum applied. This would help facilitate the mixing of soil and gypsum and prevent the exposure of dispersive soils, resulting in a more stable stockpile with an increased potential for agricultural use post rehabilitation. During the construction of the water pipeline, the trench would be progressively backfilled to minimise the duration of time that the more dispersive subsoil is exposed to rainfall events.

To avoid the degradation of soils during stockpiling, soil stripping during excessively wet or dry conditions would be avoided, less aggressive soil handling techniques would be adopted to scrape, or grade and push soils into windrows and soils removed would be placed into designated stockpile areas. The implementation of additional management and mitigation strategies, such as treating stockpile surfaces with ameliorants and ensuring a maximum stockpile height of 2 m would ensure impacts are minimised.

The exposure of dispersive soils during Project operation would also be managed by treatment with gypsum and ameliorants. Cover crops would be seeded to provide stockpiles with appropriate protection during rainfall events and to provide competition for weed species. Weed control would also be undertaken in areas yet to be mined to prevent seed set prior to topsoil stripping. Where timing may not be conducive to cover crop germination, appropriate erosion and sediment control measures would be applied, as per a site specific Erosion & Sediment Control Plan, to be developed ahead of the Project's construction and operation.

### Social and community effects

The Project is predicted to generate notable benefits for the Region, in the form of employment creation and wealth generation and the extraction and utilisation of a productive resource which is in demand. Furthermore, the employment created by the Project would assist in attracting and retaining young adults to the region and in doing so, contribute to the viability of community services such as schools and childcare, and inject energy and enthusiasm into activities such as community sports, the arts and alike.

In addition, the Project would attract new people to the region and this influx has the potential to place strain on existing housing markets, community facilities and services, and social dynamics (social cohesion), particularly in smaller townships.

A Workforce Accommodation Strategy that has been developed for the Project would be further development and implemented to ensure that the influx of workers into established communities does not exceed each township's capacity to absorb new residents without undue consequences. The Workforce Accommodation Strategy would be further developed in consultation with relevant stakeholders, including local councils, prior to commencement of construction. The strategy, as a minimum, would estimate the housing needs of the Project workforce by location and accommodation type (permanent and temporary), schedule housing under the control of VHM and would estimate permanent and temporary housing available on the open market by location, and agreed maximum percentage to be taken up by the mine workforce over the life of the Project, with a view to facilitating permanent settlement within the region among the majority of imported operational workers.

It is acknowledged that the Project would alter the character and amenity of the rural area in close proximity to the mining areas. While all nearby residences would remain habitable, and no risk of harm to members of the public, changes to amenity in regards visual and noise would occur. Such changes have the potential to result in a sense of powerlessness among those who are displaced, and perceived inequities between those who benefit financially from the project and those who are negatively affected by the Project. Notwithstanding, the proponent has negotiated land acquisition contracts for the directly affected farm properties and proposes to support nearby



residents via a Neighbour Agreement. This approach would aim to mitigate negative impacts for displaced rural landholders and nearby residents.

### 23.2.6 Cultural heritage

Cultural heritage – *To avoid or minimise adverse effects on Aboriginal and historic cultural heritage values.*

EES documents relevant to this evaluation objective include:

- Chapter 08 Cultural Heritage.
- Technical Report C: Cultural Heritage.

#### Effects on Aboriginal cultural heritage

The Wemba Wamba Aboriginal Corporation is recognised as Traditional Owners for the Project area and were consulted during the process of the Aboriginal cultural heritage impact assessment. The Project is in the southern Murray Basin at the boundary of the Riverine plain and Mallee Regions of Victoria.

The archaeological survey undertaken for the Project identified a low likelihood of subsurface Aboriginal cultural heritage. The entirety of the study area has undergone continuous ploughing activities, including the removal of the lower calcareous layer which has revealed the limestone/ironstone nodules to the surface. It is therefore likely the archaeological deposits have been disrupted and would have been visible on the surface especially in consideration of the excellent visibility. During construction and operation, there is the potential that ground disturbance works would result in partial or complete disturbance of previously unidentified and unregistered Aboriginal cultural heritage, resulting in loss of heritage values.

Mitigation measures including the preparation of an Aboriginal Cultural Heritage Management Plan (CHMP) would reduce potential impacts to Cultural Heritage. To manage intercepting any unknown heritage resources, an unexpected finds protocol would also be integrated into the Project's CEMP.

#### Effects on non-Aboriginal cultural heritage

No historical artefacts, historical archaeological deposits or standing structures of historical significance were identified during the historical survey, with assessment concluding that there is a low likelihood of historical cultural heritage in the Project area. A single historical site H7626-0004 (Beauchamp State School No. 3560 and Memorial Hall) is located 150 m north of the study area. The site is listed on the Victorian Heritage Inventory (VHI) and within a privately owned paddock outside of the Project area. A review of the ground surface immediately adjacent to the VHI site did not identify any artefacts, or structure. Historical cultural heritage values are therefore unlikely to be impacted by the Project. Contingency measures would be implemented to reduce harm to unknown historical cultural heritage values that may be present within the study area.

To manage intercepting any unknown heritage resources, an unexpected finds protocol would be integrated into the Project's CEMP as a contingency measure, as well as an unexpected archaeology finds protocol in the Project's Environment Plans.

### 23.2.7 Landscape and Visual

Landscape and visual – *To minimise adverse effects on landscape and visual amenity associated with the environs of the project site.*

EES documents relevant to this evaluation objective include:

- Chapter 09 Landscape and Visual.
- Technical Report D: Landscape and visual.

The Project area is located within a highly modified agricultural setting. The landscape typical of the region is predominantly cleared for broadacre croplands, consistent to its historical land use as wheat growing. Under the Gannawarra Planning Scheme, land within and around the study area is zoned Farming Zone. Rural dwellings and agricultural structures and sheds intersperse the landscape. The rural dwellings are generally surrounded by vegetation for visual screening and wind break planting.



Figure 23-4 Bennett Road, Lalbert

Construction and operation of the Project would result in minor changes to the landscape, which predominately consists of flat cropland with roadsides and dwellings bounded by vegetation. The greatest potential for visual impact exists in closer proximity to the Project area where there is limited existing vegetation of a sufficient scale to screen or fragment views of the Project and processing facility. Despite this, the assessment of visual impacts from a number of different locations indicated that potential impacts were generally considered to be low prior to the introduction of mitigation measures. Mitigation measures such as retaining vegetation where possible and planting vegetation along the western perimeter of the processing facility boundary would assist in screening views and reduce potential visual impacts.

There is the potential for moderate visual impacts at one dwelling approximately 2 km south of the Project site (dwelling R0012). Additional screening could be provided in the immediate foreground of this dwelling to completely screen views of the Project. Consultation with the landowner would be required prior to implementing any additional screening.

There would be minor impacts to nearby dwellings from light sources at the Project site, however these impacts would be minimised through careful design and installation. This would include, but is not limited to, only using lighting for areas which require it, considering the use of sensors to activate lighting and timers to switch off lighting and directing light downwards to eliminate light spill or glow effect.

### 23.3 Environmental Management Framework

The EES scoping requirements outline the requirements for an EMF to be prepared for the Project. The EMF is a framework for addressing the environmental requirements for the Project and is built from the requirements of each of the statutory approvals required for the Project. It lists the mitigation measures proposed to be implemented to manage any potential adverse effects identified in the supporting technical specialist studies.

In addition, the Project has been prepared to meet the obligations under the EP Act by requiring certain steps to be taken to eliminate or reduce risks. The Project also establishes a proactive approach to preventing and minimising risks of harm to human health and the environment. Importantly, these obligations are ongoing and form a key role in the EMF by seeking to ensure controls are continually evaluated and staff are adequately trained in compliance with the GED. These obligations continue during all project phases, informed by a suite of management plans, mitigation measures, and monitoring requirements forming part of the EMF.

The mitigation measures set out in the EMF are the environmental commitments and would be given effect through the relevant statutory approvals. These commitments would also be included in management plans such as the Work Plan, CHMP and other subordinate management plans.

The EMF demonstrates that there are no gaps in the required statutory approvals to ensure accountability for implementing all the environmental commitments. The mitigation measures would inform the conditions administered by relevant statutory authorities, and the proponent and its contractors would be responsible for their implementation. The Project would be delivered in accordance with these environmental commitments, including stakeholder and community engagement, project approvals, design, construction and operation.

VHM would enter into contracts with each contractor that set out the contractual obligations for the development and delivery of the Project works, including requirements to adhere to specified mitigation measures. Each of the Project contracts would require contractors to comply with legislation, the conditions of key approvals and to obtain other approvals, licences, permits or consents that may be required. The EMF outlines the procedures for community consultation, stakeholder engagement and communications during the construction, operation and decommissioning of the Project.

### 23.4 Rehabilitation and Closure

A draft Rehabilitation Plan has been prepared to inform the preparation of the EES and addresses the scoping requirements related to mine rehabilitation. Specifically, it has been prepared to outline the key rehabilitation

objectives, methodologies and goals to be achieved by VHM in achieving the proposed final land use that is safe, stable and sustainable. It aims to be in line with the *Mineral Resources (Sustainable Development) Act 1990* and *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019*. The draft Rehabilitation Plan has been prepared with reference to the guideline *Preparation of Rehabilitation Plans: Guideline for Mining & Prospecting Projects* and largely follows the structure of the guideline. The draft Rehabilitation Plan would be updated prior to operations commencing to include additional details, such as any relevant conditions of approval following the EES.

The closure and rehabilitation for the Project is to achieve a post-mining land use suitable for future ongoing agriculture. It is proposed that the ancillary components outside the mine site will be retained for ongoing community and/or landowner use.

Four rehabilitation domains were identified to assist with the rehabilitation methodology and based on similar mine-related impacts and subsequent rehabilitation requirements: 1) processing and infrastructure areas, 2) active mining areas, 3) stockpiles and 4) services, and transport corridors.

Progressive rehabilitation would be undertaken throughout the life of the Project, occurring as soon as the first pit cells have been mined and tailings deposition completed.

The final landform would include levels and local relief similar to current conditions, avoiding sharp relief between the existing and rehabilitated landscapes. To achieve these desired outcomes, the approach to rehabilitation includes measures undertaken during decommissioning, soil stripping and handling, erosion control, revegetation and weed and pest management, and includes monitoring, record keeping and quality assurance.

Rehabilitation objectives and completion criteria were also developed to ensure that the overall objective for rehabilitation, to restore land disturbed by mining to an equivalent (or better) agricultural land capability to enable a variety of productive agricultural uses, is achieved.

The closure criteria include the removal of all infrastructure and underground services, the backfilling of mine cells to final levels within +/- 0.5 m of existing (pre-disturbance) levels when averaged across the mining blocks and the restoration of the topsoil and subsoil profile, comprising at least 20cm of topsoil and 80 cm of clayey subsoil material.

In response to the EES evaluation objective, rehabilitation of the Project has considered changes in topography, groundwater conditions, drainage and vegetation cover during mining operations and at the end of the mine life, and the mine rehabilitation plan has been informed by and has adopted recommendations from specialist studies within the EES.